

Freight crossing the Pyrenees.

Potential for short sea shipping

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On the one hand, around 45% of European Union foreign trade is still carried by road and is consequently conditioned by traffic congestion or high fuel consumption, implying disadvantages related to pollution and safety, while on the other hand, 40% is carried by short sea shipping. Short Sea Shipping in European waters has been considered by national and European governments as one of the most feasible ways to alleviate the congestion that gets worse every day on the roads and highways across Europe. This paper poses criteria providing recommendations for the best alternative means of transport for carrying cargo across the Pyrenees.

KEY WORDS

1. Cargo flows, 2. Sea trade, 3. Intermodality, 4. Pyrenees

1. INTRODUCTION. The European Commission and Member States appreciate that transport in Europe is growing at a high rate and that beyond 2010 it is possible the figures for inter European transport, including the new accession countries, will show a growth of over 80% in volume, and unfortunately these values will be absorbed mostly by road transport. Therefore a big commitment is needed from all those involved in order to improve alternative ways to guarantee the flow of cargo.

With this scenario in mind, the TRANSMAR research group of the Nautical Engineering and Sciences department from the Technical University of Catalonia, supported by the Spanish Ministry of Transport, has carried out the INECEU (Intermodality between Spain and Europe) project for proposing some solutions.

The European Union has gone one step further by approving an overall budget of 22,000 millions € over 7 years (from 2007 to 2013) for a programme that will include funding for TEN – T,[1] dedicated aspects of Galileo and Marco Polo programmes, for the development of means of transport other than road transport.

2. THE GEOGRAPHY. From 1991 to 2000, transport volumes increased between the Iberian Peninsula and other EU states, having affected all the means of transport in the following percentages; 40% for road, 41% for shipping and up to 32% for rail, even though it decreased in

general terms. The share of each means of transport favours road with 52%, shipping 43% and rail only 5%.

In 1998 the volume of cargo haulage by train was only 4.7 millions of metric tonnes, and for combined transport (ferroustage) this amounted to 2.4 millions of metric tonnes, but up to 56.9 millions of metric tonnes by truck during the same year. When talking about light and specific vehicles the trends have shown an increase of up to 33% in 10 years among the two means. The previous figures translated to absolute numbers bring us up to 17,000 heavy vehicles passing the Pyrenean border in the year 2000 [2]. The permeability of this mountain range, has been discussed in different fora such as the *Comunidad de Trabajo de los Pirineos* [3], an organisation that represented both sides of this natural barrier whose main objectives were to identify as the main problem, the lack of enough transport networks, linking the Iberian peninsula and Europe.



Figure 1. The Pyrenean border during the year 2002 and the communications network. Source: Conseil Regional Midi Pyrénées.

2. EXISTING COMMUNICATION LINKS. The ways currently used for carrying goods from one side of the Pyrenean border to the other are mainly road accesses as follows:

1. Donostia – Irún (A-8) to Biriatou – Bayonne (A-63)
2. Iruña – Roncesvalles (N-135) to St. Jean Pied de Port – Ortez (D-933) (a highway is intended)
3. Iruña – Salies de Béarn or Transnavarra highway just opened.
4. Huesca Jaca – tunnel of Somport (N-330) to Oloron St Marie – Pau (N-134)
5. Ainsa tunnel of Bielsa (A-138) to Lannemezan (N-125)

6. Lleida – tunnel of Vielha (N-230) to Pont del Real - St. B at (N-125) towards Toulouse
7. Barcelona – Puigcerda (A-18, C-16, N-260) to Bourg Madame – Foix - Toulouse (N-20)
8. Barcelona – La Jonquera (A-7) to Le Boulou – Perpignan (A-9).

Although there seems to be plenty of choice, the volume is, in practice, concentrated in 90% travelling through the two coastal highways (1 and 8) because of the higher quality roads.

Regarding the railway, the lines in service are mainly the two coastal passes and one minor central passage:

1. Donostia – Hendaya to Bayonne.
2. Ripoll to La Tour de Carol – Foix
3. Figueres – Portbou to Perpignan and connection to C eret

There is planned for the future the Canfranc Pyrenean passage (linking that city through a tunnel under the Somport with Oloron – Buzy in B arn and Pau) that is in the region of Aragon and is being promoted to be considered as another choice. After the major work to be done, it will eventually be capable of dealing with up to 3 millions of tonnes per year.

