Task 5.1. Port to Rail/Highway Bottleneck Management Analysis

Case Study: Intermodal Railway Transport Between The Port Of Ancona And Central European Logistics Hubs
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1. Introduction

This Report focuses on an in-depth analysis that has been carried out in the framework of the research activity launched through the INTERMODADRIA Project. In particular, it is envisaged in WP 3 on “Freight and Routes Analysis”, tasks 3.1. and 3.2. on “Origin/Destination Container and Ferry Traffics”, dealing with current and potential traffic in the Adriatic area. This analysis builds on a Case Study carried out by the Ancona Port Authority on possible future development prospects for Ro-Ro and Container Traffic in the Port of Ancona, with a view to assessing the potential demand for intermodal transport services to Central and Northern Europe, for the two aforesaid traffic segments. Among other initiatives considered, was a feasibility study for combined transport from Greece to the Port of Ancona and Bavaria, carried out within Case Study n° 2 AN.I.C.E. (Ancona Intermodal Connections for Europe), which was performed in the frame of this Task (WP5, Task 5.1).

Last, this Report also builds on the output of the Marche Region Logistics Centre Observatory on the railway link from and to the Port of Ancona. Such output was included in the 2010 Report on “The Port of Ancona And Rail-Sea Transport Development Prospects”, and in the 2012 Report on “Intermodal Transport: From Infrastructure To Service Development”.

By building on the above-mentioned wide variety of information, this Study aims at:

1. Carrying out an in-depth analysis of the critical issues/potential of the so-called “last mile” railway transport, that is, all technical, organisational, and structural aspects that often make entering and exiting a port difficult or even impossible for trains, on the one hand; and at making an analysis of the potential of the railway network linking the port to the main North European logistics hubs, in terms of modules (length of transportable trains) and gauge (maximum size of wagons), on the other hand;

2. Assessing both the feasibility of intermodal transport services and the competitive positioning of the Port of Ancona against that of all other intermodal transport hubs on the Adriatic coast (first of all the Ports of Ravenna and Bari, and then those of Venice and Trieste), by building on the above-mentioned analyses;

3. Comparing the draft design for the organisation of the Port of Ancona’s intermodal transport services with Trieste’s, which are similar and have been operational for many years now.

The aforesaid in-depth analyses and assessments shall start from the assessment of the Adriatic coast’s (Trieste, Venice, Ravenna, Ancona, Bari) competitive advantage in terms of infrastructural and logistical access, existing infrastructure, and “last mile” railway services; then – by building on the existing studies mentioned above, including both the AN.I.C.E Case Study and the PLM Observatory’s output – the technical and market conditions required to launch intermodal railway transport services shall be outlined, by:
The project is co-funded by the European Union, Instrument for Pre-Accession Assistance

- Assessing the technical capacity of the railway infrastructure (within the port and the links to the railway backbones towards the Alpine Passes);
- Performing and organisational analysis of the railway service in terms of actors involved;
- Estimating the shunting costs for the wagons to enter and exit the Port.

2. Accessibility As A Competitive Advantage

Accessibility is a crucial element of the competitive advantage any terror may boast when compared with direct competitors. The dynamic nature of accessibility makes it easily "obsolete", but meanwhile always susceptible of improvement. Here, however, we intend to picture the existing infrastructure and, in particular, the degree of accessibility of such infrastructure. Therefore, an analysis shall be performed of each Port’s railway and road links, and of the availability around such ports of any logistic centre to rely upon for any intermodal transport operation or triangular logistical activity, which may include any step between storage and initial processing.

From a first analysis, it can be inferred that Adriatic Ports show two levels of accessibility. The Ports of Trieste and Venice are located in an area that is rich in 1st-level logistic centres, with good connections to such hubs. Conversely, the Ports of Ravenna, Ancona, and Bari – besides being located in areas where there are less logistic centres – also feature less viable and functional links and connections. The infrastructure being equal (similar range), the accessibility index varies. As a matter of fact, it is above average for the Ports of Trieste and Venice, while it is average or below average for the three other ports, which means that the existence of infrastructure per se does not ensure good accessibility\(^1\) (Fig. 1).

The Port of Ancona shows the worst road access conditions. Actually, it does not feature a direct link to the highway system (this gap should be bridged through the construction of the West junction and exit), which has a significant impact in terms of heavy goods vehicle (HGV) traffic passing through the town, thus making the port unpopular with the local communities, and slowing down HGV traffic from and to the port. The ports of Trieste and Venice, instead, are directly linked to the highway system through junctions that lead HGV traffic outside the urban areas. In Trieste, the elevated road serving as a junction goes through the industrial park, thus collecting additional traffic from the local companies. The Port of Ravenna and Bari do not feature ideal road access; however, they are both served by high-speed bypasses (Tab. 1).

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\(^1\) The Accessibility Index is a measurement tool developed by ISFORT, allowing measuring the dynamic interactions between the production activities and the logistics network, by measuring the distances and relations between the infrastructural nodes allowing access to the transport systems, and the concentration of business operators utilising such systems (measuring the hierarchically defined actual “availability”, and not the mere existence of infrastructure.)
The project is co-funded by the European Union, Instrument for Pre-Accession Assistance

**Fig. 1 – Accessibility Index and Existing Infrastructure**

![Accessibility Index and Existing Infrastructure](image)

*Source: Isfort 2012*

As to railway access – except for the Port of Bari – all Ports are connected to the national railway network. However, the infrastructure levels and “last mile” services vary, depending on the Port. As a matter of fact, Trieste and Ravenna feature consolidated sea-rail intermodal traffic, relying on a network of intermodal logistics hubs with which they exchange measured and regular unitised flows of goods (Tab. 1). Nevertheless, it is worth reminding that the railway link between the Port of Ravenna and the Adriatic railway backbone passes through Ravenna’s urban area, with the intersections with the local road system being regulated by a series of level crossings. Although they feature the infrastructure required for railway transport, intermodal transport in the Ports of Venice and Ancona is still in a stalemate.

