MOTORWAYS OF THE SEA: GIJÓN – NANTES SAINT NAZAIRE

- CASE STUDY -

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1. INTRODUCTION

Rapid trade growth has led to a steady increase in the underlying demand for transport services. These new transport operations have not been carried uniformly across the existing network, usually leading to congestion problems in road infrastructure. Besides congestion, road haulage burden society with other negative externalities such as environmental damage and increased risk of accidents. Instead of upgrading road infrastructure, which would foster road traffic volumes and the associated large undesired effects, promotion of alternative transport modes is a popular policy in the last decades.

In this context, European authorities have tried to inhibit road freight flows via different policies aimed to increase the demand for railway and Short Sea Shipping (SSS) services. The rail mode is more environment friendly than road transport, but faces other problems such as the necessary large investments to adapt facilities to modern cargo units or the lack of flexibility to open/close routes where demand levels justify this sort of actions. Increased bottlenecks in the road transportation infrastructure, short-comings of rail mode and SSS environment friendly characteristics have created a strong interest for Short Sea Shipping projects.

In January 2007, an agreement between the Spanish and French governments was signed in order to promote the establishment of Short Sea Shipping connections between French and Spanish ports that aim to alleviate congestion and related issues caused by heavy road traffic crossing the Pyrenees. Some parts of the road network, especially those closer to the border, are overused and a modal shift from road to sea is likely to reduce the problem. In April 2007, an invitation to tender was opened setting the deadline for submitting bids seven months later.

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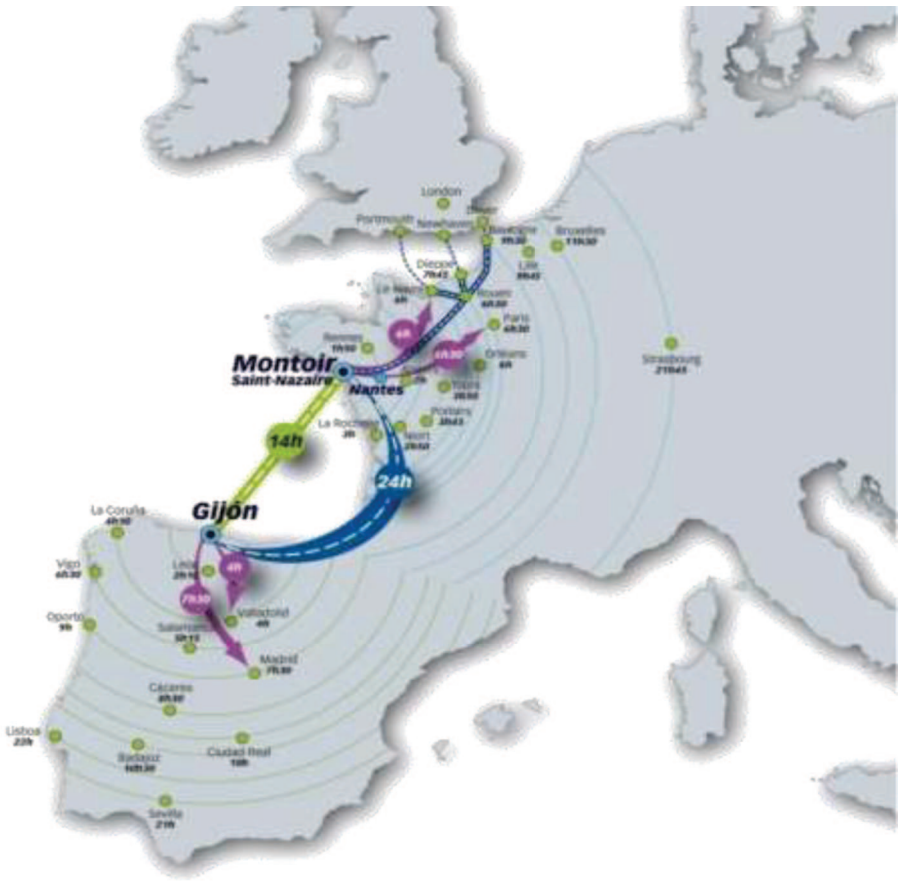
The main conditions of the tender were:

- Motorways of the Sea (MOS) maritime services could involve the creation of new routes or the improvement of those already existing.
- Services provided should be safe, regular, frequent, economically feasible and competitive.
- The tender was addressed to companies composed by port operators, ship owners, ship operators and any other maritime industry participants.
- The selection of the ports of origin and destination of the service was attributed to the bidding companies.

FIGURE 1. PORTS LOCATIONS



Source: Port Authority of Gijón

In January 2009, the proposal to link Gijón and Saint-Nazaire ports (Figure 1), integrated by the Gijon Port Authority, the Nantes-St. Nazaire Port Authority and ferry operator Louis Dreyfus Lines (LD Lines) was approved. A year later, in January 2010 the European Commission

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authorizes State aid from the Spanish and French governments (30 Million €) complementary to Community funding for the launching of the Motorways of the sea (4.1 Million €). The second "Marco Polo" programme is one of the two Community funding instruments supporting MOS through financial assistance for a maximum of 35% of operating cost of the service and a maximum duration of 60 months. However, in the case of MOS Gijón-Nantes, Spanish and French authorities established that the aid had a maximum duration of 48 months.

Financial aid to the project was subject to the accomplishment of some objectives in terms of performance. In particular, during the fourth year of service, it is required a daily trip frequency in each direction and a yearly transport of at least 100.000 Intermodal Transport Units (ITU). In the first five years, MOS should have moved a total of amount of 350.000 ITU, reaching 850.000 ITU if a total of ten years is considered (Table 1).

TABLE 1. PERFORMANCE OBJECTIVES OF MOS GIJÓN-NANTES

Year	ITU	Frequency	Annual trips	ITU/trip
1	25.000	4	312	45
2	50.000	4	416	120
3	75.000	7	728	103
4	100.000	7	728	137
5	100.000	7	728	137

In addition, the frequency of the MOS should be increased by the end of the second year, from 4 trips in each direction per week to a daily trip in each direction.

The concession agreement between port authorities and LD Lines was for a period of 7 years but a clause in the contract indicated that the ship operator had the right to terminate the service at any time in case this activity was not profitable. After 4 years operating the MOS Gijón-Nantes St. Nazaire, LD Lines stopped providing the service taking advantage of this clause.

The operator of the route, LD Lines, unilaterally terminated the connection between Nantes-St Nazaire and Gijón in September 2014. During the previous months, LD Lines managers indicated that once the aid period came to an end, LD Lines would no longer provide the

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service. According to the company, the MOS was not financially sustainable due to the high operating costs and insufficient demand causing an economic loss of 6 million Euro even when the service was highly subsidized.

This argument has been challenged by the port authorities' concerned and French and Spanish governments that claim the need of a proper audit of costs and revenues of the MOS. There have also been attempts to extend the aid period for another 12 months as the justified expenditures by LD Lines have just covered 25 Million Euros of the total (34,1 Million Euros). Last attempts to restart the service included the threat of repayments of public funding.

2. OVERVIEW

Gijón Port is located in outskirts of Gijón, a city in the middle of the Cantabrian coast. Its hinterland comprises 13 provinces of Spain and the northern region of Portugal. This represents an area of 110.000 km^2 and a population over 10 million people. The companies operating in the hinterland are in principal Short and Medium Enterprises (SMEs) dedicated to food agriculture and wood sectors although there also exist large companies in the metal, chemical, stone and vehicle parts sectors.