However, studies carried out [4] are confirming that the origin of the problem of overloading rests on the next points:

1. The railway network crossing the Pyrenees is limited to the 2 coastal passes that were built 125 years ago.
2. The different rails width.
3. Blockage at the frontier due to road congestion.
4. The increase of the flow of goods crossing the border. In 1998 up to 14,000 trucks per day and this rate is on the increase, being 17,000 in 2002.

The capacity of land carriage is complimented by air traffic with a minor impact in terms of volume, and also the shipping link from commercial ports in Spain with others in Europe.

3. INTRA EUROPEAN COASTAL TRANSPORT. If a European coastal trade may be defined as that carried out within the European geographical limits and even reaching the sea areas near to the European coasts, it should include the short sea trade. Taking a quick look into the last technical advances in the marine sector, we identify three basic pillars on which modern shipping rests; bulk, container and rolling cargoes. All of them are so specific that they have particular features regarding their logistic chains and performances [5]. We should consider bulk transportation of mass freight where the ship is the most favourable option compared to the truck. However, when we consider the container and Ro/Ro services available we can see that for regular traffic there are opportunities for a steady flow of cargo for road to sea and vice versa. There is a future to be

considered when talking about container traffic because the trend of reducing port calls for the larger container carriers entering each year into a few hub ports, should be backed by frequent feeder services that are spread out and that should be included in the short sea shipping European trade. Ro/Ro services have also been firmly placed as a link between insular territories and the mainlands as communications links within closed seas and generally on the basis of a fast transshipment of cargo loaded on trucks, trailers or specific platforms. There are true cabotage and short sea trades, not only in Europe as the paradigmatic case of Grimaldi Napoli, but in our country mainly Grupo Boluda with Naviera Pinillos, Vapores Suardíaz or Contenemar. However a brief look will confirm the real chances that short sea services have in Europe, provided the future funding and regulations are approved for their endorsement. Superfast ferries are Greek owned, previously serving in the Adriatic and Baltic seas and they recently opened a service between Zeebrugge and Rosyth in Scotland, therefore avoiding the long trip for trucks from the North of Great Britain.



Figure 2. An example of ferry linking European ports. Source: Brittany ferries.

Grimaldi Napoli, have consolidated its Barcelona – Genoa line and a few months ago introduced the Barcelona – Civitavecchia and Valencia – Civitavecchia services, with successful results. Brittany Ferries and P&O ferries have provided services in the English Channel for a long time now and it has reinforced its services between Spain and Great Britain. The *Pont Aven* is the latest ferry presented last October by Brittany Ferries. Naviera Pinillos from Group Boluda, using container and Ro/Ro ships, is serving Canary Islands traffic with the mainland but also maintains services from the peninsula and islands to Italy, Great Britain or Mauritania. Also Contenemar, serves certain container traffic, not only with Spanish archipelagos but also with the Atlantic coast of Africa, Livorno, Civitavecchia or Southampton, Flushing and Zeebrugge together with ports in the eastern Mediterranean. Cobelfret's Belgian owner, have most of their ships flagged in Luxemburg and is a solid provider of traffic between mainland ports and the UK, but it is an

example of a transport provider for the Swedish paper manufacturer Stora-Enso. And last but not least we ought to note the Spanish owner Group Suardiaz providing service with 16 car carriers, 13 ships being involved in regular lines to Flushing, Zeebrugge, Southampton, Italy or eastern Mediterranean. The last service opened in November is Flushing – Zeebrugge – Santander – Bilbao. There are examples of fixed contracts such as the one signed with the NATO for serving in any required traffic in Europe, or the GEFCO (Peugeot - Citroen) contract linking Vigo with Saint Nazaire and Toulon, that is being served by Trasmediterranea.

4. THE EUROPEAN TRANSPORT NETWORKS. The European Commission has promoted a set of measures directed to coordinate and unify European transport objectives, avoiding the different legislation distortions that would have a negative influence on and increase the price of cargo and passengers transport. We could look at October 1992 when the Maritime Industries Forum recommended the: *“promotion of the short distance and multi modal maritime transport, facing the problems in the use of the maritime transport as a challenge to oppose road transport”*.

