

## **ANALYSIS OF VIABILITY TO PROMOTE A HUB RO/RO TERMINAL IN PALMA OF MALLORCA (SPAIN) PORT**

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### **Abstract**

*The presented paper is going to analyze the opportunity to develop a Ro/Ro hub in the Port of Palma de Mallorca.*

*In order to get introduced in the study, the state of art related to geographical, economic traffic and human; conditions, will be reviewed; together with an in deep analysis of the port future capacities and main shipping lines crossing the western Mediterranean.*

*At a first glance is it easy to understand that the competition with other container hub ports in Mediterranean does not afford Palma de Mallorca to be positioned in this market. But the chance to become a hub in rolled traffic will be studied.*

*The final results of this paper are going to identify the main particulars to be enforced to attract the main shipping companies that are providing transport services between the North and South coasts of the Mediterranean and the traffic between Italy and Spain.*

### **Keywords**

*Short Sea Traffics, Ro/Ro, Balearic Islands, hub.*

## **1. INTRODUCTION**

From the time of the White Paper on Transport of 2001, the EU provided a clear boost to the promotion of alternative means of transport, being the Short Sea Shipping (SSS) one of them. This paper was accompanied and followed by different schemas for founding any proposal that represented a removal of freight from road to sea or inner waterways (PACT, Marco Polo I and II programmes or funds from TEN-T. [1]).

The work carried out by the author's shows in this paper the carried out analysis to develop a Ro/Ro cargo hub in the Port of Palma of Mallorca, that would represent an increase of the occupation rate in some berths at port and also an increase of the number of trailers boarded on ships developing this traffics.

In order to cover this goal, a study of different steps will be carried out:

- Assessment of different commercial exchanges between Spain and the countries of the North of Africa.

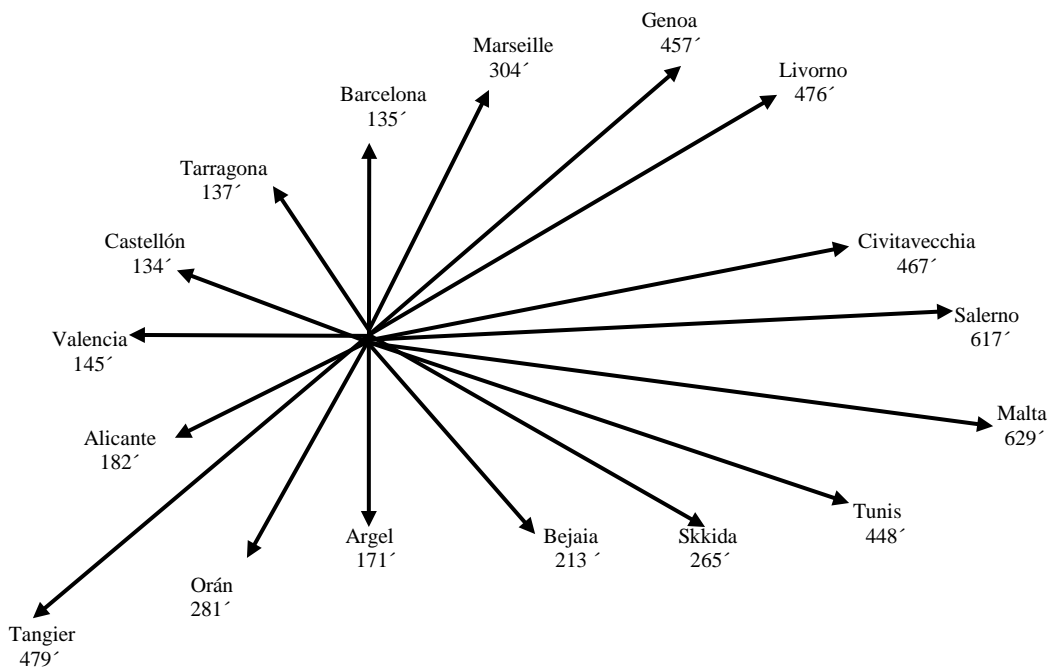
- Location of the origin and destination of cargo in the traffics in Western Mediterranean among the mentioned countries. Identification of the route more susceptible to be deviated to Palma.
- Study of involved ships in these traffics and the level of occupation in their holds.
- Study of the port infrastructures in Palma, to be dedicated to receive the new cargo.
- Study of the supplemental costs on doing an additional call in the Port of Palma
- Proposal of lines to be deviated to the Port of Palma.