The Port of Nantes Saint-Nazaire is located on the Loire estuary, close to the city of Nantes, in the Bay of Viscay. Its hinterland mainly covers Greater Western France, Belgium, Netherlands, the north of Germany, United Kingdom and Ireland. This seaport is predominantly oriented to import operations, specially energy (Liquefied Natural Gas and petroleum products), agrifood stuffs (grain and cereals, cattle feed), forest products and motor vehicles.

Considering the regions that compose the hinterlands of both ports, freight flows between these areas are transported using different road traffic infrastructure located in the north of Spain and west coast of France. Although drivers might choose among a wide set of road routes when travelling Spain and France, they can just use one of the few border crossings between both countries. As it is displayed in Figure 2, flows traveling the north and west-central regions of Spain and Portugal to west France are mainly driven via border crossing at Biriatou / Irun that connects San Sebastian and Bayonne.

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FIGURE 2. PYRINEES TRAFFIC INTENSITY IN 2009

Source: Ministère de l'Écologie, du Développement durable et de l'Énergie

2.1 MOS SERVICE CHARACTERISTICS

In order to reduce high demand on road transport infrastructure and lower the associated negative effects, Motorway of the Sea Gijón – Nantes connected Gijón and Saint Nazaire seaports providing its first service the on 8 September 2010. MOS Gijón-Nantes was a Ro-pax service oriented to transport passengers and accompanied or unaccompanied cargo. Ro-pax ships are Roll-on Roll-off (ro-ro) ferries transporting passengers and goods and they are seen as an extension of road transport. These vessels incorporate built-in ramps used to load and un-load wheeled cargo such as private vehicles, trucks, semi-trailer trucks, trailers and even railroad cars, which are driven on and off the ship on their own wheels or using a platform vehicle. Once the cargo is inside the ship it is driven (or towed) and secured in one of the decks using ramps or elevators.

Three different ships were used in the MOS Gijón-Nantes: Norman Bridge, Norman Asturias and Norman Atlantic (Figure 3). The 3 vessels shared similar technical characteristics: 20 knots average speed, a fuel consumption of 40 tonnes/trip, 2200 lane meters and a capacity of loading 120 ITU and 500 passengers (300 passengers Norman Bridge). Crews operating the ships were composed by 40 to 50 people.

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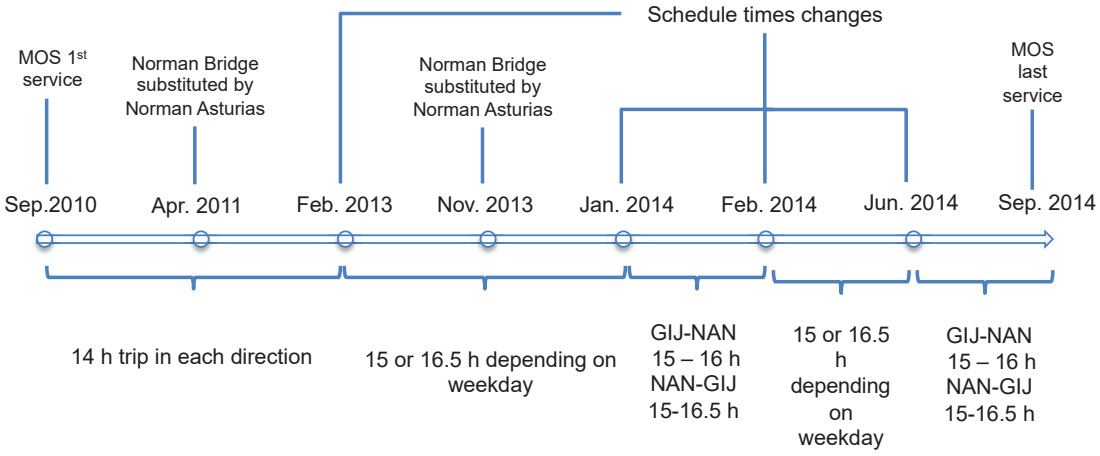
FIGURE 3. NORMAN ASTURIAS AND NORMAN BRIDGE

Norman Bridge was the ship used in the crossings between Gijón and Nantes from September 2010 until April 2011 when it was substituted by the Norman Asturias. This substitution was caused because the high demand for passengers transport which was not initially expected. In the months of service, until February 2013, each leg of the trip lasted 14 hours and it was performed three times a week. In that month, LD Lines reduced the average travel speed of the ship in order to reduce fuel consumption and operative costs and also changed the schedule of departure times (Appendix 1).