Over the last few years, the Port of Venice has been strengthened through the construction of seven new railway tracks – three of which are electrified – plus one serving the docking area, as well as two sidings where the locomotives are parked. This new layout would allow handling up to fifty 700 m-long trains per day.

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2 The accessibility analysis carried out by ISFORT does not merely record the presence of the logistics node, but also measures the quality of the links between the territory and the node/hub (port, airport, logistics centre, highway tollgate), as well as the conditions of access to existing node-to-node transport services.
<table>
<thead>
<tr>
<th>Accessibility of Adriatic Ports</th>
<th>Trieste</th>
<th>Venice</th>
<th>Ravenna</th>
<th>Ancona</th>
<th>Bari</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Road Accessibility</strong></td>
<td>Direct link to the highway system through elevated junction from the Port to the external road system, bypassing the centre</td>
<td>Direct link (through “Ponte della Libertà” bridge) to Highways A4 and A27, Main Road SS Triestina (SS14), and Main Road SS Romea (SS309-SS5)</td>
<td>Ravenna’s bypass links the Port to Highway A14, to Main Road SS16 Adriatica, to Highway E45 Ravena-Orte, and to Main Road E55.</td>
<td>The Port does not feature any direct link to Highway A14, as the formalities and paperwork for the beginning of the works have not been completed, yet.</td>
<td>Ling to Highway A14 through the Town’s ring road. Main Road SS 16bis links the Port of Brindisi and the other coastal towns, including the Port of Porto di Barletta.</td>
</tr>
<tr>
<td><strong>Railway Accessibility</strong></td>
<td>Internal railway system linked to the national network. Marshalling and/or train formation services directly at terminals</td>
<td>Internal railway system (Marghera station) linked to the national network (Venezia-Mestre station). Trucks in the terminals. Possible stay/transit at Marghera station after loading/unloading.</td>
<td>The main port terminals are linked to the railway network, and pass through the urban area</td>
<td>Internal railway system linked to the national network (Ancona Centrale FS-Marche et dock). Tracks at the wharf.</td>
<td>At present, the Port does not feature any railway link to the railway station. The tracks that were in the port area have mostly been removed or covered with earth.</td>
</tr>
<tr>
<td><strong>Functional links to external logistics centres (developed /to be developed)</strong></td>
<td>Consolidated links to:</td>
<td>When the railway is fully functioning, 3 trains/week are envisaged to Padua and 1 to Verona. Padua Logistics Centre – featuring 2 terminals (16 tracks; max train length 650m) linked to network through internal train station. There are 21 reception sidings, located 500 m away from the loading/unloading ones. Verona’s Logistics Centre – featuring 3 terminals; for a total of 300 thousand sq.m., linked to the network through an internal railway station 600-800 m away from the terminals. 31 600 m-long reception sidings.</td>
<td>Melzo Terminal – Private facility owned by Contship Italia (through subsidiary company Sogemar) located on the Milan-Treviglio-Brescia railway line</td>
<td>Potential partnership with Jesi Logistics Centre (25 km from the Port). 110,000 sq. M. container terminal, linked to the railway (500 m static capacity); Gap: need to send trains to Falconara in the form of integral trains (additional costs between 1,600 and 3,200 euros per train).</td>
<td>Potential partnership with the Puglia regional Logistics Centre to develop intermodal transport (5 km away from the Port). Internal railway Terminal (four 580 m-tracks) linked to the network through Bari-Lamasinata railway station 57,400 sq. m. warehouses for dry products 9,000 sq. m. controlled temperature area and 11,000 sq. m. for frozen goods.</td>
</tr>
<tr>
<td><strong>Significance of Sea-Rail Intermodal Transport</strong></td>
<td>332 inbound and outbound trains per month</td>
<td>n.a.</td>
<td>Structured traffic equivalent to 12% of transit goods</td>
<td>Non structured and atypical traffic (not fully intermodal transport), consisting, in the past, in the handling of coal for Enel’s Bastardo Power Plant and the handling of containers for Evergreen, to replace feeder services on the Ancona-Taranto line (presently suspended)). In 2013, 378 trains were recorded, mainly transporting solid bulk goods.</td>
<td>-</td>
</tr>
</tbody>
</table>

*Source: Processed by Isfort, 2014*
The new infrastructure would link the Port of Venice to the two main regional logistics hubs located in Padua and Verona (when fully operational, three trains/week to Padua and one to Verona are envisaged). Through them, the port would be connected to the Northern and Eastern European markets, with the ultimate goal of offering businesses and shipping companies 720 TEU freight forwarding capacity per week (that is, 12,000 tons of goods). As to Ancona, freight trains have been diminishing over the years, and they have been mainly transporting coal to Enel’s Bastardo Power Plant located in Umbria. In the past, freight trains also transported containers on behalf of Evergreen, to and from the Port of Taranto, thus replacing the feeding service that had been suspended and that, later on, resumed.

In essence – as it has been pointed out in the 2012 ISTAO research study\(^3\) - as shipping and unloading to not take place in the Port of Ancona, this is not real intermodal transport. Lastly, the Port of Bari does not feature an internal railway system, yet. The tracks that were in the port in the past have been removed or covered with earth, not to hinder port operations.