In 1994, the Essen European Council, adopted 11 of 14 priority projects regarding transport resources and in 1996, the European Parliament and Council, drew up the future guidelines for the trans European transport networks towards the year 2010. In 2001, the decision was revised in order to admit maritime and inner ports into the transport policy. In fact the Trans European Transport Network or TEN is a concept formulated in some of the above mentioned European documents that originated in the Maastricht Treaty, which requires the Community to contribute to the creation and development of such transport and communication networks. Further in September of 2001 and triggered as a response to the Mont Blanc accident of 1999, the European Commission presented the *“The European transport policy towards 2010: time to decide”* White Paper, that posed among its priorities, to look for an alternative to the congested road passages and mainly those of the Alps and the Pyrenees. The coastal services are initially very difficult to be started up and being conscious of this, the EC proposed to identify and help them through initiatives such as the Marco Polo and previously the PACT structural funds, focusing on the establishment of the new short trade shipping lines. During the month of June 2002 in Gijón, the EU Transport Ministers informal meeting was held, where it was decided to draft a plan for promoting coastal shipping transport. That concluded in the 14 points programme for stimulating short sea trade, with the sea highways concept being among them once again. Some of the first reactions to the Gijón declaration were two French Parliamentary reports called François Liberti in 2002 and Henri de Richemont [6] in 2003. This last report proposed policies to promote Ro/Ro services in French ports, which are justifiable although there are a lack of key items (capitalisation, inadequate offer or absence of industrial dedicated traffic) that are expected to be facilitated by the local authorities.

The van Miert Group, led by the ex EC transport commissioner Mr. Karel van Miert, carried out a study of over 100 proposed projects [7] by the member states, in order to select the most urgent ones and to distribute available funds. This study kept in mind factors such as the technical and financial ones, together with their agreement to European transport policies as proposed in the white paper, funding possibilities, together with the real chances to be carried out. 22 priority projects were chosen including the sea highways and the 5 projects known as Essen [8], close to their finalisation. Those projects should be started before the year 2010, whilst the European Commission carries out a detailed impact study and proposes a revision of the community guidelines for the development of transport networks [9]. The van Miert report was further developed when the European Parliament Transport Committee passed, on 17 February 2004, the preliminary report by Philip Bradbourn on the Communitarian directives for TEN-T development. The European Commission confirmed the decision in March keeping in mind that this should be a tool for improving the articulation of the 25 members Europe and also providing for the development of the sea highways, simplifying frontier procedures and ensuring that such highways are free of bottlenecks and really are promoting alternatives such as sea transport for the regular bulk trades. The case of Spain is a good example as it is a peripheral country that would suffer to a greater extent any lack of infrastructures. The term “sea highways” are defined in the van Miert report presented in Brussels, establishing up to four:

1. Baltic (link between Baltic and central-north European states)
2. Atlantic (link between the Iberian peninsula, Ireland and the North Sea)
3. West Mediterranean (link between the Adriatic sea with the Ionian sea reaching Cyprus)
4. East Mediterranean (link between Spain, France, Italy and Malta connecting with the Atlantic highway).

The sea highways intend to improve connection with the insular countries and those that are isolated because of the natural separation of the Alps or Pyrenees or the Baltic Sea.

5. METHODOLOGY OF STUDY. The present study was divided into three main phases. The first one was focused on an analysis of existing projects and studies closely related to the same topic, available bibliography and gross data sources. A second phase intended to propose different sea corridors, depending on the cargo fluxes and volumes or the production and consumption centres in Spain. The points to be used as connections for moving the cargo were, of course, the ports along the Spanish coast, connected by two of the seaways previously mentioned. On a first analysis, the cargo to be transferred from road to sea would be mainly iron and chemical products, food stuff in general but mainly agricultural produce, largely concentrated in Andalusia and Levante coasts. This last would be easily packed in container units that facilitate intermodality. Once the chances for

transferring the cargo to shipping had been evaluated, the high speed use was studied for certain kinds of perishable goods. The last and final step covered the criteria and recommendations arising from the previous two and studied the best port facilities that would provide safe and quick cargo transfer. The difficulties of those ports for connection to the main communications axes with the hinterland, the need for new open traffic corridors in certain ports or the railway links, need to demonstrate they are a viable alternative to the truck.

Looking deeper into this, when the study had just started, some quite interesting European projects were identified, such as INSPIRE, SSS CA, EMMA [11] or even the most recent REALISE [12] inter alia, very close to the sea trade question of our study together with some others funded by SPC-Spain. [13]. Further, the viability analysis of the routes, was initiated using the figures provided by a permanent enquiry for trucks carried out by the French and Spanish governments in the Pyrenees.