## 2. GEOGRAPHICAL PARTICULARS OF BALEARIC ISLANDS

Balearic islands is an archipelago placed in the Western Mediterranean close to Iberian peninsula and it is part of a number of islands and small islands like Gimnesias: Mallorca, Menorca and Cabrera, and Pitiusas: Ibiza and Formentera. Mallorca (Maiorica), big island, is the biggest one in the archipelago, situated in  $39^{\circ} 33,7'N$   $002^{\circ} 38,4'E$ . From the demographic point of view, is the more populated reaching the 873.414 inhabitants in the last cense in 2.011.

Its situation as it is shown in Figure 1, is at mid distance between both sides of the Western Mediterranean basin.

**Figure 1** - Distances among different western Mediterranean ports and Palma de Mallorca



Nowadays, there are several routes in the North-South and west-East, and for this purpose we think that we can propose Palma of Mallorca as a hub in between those routes.

In the table 1, we are going to show the optimum distances between two ports, specifying in back ink the ones with a call in Palma of Mallorca and in red ink, the direct to destination ones.

**Table 1** - Distance chart among Mediterranean ports with direct course or with a call in Palma.

	Barcelona	Tarragona	Castellón	Valencia	Alicante	Genoa	La Spezia	Livorno	Civitavecchia	Naples	Salerno	Marseilles
Genoa	602	594	591	602	639							
	357	400	483	513	568							
La Spezia	626	618	615	626	663							
	385	431	511	541	592							
Livorno	621	613	610	621	658							
	386	432	510	539	586							
Civitavecchia	612	604	601	612	649							
	466	512	589	617	612							
Naples	747	739	736	747	784							
	560	603	708	716	725							
Salerno	762	754	751	762	799							
	582	625	722	730	739							
Algiers	316	308	305	316		628	652	647	638	773	788	475
	291	277	244	231		532	542	530	552	583	598	414
Oran	426	418	415	426		738	762	757	748	883	898	585
	368	337	266	243		696	704	692	742	774	789	539
Tangier	624	616	613	624		936	960	955	946	1081	1096	783
	548	515	444	421		878	902	901	914	1009	1023	721
Casablanca	787	779	776	787		1099	1123	1118	1109	1244	1259	946
	711	677	606	584		1041	1065	1064	1077	1172	1186	884
Agadir	1039	1031	1028	1039		1351	1375	1370	1361	1496	1511	1198
	962	929	858	836		1293	1317	1316	1328	1423	1438	1135
Malta	774	766	763	774	811							933
	668	702	735	743	744							655
Marseilles			438	449	486							
Toulon			315	347	409							
			448	459	496							
Tunisia			334	365	423							
	593	585	582	593	630							752
	492	525	553	561	561							481

source: own.

In each case it has been studied the direct course between two ports and the same with a call in the port of Palma. Once calculated the distances we have classified the differences under a criterion, if it is below 100 miles in green and less than 50 miles in blue. The other cases have been neglected as they are superior to 100 miles.

These differences between distances have been considered because a ship with a nominal speed of 25 knots could need between 4 to 6 hours more in her trip on average in case of being at port for less than 2 hours.

Nowadays the short sea shipping routes in the Western Mediterranean, like Genoa-Barcelona-Tangier and Valencia-Salerno-Tunisia, have delays in port higher than two hours, and this is one reason that justifies the proposal of the objective of this paper.

In a first assessment in table 1, we can see the routes with more opportunities of success:

**Barcelona:** North of Africa and Morocco.

**Tarragona:** Civitavecchia, North of Africa and Malta.

**Castellon:** Italian ports, Algiers, Malta and Tunisia.

**Valencia:** European ports (except Marseilles), Algiers, Malta and Tunisia.

**Alicante:** All ports (less the ones in North of Africa and Morocco).

**European ports:** Ports in Algeria and Morocco.

As it can be seen in the table, we can confirm that most of the routes are within the two parameters of 50 and 100 miles. There is 102 pair of ports and 14.7% of them are a very good option and 53.9% are adequate. So 68.6% of the routes could be analysed in deep.

## 2.1. INFRASTRUCTURES IN THE PORT OF PALMA

The port in itself is divided in three main parts (Commercial basins, west berth and Peraires), being the nowadays infrastructures, built in the fifties. Financial and political problems, have delayed possible improvements or enlargements. There is a visible congestion of berths from early morning up to midday, because of the ships covering the main traffics with the peninsula.