From the analysis carried out, it can be inferred that significant relations exist only between the Ports of Trieste and, to some extent, the Port of Ravenna and the relevant logistics centres. Trieste mainly relies on them for the formation of trains heading to Central and Eastern Europe, while the Port of Ravenna is linked to Melzo’s terminal because it is used by Contship Italia Group, which handles Ravenna’s container traffic. A partnership is potentially possible between the Port of Ancona and Jesi’s Logistics Centre. It has not been established, yet, although the two entities could integrate their traffic (Jesi’s Logistics Centre could potentially serve Central Italy, including the macro area of the Marche-Abruzzo-Umbria Regions) so to create economies of scale in the train formation field. However, there are two critical issues that need to be quickly solved. First, the trains are sent from the Logistics Centre to the Falconara railway station in the form of integral trains, with additional costs ranging between 1,600 and 3,200 Euros per train compared to ordinary transport\(^4\); second, there is a bottleneck consisting of Cattolica’s tunnel, which has been a top priority for years to launch intermodal transport but, so far, the problem has not been solved (according to the national railway company – RFI – the problem should be solved in 2015.)

It is worth highlighting that inbound and outbound railway services from the Ports of Trieste and Ravenna have been promoted by a series of regional laws – which will be analysed in deeper detail in the next paragraphs – aiming at covering the cost difference between all-road transport and road-rail intermodal transport.

\(^{3}\) “Intermodalità: dalle infrastrutture allo sviluppo dei servizi”, 2012 (“Intermodal Transport: from infrastructure to service development”)

\(^{4}\) Idem
3. Ports And “Last-Mile” Railway Transport

In Italy, in 2012, intermodal transport accounted for some 55% of the overall railway freight traffic. In particular, looking at the traffic handled by major field players, 49.0 million tons of goods were handled in 2012, 69% of which in containers, 20% in accompanied vehicles, and 11% in unaccompanied trailers.

Between 2010 and 2012, intermodal transport increased from 35.0 million tons in 2010 to 49.0 million tons in 2012. The most significant percentage increase was recorded for accompanied semi-trailers, which increased by 115%, while in terms of absolute value, the container and swap body segment showed the highest increase, which amounted to 10 million tons in just two years (+ 42.7%). Instead, the 22.9% decrease in accompanied vehicle traffic was probably due to the fact that some businesses have abandoned traditional logistics to adopt more advanced freight transport schemes. (Tab. 1)

Tab. 1 – Intermodal Transport in Italy

<table>
<thead>
<tr>
<th>Intermodal Transport Units</th>
<th>2010</th>
<th>2011</th>
<th>2012</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tons</td>
<td>35,447,076</td>
<td>7,122,556</td>
<td>9,750,127</td>
</tr>
<tr>
<td>Tons./km</td>
<td>50,489,762</td>
<td>9,015,856</td>
<td>9,682,513</td>
</tr>
<tr>
<td>Average distance covered</td>
<td>200,9</td>
<td>193,1</td>
<td>197,5</td>
</tr>
<tr>
<td>Total Transported Goods</td>
<td>84,434,666</td>
<td>18,616,131</td>
<td>20,244,422</td>
</tr>
<tr>
<td>Intermodal Transport to total Transported Goods Ratio (%val.)</td>
<td>41.98</td>
<td>38.26</td>
<td>47.82</td>
</tr>
</tbody>
</table>

Source: Istat, Railway Transport, 2013

Nevertheless, intermodal transport – and more generally speaking railway freight transport – remains a minor transportation mode. And this includes sea-rail intermodal transport.

Italian Ports are the Country’s main import-export channels – as a matter of fact, 57% of all imports and 62% of exports transit through the port network. In 2012, Italian ports have handled a total of 459 million tons of goods, and only a very small percentage of them relied on sea-rail intermodal transport independently operated by Ports or with the support of external entities such as Logistics Centres (La Spezia 25%; Trieste, Genoa, Leghorn and Ravenna 12%; these are the Ports recording higher sea-rail intermodal transport traffic shares). According to the yearly survey of the Association of Logistics Hubs (Unione degli
Interporti Riuniti - UIR), in 2011, these ports have handled more than 1.7 million TEUs, with only a bit less than 1 million UTIs being transported via rail (container, swap bodies and semi-trailers), besides some 100 thousand traditional railway transport wagons (Tab. 2).

Tab. 2 – Railway Traffic In Major Italian Ports. 2011

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<tr>
<td>Handled ITUs</td>
<td>971,852</td>
</tr>
<tr>
<td>TEU equivalent</td>
<td>31,739,625</td>
</tr>
<tr>
<td>Traditional Wagons</td>
<td>105,847</td>
</tr>
<tr>
<td>Weekly Intermodal Train Pairs</td>
<td>551</td>
</tr>
<tr>
<td>Yearly Intermodal Train Pairs</td>
<td>427,550</td>
</tr>
</tbody>
</table>

Source: UIR, 2012

Feeder tracks and last mile services (including handing and shunting) are the most critical factors discouraging or slowing down the Ports that have decided to widen their range of transport services.

The lack of adequate infrastructure and services can entail such an increase in time and costs that it may undermine the competitive advantage for ports that offer intermodal transport solutions.

The feeder tracks – that is, the track sections linking the port loading/unloading yards to the railway network – are the most delicate elements of the system, and represent the interface between customers and the railway service. In Italy, RFI (FSI Group) is in charge with managing the feeder tracks but, in the last few years, the company policies have been neglecting freight transport. The fees are often deemed financially not viable by the operators, and the time windows allowed to carry out the operations often do not meet the needs of users (namely ports, logistics centres, and businesses). Furthermore, the minimum wagon handling thresholds required to guarantee the survival of those feeder tracks often do not take into account the real conditions of the local business community and of the supply chain they serve. Besides, according to the operators, the legislation in force does not seem to provide clear and accurate guidelines as to the construction, maintenance and operation of the facilities served by the feeder tracks, and does not consider that the operation of the last railway mile has specific characteristics and cannot be compared with the operation of the whole railway network.