FIGURE 4. MOS TIMELINE



Source: Port Authority of Gijón

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In November 2013 the Norman Atlantic begins operating the line in substitution of Norman Asturias although this change did not affect the supply of services as they are twin ships. Later on, in January 2014 Norman Atlantic sails two return trips a week, one of them reaching Roslare (Ireland) while Norman Bridge makes the remaining two-way trips. These changes are accompanied by a new schedule that does not last long, as in February 2014 there are new changes in the use of the ships and the times of departure and duration of the trip. After a few months, the schedule and ship used in the MOS is restored to the same setting established in January 2014. A visual summary can be found in the timeline in Figure 4.

These changes led to a variation in travel times that ranged from 14 hours in the beginning of the service to 15:00-16:30 hours depending on the direction of the trip and weekday. Despite the increase in the duration of the trips, this was still much lower than the alternative road trip that involves a 1000 km drive. Using road transport mode, driving between Gijón and Nantes, takes on average 24 hours considering one driver and maximum daily driving times and minimum rest periods for road haulage drivers.

The tariffs of the service for freight vehicles are displayed in Table 2. The price per trip depends on the type of vehicle where the cargo is loaded, the weekday and the trip direction. Basic rates for accompanied cargo range from 450 to 500 euros, being cheaper traveling from Nantes to Gijón than trips with origin in Gijón. Also the price of the service is higher on Sundays, due to existing traffic restrictions in France and Basque Country which reduce the availability of substitutive road routes.

TABLE 2. MOS TARIFFS FOR FREIGHT VEHICLES

		Basic rate*					
Type of cargo	**Vehicle**	**GIJ-NAN**	**NAN-GIJ**	**BAF***	**IMDG**	**PLUG**	**2nd driver**
Accompanied	Articulated <16.5 m.	480	450	26.45	50	50	50
	Road Train <18 m	500	470				
Unaccompanied	Roll trailer 25 tons	550					
	Roll trailer 50 tons	1100					
	Trailer/Semi-trailer <13.6 m	510	480				

*The basic rate and BAF are increased in 20 and 25 euros, respectively in the Sunday trips from Gijón to Nantes.

Source: Port Authority of Gijón

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The tariffs structure responds to demand side factors and occupation rate of the ships, which will be analysed in detail in the next subsection. Overall, demand was significantly higher from Gijón to Nantes due to northern-south trade imbalances, and freight movements in these particular trips were also higher on Sundays as it is expected because of the existence of traffic restrictions commented before.

The freight rates for unaccompanied cargo are higher and show larger variation than those for accompanied cargo as they are related to a wider range of tonnage. For both types of freight, rates paid are adjusted according to additional features. Fuel price rises are captured through Bunker Adjustment Factor (BAF), while transporting International Maritime Dangerous Goods (IMDG) is 50 euros more expensive than moving any other cargo. Having access to electricity through a plug and a second driver traveling with the vehicle also increase the final price paid by the costumer.

Besides cargo, the MOS Gijón-Nantes also transported passengers and private vehicles: cars, motorbikes, bicycles, vans and even buses. The ticket prices had a large variation depending on the season and type of vehicle. On average, the price of transporting a private car with 3 passengers was 210 euros.

Short Sea Shipping maritime services are examples of broken logistics transport chains and they require different interfaces that help making cargo transfer between transport modes. These interfaces include dedicated terminals and dry ports, handling equipment and storage facilities. In addition, efficient and reliable intermodal connections (rail and road) are required to reduce travel times and bottlenecks.