This situation is worsened in summer because the arrival of cruise ships and sometimes regular line ships must leave the berth and go to anchor to give the berth to a cruise that is arriving.

**Table 2 - Palma port capacities.**

	Berth lineal meters	Nº of berth positions	Surface (m <sup>2</sup> )
<b>Commercial berths</b>	1.174	5	119.000
<b>West berth</b>	1.688	8	88.900
<b>Peraires</b>	2.185,8	6	13.800
<b>Total</b>	5.047,8	19	221.700

source: own, based on Palma pilots information - 2013

But from midday in winter time, the port remains almost free, remaining West berth and Peraires released for virtual ships that could be serving short sea traffics. The Port has a lot of ramps to serve the Ro/Ro traffic but only three small cranes to discharge wood or corn.

In table 2 it is showed the different capacities of the Palma berths and in table 3 is shown also the main regular line ships with their time table. So it is possible to deduct how much time is available in those berths.

**Table 3 - Ro-Ro Palma Port berth time table occupation, by regular line ship in 2013.**

<b>REGULAR TRAFFIC SHIPS CALLING IN PALMA PORT</b>			
<b>SHIP</b>	<b>BERTH</b>	<b>FROM</b>	<b>TO</b>
ABEL MATUTES	2nd. Line West berth	06:00	11:30
VISEMAR ONE	1st line West berth	06:15	12:30
F. GARCIA LORCA	Peraires mole Maritime station n°3	22 :30	08 :00
ALBAYCIN/ZURBARAN	Peraires mole Maritime station n°2	07 :00	11 :30
MIRANDA	Head of Commercial berth	07:00	20:00
TENACIA	Outer ramp of Commercial berth	06:30	12:00

source: own, based on Palma pilots information - 2013

There are up to 16 ramps that would afford port operations in this type of ships in the overall port, being 5 in the Commercial berths, 5 in Peraires berths and 6 in the West berth.

**Table 4 - Ro-Ro Palma port berths occupation level of the in 2013.**

<b>OCCUPATION OF RO-RO BERTHS</b>																								
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
<b>Head Comm. Berth</b>																								
<b>Outer Comm. Berth</b>																								
<b>Peraires N° 2</b>																								
<b>Peraires N° 3</b>																								
<b>West B. 1st line</b>																								
<b>West B. 2nd line</b>																								

source: own, based on Palma pilots information - 2013

We can conclude that the occupation of berths 6/16 is only of 13.8% of time. The most congested time lapse id between 5 to 13 hours in the Peraires and West, berths. These traffics are covered mainly by super-ferries and Ro/Pax ships, with daily round trip to the peninsula part from an HSC that leaves the berth at 8:00 and comes back at 22:30, where the ship remains up to the next day.

Commercial berths receive pure Ro/Ro ships every two days and Ro/Pax ships every day. There is a 71.800 m<sup>2</sup> platform in the West berth with six positions in between 130 to 361 meters and drafts bigger than 13 meters, could act as a freight hub for SSS routes not only for N-S but also W-E, routes.

### 3. CLIMATIC CONDITIONS

The port of Palma, is part of the Western Mediterranean scenario in terms of climatic conditions, and it is not an exception. The pressure, temperature and raining, conditions are similar to the ones in this area but the local winds regime is a little bit different.

Pressure has no major variations during the year and this value is relatively high. So we can confirm that there is stability during the year round and in general terms there are very stable conditions due to its situation in the 40° of latitude.

Regarding the wind conditions, we can observe that the most common wind during the year is SW in the Palma bay. The W and NW winds are common in autumn and winter time and even very cold N and NE. Southerlies are typical in summer time which can affect the ships' manoeuvres from midday to the afternoon.

Also in summertime it is possible to register very strong SE winds but those are not so common and can join to coastal breezes.

Temperatures are not so cold in winter but not so hot in summer, this last because of the medium size of the island that does not afford a very high warming of the air during the summer. Because of this mentioned slight warming of the air on the island surface, it elevates leaving pass to the sea breeze and giving a certain degree of humidity in the environment.

Precipitations are most common in autumn, being spring the other season with some rain levels, but in general terms the situation is very similar to the one in the Iberian Peninsula.