Handling and shunting services in the yards can be provided by one or more companies, both private and public; they can also be provided by mixed private-public companies, such as Terminali Italia⁶, a company whose majority shareholder is FSI, operating in the market as

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⁵ In the Study, it is estimated that 1 ITU can be converted into 1.79 TEUs.
⁶ Rete Ferroviaria Italiana (RFI) owns 89% of the shares, while Cemat has an 11% shareholding. The company is a national combined transport leader. Terminali Italia belongs to the Ferrovie dello Stato Italiane (FSI) Group, and was set up in order to offer integrated terminal services within RFI’s intermodal terminals, which are part of a network. Through the Company, RFI intends to enhance the capacity of the access lines and freight facilities as parts of the same system, also optimising their use. The Company offers its services as single operator for last mile railway services (handling and shunting), thus ensuring, together with RFI:
a single provider of last-mile services, both at the intermodal terminals owned by RFI and at those owned by other companies; but there are also Oceanogate Italia and TPER (Trasporto Passeggeri Emilia Romagna S.p.A.).

The Adriatic Ports have developed – or are developing – different solutions in this area.

The Port of Ancona has outsourced its railway transport services to CPS (Compagnia Portuale di Servizi s.c.r.l.), which was awarded the service in 2009. The 5-year concession for the provision of the services – which actually expired at the end of 2013 – relates to the handling and weighing of the railway wagons at the Port of Ancona (Tab. 3).

Tab. 3 – Organisation of Railway Services In Adriatic Ports

<table>
<thead>
<tr>
<th>Sea-Rail Transport Actors</th>
<th>Port of Trieste</th>
<th>Port of Venice</th>
<th>Port of Ravenna</th>
<th>Port of Ancona</th>
<th>Port of Bari</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intermodal Operators</td>
<td>Società Alpe Adria S.p.a.</td>
<td>LOGISTICA NORD EST S.R.L. SOGEMAR</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Railway Company</td>
<td>Adriafer S.r.l.</td>
<td>Oceanogate Italia</td>
<td></td>
<td></td>
<td>None</td>
</tr>
<tr>
<td>Infrastructure Operator</td>
<td>RFI</td>
<td>RFI</td>
<td>RFI</td>
<td>RFI</td>
<td>None</td>
</tr>
<tr>
<td>Shunting Service Operator</td>
<td>Adriafer S.r.l.</td>
<td>Trenitalia Spa Cargo Division</td>
<td></td>
<td></td>
<td>C.p.s. s.c.r.l. (*)</td>
</tr>
<tr>
<td>Road Tractor Drivers</td>
<td>Ferretti</td>
<td>Terminal Intermodale</td>
<td>Padua Log. Centre</td>
<td>Melzo Log. Centre</td>
<td>C.p.s. s.c.r.l. (*)</td>
</tr>
<tr>
<td>Directions</td>
<td>Northern Italy</td>
<td>Northern Europe</td>
<td>Northern Italy Central Europe</td>
<td>Eastern Europe</td>
<td>-</td>
</tr>
</tbody>
</table>

(*) Concession Expired On 31.12.2013

Source: Port Authority Data processed by Isfort, 2014

- the promotion of an integrated system of services and infrastructure to be provided to freight transport operators;
- the implementation of an integrated organisational model, through timing and resource joint planning;

The RFI-Terminali Italia relation is based on an Agreement through which RFI entrusted Terminali Italia with the terminal network, for the Company to carry out terminal activities, be responsible for the relevant marketing and development policies, and for compliance with the safety rules and regulations in force.

Along the same line, in order to provide integrated terminal services and access to RFI’s railway network, RFI also operates within intermodal transport terminals belonging to other companies.

The activities mainly consist in receiving full and empty railway wagons and other materials, on the reception sidings, in transporting them from such sidings to the docks to be unloaded, or to the individual plants connected through the railway; carrying out of the relevant marshalling/shunting operations and reorganisation of the wagons themselves, on the port railway network and on the tracks located within the plants; checking the rolling stock to be exchanged with Trenitalia; weighing the goods loaded on the wagons; disassembling and formation of the trains for specific customers and port operators.
4. Possible Railway Intermodal Transport Outline

The conclusions drawn in the Case Study of the Marche Logistics Centre on the feasibility of a combined transport service covering the distance from Greece to the Port of Ancona and Bavaria, are extremely important for our Study, considering its aims.

With reference to intermodal transport solutions, the Case Study envisages the possibility to provide the following services: Rolling Motorway (tractor + trailer) (ROLA); unaccompanied transport (UCT) (trailer only)\(^8\).

This twofold opportunity shall be examined starting – first of all – from the experience of the Port of Trieste that, besides being located on the Adriatic Coast, has already been providing intermodal railway transport for some time now; secondly, an in-depth analysis shall be carried out of the organisational and infrastructure-related issues relating to the Port of Ancona’s internal and external railway network.

In the framework of this present research study – in order to complement the output of the aforesaid Case Study – the following analyses have been carried out:

1. The technical and financial feasibility of the link has been assessed, together with a railway company specialised in national and international freight transport;
2. The national and regional Authorities in charge with managing and developing the national railways were interviewed in order to get to know the present and future availability of the infrastructure;
3. The potential demand for truck traffic was assessed, and possible railway lines were identified that could be viable alternatives to all-road transport.