In the case of Gijón Port, a SSS terminal was built in el Muelle de la Osa implying an investment of 1,25 Million €. The terminal is equipped with a ro-ro ramp. However, according to the line operator the ships had to be adapted to the characteristics of this ramp by cutting the vessels built-in ramps. Following the logic provided by line operator, this modification had an impact on terminal operation times in Nantes: if the ships' ramps had not been adapted, these times could have been reduced. Additional infrastructure includes rest areas, toilets and showers for freight drivers, vending machines and check-in facilities. Parking facilities include 118 places for cars, caravans or motorhomes, 421 parking places for new cars and 18 overnight parking slots for Motorhomes that can be found just outside the port. The terminal is located 10 minutes away from a motorway and the port has excellent communications by railway.

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The Nantes-Saint Nazaire created a SSS terminal that is capable of receiving two ships simultaneously after the construction of a second landing stage at the end of 2009. The 16 Million Euros investment has also been dedicated to create a building to receive drivers and a 30-hectare storage. These facilities have an extraordinary accessibility as they are connected by road, rail, river and air.

2.2 PERFORMANCE INDICATORS

The Motorway of the Sea line connecting Gijón and Nantes-St. Nazaire operated for four years, since September 2010 to September 2014. In this time the MOS has provided a reliable service with 1118 trips completed, usually not suffering from any delay, but when unexpected factors happened the duration of average deviation from the planned schedule was 14 minutes. In case any delay happened in the stowage operations, the power of the ships allowed the operator to increase travel speeds and balance the expected and actual times. MOS service cancellations rarely occurred and they were caused by maintenance reasons (31 times) and severe weather conditions (27 times). In any case, cancellations or expected delays were immediately noticed to MOS customers via web, text message or phone call.

Table 3 summarizes freight transported in the ships in that time specifying the type of cargo. New vehicles label makes reference to brand new vehicles distributed by manufacturers. Unaccompanied trailers collect those cases when only the load unit is transported, without motor vehicle or driver, while accompanied trailers indicate that both vehicle and driver travel with the load unit. The cargo roll trailer is a kind of rolling platform towed by a tractor or forklift truck with gooseneck.

New vehicles have been the type of cargo that outnumbers the rest, followed by accompanied trailers. Unaccompanied trailers and roll trailers were a small fraction of the total transported freight. The number of accompanied trailers, unaccompanied trailers and roll trailers have remained relatively steady during this period, whereas the number of new vehicles carried has been increasing, especially between the first and second year.

TABLE 3. TRANSPORTED CARGO BY TYPE OF VEHICLE AND YEAR

	Year				
	1	2	3	4	Total
New veh.	6,446	19,750	20,755	23,571	70,522
Unac. Trail	2,142	4,126	2,367	2,245	10,880
Roll trailer	0	68	918	1,762	2,748
Acc. Trail	11,334	14,248	14,847	11,301	51,730

Source: Port Authority of Gijón

Table 4 displays information about traffic in the route broken down by direction of the ship. Data shows that for all types of cargo, MOS heavily relied on shipments from Gijón to Nantes, especially those involved in the transportation of new vehicles. In the case of shipments from Nantes to Gijón, the most common cargo loaded in the vessels was composed by accompanied trailers followed by smaller share of unaccompanied trailers.