The following table shows the cargo volumes moved over the Spanish borders during 2003, using data from the governmental enquiry already mentioned.

Cargo moved by road	Imports (Tm.)	Exports (Tm.)	TOTAL (Tm.)
FRANCE	10,839.000	10,069.000	20,908.000
GERMANY	3,250.000	3,395.000	6,645.000
HOLLAND	866.000	908.000	1,774.000
UNITED KINGDOM	698.000	1,529.000	2,227.000
BELGIUM	1,020.000	681.000	1,701.000
ITALY	2,280.000	2,352.000	4,632.000
PORTUGAL	2,423.000	3,816.000	6,239.000
OTHERS EU-15	102.000	143.000	245.000
TOTAL EU-15	21,480.000	22,893.000	44,374.000

Table 1: Cargo volumes moved over the Spanish borders. Source Spanish Ministry of Transport.

The total exchanged volumes were also classed by type of cargo and their origin or destination in Spain. So the parameters to be studied were:

- 1 Total volumes in export and import flows by truck, segregated by country.
- 2 Total volumes exchanged by truck, classed by groups of commodities.
- 3 Spain was divided into 5 different areas, representing each one homogeneous production and consumption zones and selecting some transport centres or logistic platforms.[14].

Some ports were selected in Spain depending on the kind of cargo mostly moved and the distance to the closest transport centres.

6. PRELIMINARY RESULTS. Once the largest exchange volumes were identified, the research group centred on these. Those countries were France, Germany and Italy.

Regarding the groups of selected goods:

1. Agricultural products and live animals
2. Foodstuffs and animal fodder (alcohol drinks and tobacco)
3. Ores, metal waste and products
4. Chemicals

The two first would be very easily packed in unitized cells or cargo units, easing their inclusion in multimodal chains and a quick and efficient passage between different transport modes. We should clarify that the volumes and types of cargo are not coincident with the overall figures between Spain and Europe, but with the road exchanges. In the first case the largest party would of course be oil products, machinery, manufactured goods and transport equipment.

Segregated by geographical areas, the production of agricultural products for exportation purposes come mainly from Andalusia and Valencia regions using Valencia, Alicante, Cartagena, Almería or Huelva ports. Using distance criteria, we should remember that, for example, metal ore and its related manufactured goods, may be imported to the peninsula through specialised ports along the Cantabrian coast such as Gijón, Bilbao, Pasajes or Santander, and following the same criteria the chemical and oil products would be shipped close to refineries.

At the same time there are some ports specializing in certain export traffic as follows:

Containerized traffics:

Fruits, vegetables and beans: Algeciras, Barcelone, Cartagena, Valencia and Castellon.

Wine and alcohol drinks: Valencia, Barcelone, Algeciras and Bilbao.

Canned food: Algeciras, Valencia, Cádiz, Cartagena and Bilbao.

Bulk traffic:

Cereals and flour: Cadiz, Seville and Valencia.

Iron ore: Huelva and Seville.

Steel manufactures: Bilbao, Pasajes, Valencia and Gijon.

Chemicals: Barcelona., Algeciras, Tarragona, Huelva, Valencia and Ferrol.

The main import flows are conducted through:

Bulk traffic:

Iron ore: Gijón (the largest), Pasajes, Bilbao and Santander.

Iron scrap: Pasajes, Bilbao, Algeciras, Ferrol, Sevilla and Santander.

Steel products: Valencia, Bilbao, Barcelona, Seville, Pasajes, Algeciras and Coruña.

Chemicals: Barcelona, Tarragona, Valencia, Algeciras, Huelva and Bilbao.

Once the main data was obtained, a forecast exercise was done in order to confirm the future justification of the proposed sea lines. It was estimated that during the year 2005, around 51 millions

of tonnes would be moved by road, being the 75% between Spain and France, Italy and Germany. Also the expected figures for the year 2010 could reach the 74 millions of tonnes.

The national centre for the promotion of short sea shipping (SPC-Spain) is convinced that certain conditions must be met for the success of maritime transport as:

1. A minimum distance of 450 nautical miles.
2. In order to absorb road traffic, a minimum road distance of 1.500 kilometres would be necessary.
3. The need for increasing ship speed for maximising the number of rotations.
4. To maximise shipping services for providing the quickest service to the ship in port.