Port Areas and Operational Functions

The possible outline designed through this research study envisages loading the trucks/trailers within the Marche Dock, where there are four 350 m-long loading/unloading support sidings. Thanks to the rail traction services provided by the Port’s railway company (Compagnia Portuali Servizi S.c.r.l), from such sidings one may easily reach the three 400 m-long electrified tracks located within Ancona’s railway station (Fig. 4).

\(^8\) In this respect, it is worth stressing that the Study has thoroughly assessed the need to envisage accompanied combined (RO-LA) transport, in order to make this transport solution more appealing to hauliers – who usually do not like it very much.
According to both the Port Authority and the railway operator, this solution would be immediately available. However, it is worth highlighting that the railway network operator’s experts have expressed the need for further assessing the feasibility of a Rolling Motorway Terminal within the Marche Dock, as the existing infrastructure should undergo some adjustments. Nevertheless, this solution was deemed compatible.

The main issue does not concern the railway but, rather, the ship mooring. As a matter of fact, the Ro-Ro and Ro-Pax Terminals are currently located within the Old Port (Porto Storico). Although it is not too far from the Marche Dock, the movements and flows from Porto Storico to the Marche Dock may not be very smooth.

Actually, a wide variety of activities are carried out in the southern area of the Port, with rather different operational intensity and peaks, and with some of them being only partially operational. Besides the silos in the former Bunge area, there is still traffic related to dry bulky products (feed and cereals) and the equipment required to suck them in and load them on the trucks, which may hinder transit; moreover, there is coal-related traffic (a conveyor belt, storage and loading areas), as well as some containers stored in the area.

Should a railway intermodal transport service from the Port be established, the various flows and movements within the Terminal shall very likely need to be redesigned based on the
volumes of traffic generated by each activity. Some reserved lanes should also be envisaged in the areas where different goods are handled and, especially in the ferry areas, passenger and freight traffic should be better separated for combined Ro-Pax vessels.

In this context – and in the framework of a wider project for the refurbishment of the waterfront (Ancona Open)⁹ – it could be interesting to consider reassigning the terminals in the northern and southern areas of the Port to the activities relying the most on rail services, which should mainly be concentrated in the Marche Dock.

*Operational Guidelines Based On The Analysis of The Port and Rail Services*

1. The Port Area

The Ro-Ro and Ro-Pax vessels currently calling at the Port of Ancona use the wharf of *Porto Storico* for the loading and unloading of trucks, private vehicles and passengers. There is limited space around such area, with rather winding and often congested entrance and exit ways (especially in summer). Congestion is also due to the lines forming at the custom checkpoints that, due to the lack of agents available, cannot be scattered all over the Port area. All private and commercial vehicles rely on road transport, with rail transport being discarded by car owners and passengers, who prefer reaching Ancona’s railway station or Falconara Airport by shuttle bus. (Fig. 5).

2. Railway Links

The sets of sidings available in the Port area for the loading of semi-trailers and trucks onto the wagons are located at the Marotti Dock and in the Marche Dock areas. As to the Marotti Dock, it is worth reminding that for the loading and unloading of semi-trailers in particular, by using reach stackers, there are various limitations in terms of height, as a flyover crosses the area right above the track sets. However, the area may be used to temporarily park transit trailers and containers. The tracks and sidings available at the Marche Dock do not show the same constraints but, in order to form trains longer than 350 metres, the cargo needs to be divided into two, thus doubling the number of moves required to couple the wagons and to take them outside the port, to the electrified tracks on the external railway network.

⁹ The “Ancona Open” Project envisages integrating the Old Port (Porto Storico) in the urban fabric, and the establishment of a Cruise area at the Northern Wharf of the Port, where works shall be carried out to upgrade the area and set up a new terminal.
The trains formed on the electrified line need then to be further shunted to get to the Adriatic railway line. After loading the trailers/trucks onto the wagons in the Port area, three additional shunting operations are then required before the train reaches the national railway network. Such moves include:

1. Shunting with a diesel locomotor from the Marche Dock to the reception sidings outside the Port of Ancona, on the electrified line;
2. Transfer from those external sidings to the Ancona railway station;
3. Final formation of the train at the Ancona railway station (Fig. 6).

**Fig. 5 – Ferries Mooring At Ancona’s Porto Storico – Parked cars And Trucks**

Source: Google Maps Aerial Images Processed by ISFORT
The project is co-funded by the European Union, Instrument for Pre-Accession Assistance.

**Fig. 6 – Trailer and Truck Route From The Dock To Ancona’s Railway Station For Final Departure**

Source: RFI and Ancona Port Authority’s Data Processed by ISFORT
As to the capacity of the trains leaving Ancona to Northern Italy, RFI’s electrified railway network allows forming trains that are up to 570 mt long (train length in metres), with PC45 gauge, allowing transit of wagons with semi-trailers and special wagons transporting whole trucks.

However, when the ongoing works at the Cattolica Tunnel will be completed (with clearance gauge currently being PC32, corresponding to a max height of 3.5 m, while gauge PC45 exceeds 4 metres height), said problem shall be solved. According to RFI estimates, in early 2015 it shall be possible to form trains from the Port of Ancona to the North of Italy; they shall be reserved a limited number of tracks (more during the night), as in 2015 the Cattolica Tunnel shall only partially be open to rail traffic. However, the two sides of the tunnel shall be opened in 2016 and shall be fully available to railway traffic.

3. Railway Services That May Be Launched Starting From January 2015

According to the opinion of Rete Ferroviaria Italiana (RFI) and the Ancona Port Authority’s experts, UCT railway services may be launched at the Port of Ancona as early as at the beginning of 2015. As to accompanied combined (RO-LA) transport, some works are necessary on the Port’s rails depending on the rail wagons selected and on the loading techniques adopted by the railway operator. Hence, UCT services could be launched first, with the characteristics illustrated below.