TABLE 4. TRANSPORTED CARGO BY DIRECTION OF THE ROUTE

	New Vehicles		Unaccompanied trailers		Roll Trailer		Accompanied Trailers	
Year	GIJ-NAN	NAN-GIJ	GIJ-NAN	NAN-GIJ	GIJ-NAN	NAN-GIJ	GIJ-NAN	NAN-GIJ
1	6.446	0	1.417	725	0	0	6.826	4.508
2	19.750	0	2.607	1.519	68	0	8.198	6.050
3	20.755	0	1.444	923	918	0	8.771	6.076
4	23.526	45	1.465	780	1.762	0	6.826	4.475
Total	70.477	45	6.933	3.947	2.748	0	30.621	21.109

Source: Port Authority of Gijón

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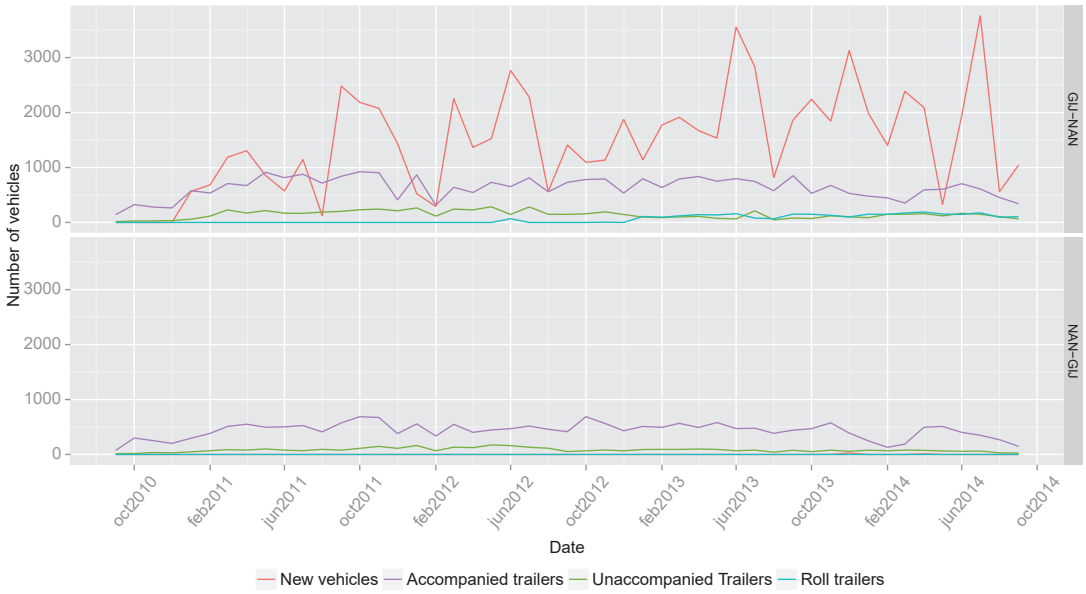
A visual display of information collected in the previous table appears in Figure 5 showing the trade imbalance in both directions. In particular, it is important to note the dominance of new vehicles in transport operations, the similar evolution of accompanied trailers movements and the low number of roll trailers and accompanied trailers in both directions.

FIGURE 5. MONTHLY DATA OF FREIGHT CARGO



Source: Port Authority of Gijón

According to Port Authority of Gijón, in the case of accompanied cargo, Portuguese road carriers have been the main users of MOS transporting a large variety of goods, including agrifood stuffs and specially goods related to automotive industry. As figures indicate unaccompanied cargo was mainly composed by new vehicles, most of them coming from Iveco and Renault factories. This type of freight also included slate from quarries in the north regions of Spain and iron and steel products from the Arcelor Mittal factory located in Asturias.

A geographical analysis of MOS traffic indicates that 58% of short sea shipping imports and exports in Gijón Port have an origin or destination in Portugal, while the remaining 42% is considered as Spanish trade. In Nantes-St-Nazaire port, French trade accounts for 64% of the total traffic of the line, followed by flows with origin or destination in Germany (16%), Belgium (8%), and Netherlands (7%). According to LD Lines MOS imbalances reflect the current trade

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situation of the hinterland regions. In this sense, LD Lines tried to overcome this situation by increasing the MOS demand with an important commercial campaign. LD Lines had contacts with more than 3,000 transport companies relying on their commercial offices located in Spain, Portugal and France.