**Table 5 - Climatic data in Palma of Mallorca**

CLIMATIC DATA IN PALMA OF MALLORCA													
Month	Pressure in hPa	Mean Daily temp.	Rel. Hum. in %	Wind frequency in direction %								Mean Int. Km/h	Rain in m/m
				N	NE	E	SE	S	SW	W	NW		
January	1021.1	10.0	71	16	17	5	2	9	26	10	15	9.1	36
February	1018.4	10.5	70	17	6	11	2	10	37	14	9	10.5	38
March	1016.5	12.2	69	8	9	7	3	8	39	18	8	9.7	39
April	1014.9	14.2	67	10	17	8	3	10	37	6	6	9.8	37
May	1016.2	17.7	67	2	7	8	6	20	52	5	4	8.8	43
June	1017.1	21.4	66	3	12	5	1	20	54	4	1	8.9	21
July	1017.5	24.5	66	3	5	5	0	28	57	0	2	9.1	8
August	1017.6	25.1	68	1	7	6	1	32	50	1	2	7.8	14
September	1017.6	22.6	71	5	12	6	6	24	38	5	4	8.9	67
October	1016.9	18.6	72	15	14	4	2	10	35	13	7	8.6	67
November	1016.9	14.2	72	16	14	6	0	7	26	13	18	9.9	58
December	1018.3	11.4	72	25	8	1	0	7	34	14	11	9.4	53
<b>YEAR</b>	1017.5	16.9	69	10	10	6	2	17	40	8	7	9.2	481

source: Derrotero de las Islas Baleares. 1983 n° 3 Tomo II - Instituto Hidrográfico de la Marina, Cadiz.

#### 4. SSS COMMERCIAL FLUXES BETWEEN SW EUROPE AND THE NORTH AFRICAN COAST

The services between Morocco and the EU covered by SSS traffics, is mainly developed by Ro/Pax ships, mainly from Italy, calling at Barcelona and arriving by Tangier-Med, apart from the services crossing the Gibraltar strait.

Different companies are serving these traffics even several ship owners have disappeared like COMANAV or COMARIT. Grandi Navi Velocci is using 4 ships in this service and Grimaldi Group with one ship; both cover the area from Genoa, Sète and Livorno calling also in Barcelona.

From Sète, Grandi Navi Velocci covers the route with Nador weekly with a ship, being most of them the same modern, big capacity and high speed units.

The authors have been studied the traffics and they are of the opinion that W-E lines crossing the Western Mediterranean could feed the N-S lines, transboarding part of their cargo in Palma

For example Grimaldi Group has important routes linking Italian Ports like Salerno and Civitavecchia with the Port of Valencia in Spain. Part of the freight could be discharged in Palma and taken by the lines that link Genoa, Sète and Livorno with Tangier-Med.

**Table 6** - Cargo and technical particulars of ships covering S.S.S services

S.S.S. in service ships particulars. Western Mediterranean								
	Particulars					Freight		
	Kw.	G.T.	LOA	Speed	Consumption T/day	Passengers	Cars /Freight	Lineal meters
Ikarus Palace	44480	29968	200	31		1500	820	2130
Excellent	25950	39777	202	24	86.4	2230	610 163/1800	2350
Majestic	23040	32777	188	22	90	1790	610 163/1500	2050
Splendid	23040	39139	214	22		2200	1010	
Fantastic	25920	35222	188	22	90	2033	630 160/1700	2150
Average	28486	35376						

source: GNV and Grimaldi Group, data - 2014

#### 5. SHIPS USED IN THE COMMERCIAL LINES

Several companies are giving service between peninsula and Balearic Islands, deploying also different type of ships depending on the frequencies (see table 7), speed and type of cargo, required. The nowadays offer affords to adjust prices but they are still high because there is no cargo for return to peninsula voyages.

The chance to use the Port of Palma as a hub, could improve the mentioned situation, so as combining the SSS services with the simple service to peninsula. But shipping companies usually has used vessels for carrying rolling cargo with or without passenger capacity and during the last years it has been possible to confirm an increase in the size and speed of the newer ships [2]. As a general trend we can confirm that the vertical cargo has been slowly disappearing and the only freight Ro/Ro ships also are being removed by Ro/Pax units.

Nowadays the average ship used in the studied traffics, is mainly a vessel with a good cargo capacity, with a speed of around 20 knots or more and certain capacity for passengers and their vehicles.