Based on the current layout of the Port, the Ro-Ro and Ro-Pax vessel mooring wharfs are located in the Old Port (Porto Storico). At present, it is not possible to move them closer to the Marche Dock, near the rail sidings, as it would be difficult to berth there and download the rolling stock; moreover, in the same area, various logistic activities take place related to different types of traffic (including container, cereal, and coal transport); last, it would be difficult to manage passengers flows (with and without cars) getting off Ro-Pax vessels, in an industrial and logistics area.

These constrains require, therefore, moving trailers from the Old Port (Porto Storico) to the Marche Dock by using tractors – thus entailing complex shunting patterns and moves – and covering quite a long distance (some 2 km) within the Port area.

In order not to have any overlapping – especially in summer – and avoid congesting the small areas of Porto Storico, it would be advisable to schedule the Ro-Pax vessel loading/unloading and embarkation/dismarkation activities together with the shipping companies and the port contractors. Passengers and their private cars should have the right of way, then followed by the trucks leaving the port independently. The trailers that need rail intermodal transport should be downloaded last. Each group could start disembarking when the previous group has completed the customs formalities.
The best procedure – also allowing emptying the ships more rapidly – would be that of designing three different simultaneous itineraries or routes. However, the lack of space and the need to have a single customs checkpoint due to the small number of customs agent available, require scheduling the embarkation/disembarkation activities time-wise, one after the other. The feasibility of such an approach shall however be checked with the relevant Maritime Agencies and against the Ro-Ro/Ro-Pax line and Port schedules.

Today, unaccompanied intermodal transport services could be provided – which would not require any particular infrastructural adjustment – also including standard and non-high cube containers, in order to complete the trains. Such trains – whose maximum length is 570 metres – can load up to 30 semi-trailers with double-pocket wagons (as it is the case for the aforesaid Trieste Wells line).

Shunting costs and times shall have to be carefully assessed, together with the railway operators, with particular focus on the following activities:

1. Collecting the trailers loaded on/downloaded from the ship (port contractors moving the trailers with their tractors);
2. Moving the train from the port area to the electrified railway line;
3. Transferring the trains from the reception sets of tracks, and then taking them to the Adriatic railway line (by examining the possibility to merge the two operations into a single one).

Once it is on the Adriatic railway line, a train may reach Bologna, and then head towards the Simplon Pass to Basel, or towards Brenner to reach Munich. The costs, time and benefits should be carefully assessed of a possible stop over to download and upload intermodal transport units (trailers and containers) at the Busto Arsizio railway station (direction Basel), or at Verona Quadrante Europa’s railway station (direction Munich).

4. Comparison With The Intermodal Transport Services Currently Available At The Port of Trieste

By comparing the terminals, the marshalling yards and the ways trucks and trailers reach the collection sidings, one can spot the Port of Ancona’s critical issues.

According to the technical experts of the Port Authority, the Ro-Ro and Ro-Pax ships calling at the Port of Ancona have no alternatives but to berth at the Old Port (Porto Storico). The terminals located in this area of the Port feature smallest parking areas, but they are also the most valuable ones in terms of beauty and landscape relevance, as they are also extremely close to the city’s urban area. Moreover, the Port railway terminal and the sea passenger railway station are located in the area. Hence, despite the presence of the tracks, this area is quite congested and, for safety and operational reasons, it cannot be used as a railway station for truck and trailer intermodal transport. Therefore, given such constraints, trailers
and trucks will have to be taken from *Porto Storico* to the Marche Dock and reach the collection sets of sidings. It is a 2-km itinerary within the port. (Fig 7).

**Fig. 7 – Tractor + Trailer Itinerary From The Wharf To The Port Collection Tracks**

Instead, it is much less complicated to transfer the trucks and trailers that arrive at the Port of Trieste on Ro-Ro ships. As a matter of fact, the Port features much wider yards and the rails are close to the terminals.

As it can be inferred from the aerial pictures of the Terminals located at the Riva Traiana of the Port of Trieste, it is much easier to move and park trucks and trailers there (Fig. 8).

*Source: Google Maps Image – Processed by ISFORT*
Fig. 8 – Riva Traiana Ro-Ro Terminal of the Port of Trieste

Source: Google Maps Image – Processed by ISFORT
5. Organisational Analysis Of The Railway Service – The Actors Involved

5.1. Local And Public Authorities

Regardless of the specific choices for the promotion of more or less effective intermodal transport solutions, public support is essential – as it has been highlighted above – to launch any service. The investment that the Emilia Romagna Regional Government is making (some 3 million Euros till 2012, with additional €800 thousand being earmarked through a new regional Law), and those made in the past by other Regional Governments (that of Friuli Venezia Giulia in particular, with €13.1 billion paid out between 2004 and 2008), show that in order to make alternatives to road transport attractive to the users, the gap needs to be bridged between the cost of road services and that of intermodal transport.

In their conclusions, the authors of the Study on the Marche Logistics Centre clarify that, among the actors that should be involved, are the relevant public institutions (Municipal, Provincial, and Regional Governments). Such institutions are essential, as they can support the initiative without needing immediate financial return; moreover, they could record a significant quality of life improvement in the areas with heavy truck traffic heading to and coming from the Port.

According to the same Study, the Ancona Port Authority should also be involved, as the new combined transport service would also affect the Port area owned by the Authority.

5.2. Businesses

There are some other essential partners to the Project, namely:

- The railway operator, tasked with the provision of railway services;
- The shipping companies operating in the Port of Ancona, which would be tasked with promoting the new service already at the origin of the transport activity, and increasing the driver's awareness of the future possibility to leave the trailers only on trains;

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10 Refer to the national and international survey carried out by the PLM Observatory on the laws encouraging intermodal transport, and to the recent research study conducted on behalf of Padua’s Logistics Centre by Sergio Bologna et al., on “Intermodal Transport Scenarios In Italy”
The freight forwarders that operate in the Port of Ancona, as it is important to try and attract not only Greek haulers, but also those who work in the Marche region and travel north;

The hauliers, whose participation in the project is essential for its success.