In brief, we propose more efficient multimodal chains in terms of time and cost, capable of competing with road haulage. Calculations were made taking actual costs for road transport and an average speed of 75 kilometres per hour at a fixed cost of 28,11 € per hour together with a variable cost of 0,337 € per kilometre, considering tolls. The ship's costs were calculated based on the average prices paid by a 25 tonnes truck adding the port costs and an additional cost representing the operational charges. These figures were combined in order to get time and costs comparisons between the road trip compared with a multimodal chain cost, keeping in mind the ship's cost and voyage time added to the outer legs covered by truck. The results showed in the Mediterranean basin, linking the Seville manufacturing area through its port unloading in Marseilles to reach Lyon, that the multimodal chain would be more efficient than the truck, and even linking the first with Milan unloading in Genoa.

Origin	Transport mode	Loading port	Discharge port	Destination	Total time	Total cost
Seville	Ship	Cadiz	Marseilles	Lyon	2d 1,9 h	1103,5 €
		Huelva	Marseilles	Lyon	2d 4,6 h	1121,4 €
		Seville	Marseilles	Lyon	2d 3,75h	1056,2 €
Seville	Truck	-	-	Lyon	2d 5,2 h	1237,1 €

Table 2: Comparison of time and cost figures between road and multimodal chains, from Seville to Lyon.

Another efficient multimodal chain would be to link the Zaragoza manufacturing area through Tarragona port unloading in Genoa to reach Milan rather than the truck.

Origin	Transport mode	Loading Port	Discharge port	Destination	Total time	Total Cost
Luceni (Zaragoza)	Ship	Tarragona	Genoa	Milan	1d 5,5 h	848,1 €
Luceni (Zaragoza)	Truck	-	-	Milan	1d 8,4 h	928,5 €

Table 3: Comparison of time and cost figures between road and multimodal chains, from Luceni to Milan

In the Atlantic, one chain is that linking Germany with the centre of the peninsula and it is an excellent example of a cheaper and more efficient chain.

Origin	Transport mode	Loading port	Discharge port	Destination	Total time	Total cost
Madrid	Ship	Bilbao	Hamburg	Berlin	2d 20,4h	1464,7€
		Santander	Hamburg	Berlin	2d 18,7h	1436,2€
Madrid	Truck	-	-	Berlin	3d 5,2 h	1719,7€

Table 4: Comparison of time and cost figures between road and multimodal chains, from Madrid to Berlin

7. CONCLUSIONS. This paper shows the results of the INECEU project, proposing after an exhaustive study alternative multimodal lines as against road transport. There are of course administrative and documentary problems within ports, but we are sure that these will be solved in a near future. Keeping in mind the figures of road traffic passing the Pyrenean borders, we analysed most of the volume moved between Spain and France. Among all the Spanish regions we should note the activity of Catalonia, the Basque country, Valencia and Andalusia. The French counterpart is contested by the Pyrenean regions of Aquitaine, Languedoc-Roussillon and Midi-Pyrenees together with Ile-de-France, Rhône-Alps and Provence-Alps-Côte d'Azur. The French territory is also crossed by important traffic fluxes southbound coming from Westfalia, Baden-Württemberg and Bayern in Germany and the northern part of Italy. From Spain it is possible to identify the main traffic towards Westfalia and Baden-Württemberg in Germany, Lombardia in Italy and destinations more spread out up in Great Britain, Holland and Belgium. Regarding the nature of the cargo, we should note that the South and South-East part of the Iberian peninsula, together with the Valencia coast; are big producers of fruits and vegetables, with the group of manufactured or canned food and alcoholic drinks being one of the larger cargo groups that is exported from Spain. There is important traffic involving solid bulk such as building materials or scrap iron, together with oil and chemical products from ports with refineries nearby that are firmly committed to removing trucks carrying dangerous or toxic substances from the road to ships that have specifically designed containers, or Ro/Ros, that will benefit society as a whole.

We can conclude that:

1. The industry in the Mediterranean basin accepts the concept of Short Sea Shipping preferring destinations in Italy or further.
2. The Atlantic mainly specialises in bulk traffic should take advantage of the SSS funding and official policy using multi purpose ships for accepting different kinds of traffic.
3. Fast ships in this kind of traffic could be justified when serving trips less than 12 hours away and when cost is not so important provided a minor time of delivery can be guaranteed.
4. The conditions shown in the first phases of the study can be submitted to change that, we are convinced, will be more advantageous to the ship.

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