As it has been commented previously, the MOS Gijón Nantes-St. Nazaire is a Ro-pax service that also transports passengers and private vehicles. In this regard, the line has achieved a similar success in both directions, although the use has been slightly higher from Nantes to Gijón (Table 5). In total more than 49.000 private vehicles and 144.000 people have travelled using this service which means that on average 2,8 passengers accompanied each vehicle.

TABLE 5. PASSENGERS AND PRIVATE VEHICLES MOVEMENTS BY THE MOS

	Passengers			Private vehicles		
Year	**GIJ-NAN**	**NAN-GIJ**	**Total**	**GIJ-NAN**	**NAN-GIJ**	**Total**
1	14.476	15.953	30.429	4.615	5.163	9.778
2	18.088	19.428	37.516	6.146	6.769	12.915
3	18.117	19.600	37.717	6.399	7.031	13.430
4	18.289	20.049	38.338	6.425	7.197	13.622
Total	68.970	75.030	144.000	23.585	26.160	49.745

Source: Port Authority of Gijón

Figure 6 displays monthly data of private vehicles and passengers that used the MOS Gijón-Nantes. It clearly shows very similar patterns in both directions of the route, with an important growth in its use from the first to the second year. Low demand periods occur from October to March, while high-demand peaks appear in July and August for those trips with origin in France and Spain respectively.

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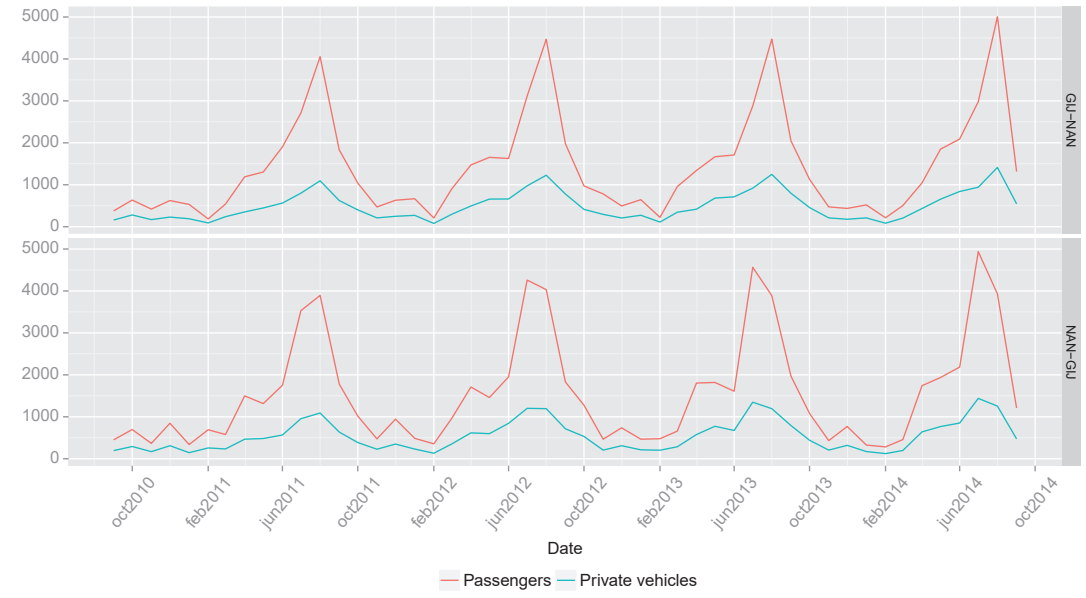
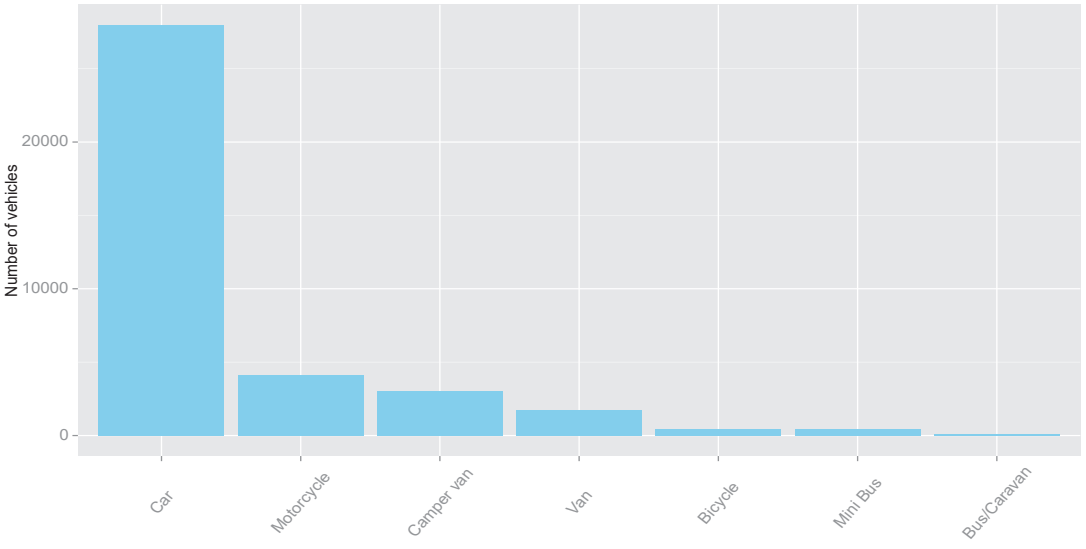
FIGURE 6. MONTHLY DATA OF PASSENGERS AND PRIVATE VEHICLES