6. Analysis Of The Potential Market

6.1. Potential Traffic Flows

The technical and financial feasibility-related aspects are dealt with in a very detailed manner in the Study for the Marche Logistics Centre. Conversely, there is no thorough analysis of the potential market, not only in terms of overall transit volumes but, most importantly, in terms of final destinations and origins of the trucks transiting through the Port of Ancona.

Therefore, our Study will rely on the results of the survey on accompanied traffic (excluding trailer traffic) carried out by Dorica Port Services on behalf of the Ancona Port Authority, by interviewing a randomly selected sample of truck drivers proportional to the significance of Ro-Ro traffic, in order to identify potential freight traffic and flows. The drivers who were waiting to board the ships were asked to show on a map of NUTS1 regions the origins and final destinations of their journeys. For additional information on such results, please refer to the Port Authority’s Final Report for WP 3.1. and 3.2.

The above-mentioned survey was carried out over 5 months in 2013 (quite a long period), covering the summer months of June, July, and September, as well as the autumn months of October and November. The survey has involved a highly significant sample (13,118 drivers) accounting for 21% of all trucks boarding at the Port of Ancona in 2013, and 10% of the total number of commercial vehicles transiting through the Port in 2013 (132,284 units, including trucks and trailers).

By summarising – and without analysing the data collected through the study and the processing results – it is possible to conclude that – considering the sample of drivers interviewed by Dorica Port Services as being representative – some 71% of the trucks boarding at the Port of Ancona to reach Patras and Igoumenitsa come from transalpine Countries (Fig. 9).
The project is co-funded by the European Union, Instrument for Pre-Accession Assistance

Fig. 9 – The Ancona-Greece Relation As The Port’s Main Asset

71% of Ro-Ro traffic to Greece originates abroad - 2/3 in Western and Central Europe

Source: Ancona PA - Iafort 2014

It can be estimated that some 74,000 trucks and 7,500 trailers cross the Alps, especially at the Chiasso and Brenner Passes, covering much more than 700 Km\(^1\) before boarding at the Port of Ancona. As 22 trucks/trailers are required to form a train, and as traffic is spread quite evenly throughout the year, there is already a potential market for both the Rolling Highway and unaccompanied transport. As a matter of fact, according to the assessments performed by the Marche Logistics Centre, by the Railway Company involved in this Study, as well as by other logistics operators involved in previous studies\(^2\), a stable and financially sustainable intermodal transport service should be able to fill 5 train pairs (each featuring 20/22 wagons) per week, over 46 weeks a year. Hence, 7,400 trucks/trailers are necessary to saturate the line (about 10% of present traffic, without considering trailers).

However, the 81,500 trucks/trailers head to a wide variety of destinations, from Spain to Germany and to the northern coasts of Europe; therefore, it could be necessary to identify two collection hubs for the trucks heading to Greece via the Port of Ancona.

As traffic originates from two main regions, namely Central Europe (32%) and Western Europe (34%) – with just 5% coming from Eastern Europe – two main intermodal transport lines may be envisaged – one starting from Basel’s (Switzerland) railway station, and the second one originating from Munich’s Railway Station – with both of them leading to the Port of Ancona (Fig. 10 and 11).

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\(^1\) This is generally deemed the minimum threshold making the shift from all-road transport to railway intermodal transport cost effective. Chiasso is some 500 km away from the Port of Ancona, while the Brenner pass is 600 km away.
\(^2\) A. Appetecchia, Feasibility Study for scalo Marotti railway activities, WATERMODE Project
Fig. 10 – The Northwest Passage!
34% of the trucks embarking in Ancona come from France and from Spain

![Map of Northwest Passage]

**Points of Entry**

<table>
<thead>
<tr>
<th>Points of Entry</th>
<th>Igoumenitsa</th>
<th>Patras</th>
<th>AN-GR</th>
</tr>
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<tbody>
<tr>
<td>Ventimiglia</td>
<td>34%</td>
<td>5%</td>
<td>13%</td>
</tr>
<tr>
<td>Bardonecchia/Mont Blanc</td>
<td>28%</td>
<td>21%</td>
<td>23%</td>
</tr>
</tbody>
</table>

*Source: Ancona PA - Isfort 2014*

Fig. 11 - Ancona: Heading To The Heart Of Europe!
32% of the trucks embarking in Ancona come from Central Europe, including GB and Scandinavia

![Map of Heart Of Europe]

**Valichi**

<table>
<thead>
<tr>
<th>Points of Entry</th>
<th>Igoumenitsa</th>
<th>Patrasso</th>
<th>AN-GR</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chiusso</td>
<td>27%</td>
<td>47%</td>
<td>42%</td>
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<tr>
<td>Brennero</td>
<td>11%</td>
<td>27%</td>
<td>22%</td>
</tr>
</tbody>
</table>

*Source: Ancona PA - Isfort 2014*
6.2. The Port Of Ancona In The Development Of The European Railway Network

The sustainability of the two intermodal transport railway lines from the Port of Ancona to Basel and Munich is also confirmed by the progressive improvement of the access to the European core TEN-T network.

Access has been improving compared to the previous design and outlines of such networks. As a matter of fact, in the 2005 Plan, the Port of Ancona was not connected, while the 2013 Plan envisaged the connection of the Port of Ancona to both the so-called Baltic-Adriatic corridor and the Scandinavian-Mediterranean one; furthermore, in the future, it envisages better railway links compared to those of all other western Adriatic ports (from Brindisi to Ravenna) (Fig. 12 and 13).