**Table 7 - Regular line services calling at Palma Port**

Owner	Itinerary	Frequencies		Type of vessel
		Summer	Winter	
Acciona Trasmediterránea	Barcelona	1 daily	1 daily	Ferry
Acciona Trasmediterránea	Barcelona	1 weekly	1 weekly	Ro-Ro
Acciona Trasmediterránea	Valencia	6 weekly	6 weekly	Ferry
Acciona Trasmediterránea	Valencia	2 weekly	2 weekly	Ro-Ro
Acciona Trasmediterránea	Ibiza	1 weekly	1 weekly	Ferry
Acciona Trasmediterránea	Mahón	1 weekly	1 weekly	Ferry
Balearia	Barcelona	7 weekly	6 weekly	Ro-Pax
Balearia	Valencia	7 weekly	6 weekly	Ro-Pax
Balearia	Ibiza-Denia	1 daily	4 weekly	Fast-ferry

source: own, based on Palma pilots information - 2013

Several authors are of the idea of classifying the ships depending on their speeds, grouping them in three different categories. For ships with a speed below 23 knots, we can talk about conventional ones, for speeds between 23 and 30 knots fast conventional ships and HSC the ones with speeds superior to 30 knots [3,4]. Also the cargo capacity is related to the developed speed, as for example the last ones are constructively light monohull or multihulls; with a limited cargo capacity.

**Table 8 - Technical particulars of ships calling in the port of Palma de Mallorca**

REGULAR LINE SHIPS, CALLING THE PORT OF PALMA								
COMPANY	SHIP	G.R. T	LOA	d	H.P.	SP.	LINE	TYPE
BALEARIA	VIEMAR ONE	26375	186,4	6,3	20700	25	PMI-BCN	CONV. RAPIDO
BALEARIA	ABEL MATUTES	29670	190,5	5,5	19800	21	PMI-VCA	CONVENCIONAL
BALEARIA	F. GARCIA LORCA	5637	115,2	5,0	4X7200	38,0	PMI-IDN	ALTA VELOCIDA
TRASMEDITERRANEA	TENACIA	25993	199,1	6,5	25200	22,5	PMI-BCN	CONVENCIONAL
TRASMEDITERRANEA	ZURBARAN	22152	180,0	6,5	2X16116	22,5	PMI-BCN	CONVENCIONAL
TRASMEDITERRANEA	ALBAYZIN	26302	186	6,2	21600	21	PMI-VCA	CONVENCIONAL
TRASMEDITERRANEA	MIRANDA	10471	153,45	6,9	12600	20	PMI-V-B	RO-RO

source: own, based on Palma pilots information - 2013



In table 8, is possible to see what it has been explained regarding the size and developed speed of ships. Shipping companies use to operate classical Ro/Pax ships with seasonal reinforcements with HSC crafts in summer time.

The optimal speed ranges around 23 knots because the distance from Palma to the destination ports in the peninsula does not exceed the 130 miles, having also a power reserve in case of bad weather.

## **6. PARAMETERS TO ASSESS THE VIABILITY OF PALMA DE MALLORCA AS A Ro/Ro HUB.**

The parameters to be assessed in order to calculate the viability of the lines to call in the Port of Palma has been analysed.

On a first step the climatic and geographic conditions of Palma of Mallorca has been considered positive and are not going to be treated more. However the geographic situation of the island, afford Palma to be at a distance of different cargo ports in the Mediterranean.

The first condition has been to establish the possible links for the ones that suppose less than 50 miles of sailing and like possible the ones being at less than 100 miles. The reason has been justified because the ships will not delay more than 6 hours of travel for actual ships, developing.

Once this first step has been studied, The economic situation it is an important parameter to be considered mainly the GDP and the commercial fluxes between countries [5,6], but in this case the scenario of study has been a priori decided.

Ships have been repeated during the paper, that are at this moment sufficiently adequate to the traffic and the last point to be analysed is the operational costs of the new call in the Port of Palma.

## **7. CONCLUSIONS**

The possibility to promote the Port of Palma of Mallorca, as a hub for rolled cargo is understood as an opportunity. This would afford to get more profit not only of the level of occupation of ships involved in SSS lines between Italy, Spain and North of Africa; but also because a better occupation of the berths in the port.

The geographic situation of the island, the climatic conditions and the availability of berths, are some of the advantages. Among the analysed routes, there are between 53,9% and 68,6% of them that would suppose a deviation delay not bigger than 6 hours if port operations do not exceed 2 hours. Of course, this scenario is considered if ships have enough power to maintain 25 knots of speed in normal weather conditions.