Source: Port Authority of Gijón

Cars and motorbikes were the most common types of private vehicles that could be found inside the ships followed by other vehicles for recreational purposes such as camper vans, vans and bicycles (Figure 7).

FIGURE 7. TOTAL NUMBER OF PRIVATE VEHICLES TRANSPORTED (2012-2014)



Source: Port Authority of Gijón

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APPENDIX 1 - DEPARTURES (DEP) AND ARRIVAL (ARR) DAYS AND TIMES AT GIJÓN (GIJ) AND NANTES-ST. NAZAIRE (NAZ) PORTS

	DEP	ARR	DEP	ARR	DEP	ARR	DEP	ARR	DEP	ARR	DEP	ARR
Period	**GIJ**	**NAZ**	**NAZ**	**GIJ**	**GIJ**	**NAZ**	**NAZ**	**GIJ**	**GIJ**	**NAZ**	**NAZ**	**GIJ**
Sep 10 - Feb 13	Sun 16:00	Tue 06:00	Tue 21:00	Tue 11:00	Tue 21:00	Wed 11:00	Wed 21:00	Thu 11:00	Thu 21:00	Fri 11:00	Fri 23:59	Sat 14:00
Feb 13 - Jan 14	Sun 15:00	Tue 06:00	Tue 19:30	Tue 12:00	Tue 19:30	Wed 12:00	Tue 19:30	Thu 12:00	Thu 19:30	Fri 12:00	Fri 23:00	Sat 15:30
Jan 14 - Feb 14	Sun 17:00	Tue 08:00	Tue 19:00	Tue 11:30	Tue 22:00	Wed 14:00	Thu 18:00	Fri 10:00	Wed 23:00	Thu 14:00	Sat 22:00	Sun 13:00
Feb 14 - Jun 14	Sun 15:00	Tue 06:00	Tue 19:00	Tue 11:30	Tue 19:00	Wed 11:30	Wed 19:00	Thu 11:30	Thu 19:00	Fri 11:30	Fri 23:00	Sat 14:00
Jun 14 - Sep 14	Sun 17:00	Tue 08:00	Tue 19:00	Tue 11:30	Tue 22:00	Wed 14:00	Thu 18:00	Fri 10:00	Wed 23:00	Thu 14:00	Sat 22:00	Sun 13:00