**Fig. 12 – 2005 TEN-T Network Outline**

*Ancona was not included in the outline, and the West Mediterranean-North-western Europe Axis was fragmented.*

*Source: European Commission, 2014*
Fig. 13 – The 2014 TEN-N network Outline
Ancona is included in the outline; it is a Gateway to Europe on the East Mediterranean-Northwestern Europe axis.

This edge over the others is also confirmed by the investment plans of the national railway network operator, envisaging the possibility to have a PC/80 gauge from Ancona to Basel and Munich, with the possibility of forming up to 750 m-long trains at the Port of Ancona. Although the port rails are maximum 500 m long, trains may be formed in two sections, if necessary (Fig. 14, 15, and 16).

Source: European Commission, 2014
Fig. 14 – RFI’s Plans already envisage linking directly the Port of Ancona to the main European Railway network as early as 2017

![Map of Italy showing Port of Ancona and its connection to the main European Railway network.]


Fig 15 – Maximum size of the wagons leaving from Ancona

![Map of Italy showing the maximum size of wagons from Ancona to Basel and Munich.]

6.3. Designing Intermodal Transport Lines

Considering the itineraries covered by the trucks embarking at the Port of Ancona to reach Greece, the Basel and Munich railway stations are considered as two viable alternatives to reach Ancona by rail, for traffic from Western Europe and Central/Eastern Europe, respectively.

Along such axes, intermediate stops could be envisaged at the Verona and Busto Arsizio railway stations – for the trains coming from Munich and from Chiasso, respectively – thus increasing the number of collection points both for trucks and trailers. However, this opportunity needs to be thoroughly examined together with the railway operator and the potential customers. As a matter of fact, many highlight that travel time is a weakness of intermodal transport, and such time could further increase by introducing intermediate stops (Fig. 17).
Fig. 17 – The Opportunities Of Intermodal Transport

Intermodal transport lines:

1) Ancona/Bologna/Verona/Munich

2) Ancona/Bologna/Busto A./Basel

Source: Ancona Port Authority- Iafort 2014
7. Conclusions

The analysis carried out on the supply and demand for intermodal transport services from the Port of Ancona to Northern Europe, clearly shows the infrastructural and commercial sustainability of two possible railway lines reaching Munich (Germany) and Basel (Switzerland).

Such lines could become immediately operational, although there would be a series of limitations in terms of shunting at the port, loading of the vehicles on the wagons, wagon gauge and, last, in terms of train length. However, such issues could be progressively solved.

As a matter of fact, based on the national railways operator’s business plan, the problems relating to the gauge and length could be solved as early as in 2017, thus making it possible to form maximum-gauge (PC80) and maximum-length (750 m) trains from Ancona’s railway station to Munich and Basel. Furthermore, the Ancona railway station shall feature infrastructure and technological equipment allowing it to interact – already today – with the whole European Railway network, by applying the highest safety and quality standards. As to the infrastructure, unfortunately, fact that Porto Storico is the only possible berthing point for Ro-Ro and Ro-Pax vessels, is and shall remain a major drawback.

The experience of the Port of Trieste mentioned in this study – which is similar to that of other European ports offering sea-road-rail intermodal transport services – clearly shows the need to place the forwarding rails for the collection of truck and trailers near the wharf where they are loaded/unloaded. Hence, transferring them from the wharf at the old port (Porto Storico) to the rails that are located near the Marche Dock entails operational complications as well as an increase in shunting and port operation time and costs.

Therefore, at the end of this analysis, it is worth reasserting the need to transfer the Ro-Ro and Ro-Pax line Terminals closer to the Marche Dock. This recommendation is based on the need to rationalise the use of port space, and takes into account the dredging operations that are already scheduled in the sea areas around the Dock under consideration. It is a suggestion that needs to be further examined, also envisaging the possible future development not only of container traffic, but also of some specific types of traffic, including that of corn, and coal, which today take place in the area.

Besides approaching the downloading point to the point where the goods are loaded on wagons, the recommended reorganisation could allow designing separate itineraries to the Port exit (which is currently not possible to envisage, due to the lack of room in the Porto Storico area) for the various types of Ro-Pax vessel users (namely passengers, private cars,
coaches, trucks, and trailers), making a distinction at least between passenger and freight embarkation and disembarkation.

Lastly, in a future perspective, the possibility should not be neglected to also provide accompanied intermodal transport services. As a matter of fact, unaccompanied transport services can meet a better organised demand for transport, based on the cooperation between railway operators and haulage companies. These services are less attractive to small and medium-sized hauliers, who can unlikely develop organisational models adjusting to the features of unaccompanied transport which, among other things, requires the availability of two tractors to transfer a single load, which is sometimes a burden for small businesses.

Therefore, on the one hand, UCT services could increase the Port of Ancona’s Ro-Ro traffic volumes, by absorbing new flows or by simply serving wider markets; however, on the other hand, they may not contribute significantly to relieve the pressure of heavy goods vehicle traffic on Ancona’s urban area. Those who demand those services today already have their own traffic; they are mostly interested in finding new transport solutions allowing improving the efficiency and effectiveness of their logistic performances (in terms of time and costs), thus hoping to improve their competitive advantage on some transport routes. However, if the intention is that of capturing the truck flows (with no road/sea/rail intermodal transport integration experience) currently going through the Port of Ancona, it is advisable to envisage a process of progressive adjustment to such combined transport, which should imperatively envisage a “start-up” phase, in which accompanied transport may act as a sort of “bridge” towards more efficient intermodal integration.