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Is there space to build one more transshipment terminal within Portuguese territory?

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Masters in Management

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Purpose of the Project

In shipping industry, there is no extra demand to support the decision to move forward the construction of another terminal. There is firstly the creation of supply and then the demand adjusts to the new conditions.

The necessity of building a new terminal arises when the port reaches its full-capacity. The location and existing infrastructures determine the port typology. There are three main types of ports: transshipment hub ports, gateway ports and regional ports. Transshipment hub ports require deep draught, suitable cranes to load and unload from large vessels and it must be well positioned in order to cross the main routes.

The gateway ports also are endowed with deep water and efficient crane activity. Though, its main characteristic is their location close to major industrial centers¹. The regional ports have shallow waters and it usually lacks of infrastructures to handle different cargo. It needs to be close to industrial centers or populated areas. The volume to and from these ports are handled by small feeders² or intra-regional transport systems such as trucking or rail connected to other minor ports.

Transshipment terminals do not belong to the country where it is constructed. The shipowner has the bargaining power of decision: it decides whether to invest or not. Given this, every country must create favorable conditions to attract the shipowners. There are several factors that will leverage the investor's decision such as localization, maritime conditions, port access, terminal operations (includes union labor), the existence of a hinterland, customs conditions and the competition between ports and terminals.

There is a tendency of the main shipowners to move their strategy towards bigger vessels. Those are addressed to deepsea shipping and its main intention is the reduction of the cost structure. Shipping industry is highly competitive which makes it hard to offer low prices for every route since every port presents different conditions and prices. In order to fight it, shipowners intend to reduce the time storage of the containers in the terminals.

By embracing a transshipment strategy the shipowner experiences many advantages comparing to multi-porting such as cargo will be most of the time within the ships which represent much lower costs for the shipowner and large ships sail between the hubs which enhances the utilization of full capacity throughout the transport chain. Continuing this reasoning, when a shipowner decides to invest in one certain port for transshipment, it creates incentives for the

¹ These ports are able to stand as hub ports in case it are close to the main routes.

² Smaller ships used to scale local ports

country and port authorities to establish transshipment terminals or hubs that are deep enough and with easy accessibility³ to avoid berthing delays that often occurs. Shipowners are able to create a worldwide networking of services to employ logistical strategies that optimize the movement of containers on their networks by matching volumes to capacity: it amortizes the demand cycles.

In a industry where supply is created first and then the demand is reconfigured based on the new offered services and routes, it is a great challenge to try to figure it out if a construction of a second terminal in Sines would be benefic for the investors and, of course, for the country.

There is no lack of supply anywhere. This means there is no cargo seeking for a port at least for the following five years. There are several big ports that are currently expanding its capacity which will be more than enough to respond to the demand expectations.

Literature Review

Previous research showed that the hinterland transportation of containers represents a considerable portion of the total costs of the deepsea container line. Other relevant cost is the pattern presented by the deepsea vessel since formerly the ships call at a several number of ports before go through the ocean (multi-porting). This way, it arise the hub-feeder structure. This tendency goes towards the large transshipment movement of containers: this provides reductions in hinterland costs and port times. This happens due to the opportunity to take the containers closer to its final destination by ship. In order to be worth it, the reduction in costs and time must compensate the increase in the number of container moves by the stevedore and the increased feeder movements. This implies that this system should only be adapted if there is enough cargo, so the terminal handling costs per move decrease. The transshipment terminal design is much different from one addressed to multi-porting operations which means that it is necessary to redesign them to achieve efficiency and competitiveness.

There are three relevant entities that compete within the transshipment business: the shipowners, existing terminal operators and third party terminal operators (for instance public sector). The leverage of each entity depends on the port⁴.

In an economical overview, as showed in figure 3, it are depicted the necessary inputs for the shipping market and its weight in terms of revenues and costs. Terminal operations are responsible for 17% of the total revenues with a return on capital of 25%, which represents an opportunity to be explored. The costs associated to terminal operations are also a critical matter, 17% of the

³It is more desirable an uncongested port with a long quay and the existence of cranes so it facilitates the operations of put-in/put-out the containers from and to the ships.

⁴ For instance, Transnet monopolizes the existing terminal operations in South Africa

overall costs. The expectations towards the development of another transshipment port will highly depend on the efficient management of the containers (for instance, how they are lifted and positioned or union labor activity). It is necessary to bear in mind the following factors when analyzing the impact on the cost structure: the nature of the markets served by the port⁵ and the existence of specific markets (growing industries).

As the number of called ports per ship increases, the operating and voyage costs will be higher. Additional time which is required for the entry of the port, the maneuvering in the port and the non-working hours of the port personnel decrease the revenues from the ship. There are two timesaving strategies for deepsea container carriers which are minimizing the turnaround time in port and the reduction of the number of ports saved.

Regarding positive externalities, there will be more employment for the handling and storage of the containers. Terminals also create jobs due to the repair and refurbishment of containers and their scraping (maintenance) and the logistical control of empty containers which represent 25% of the total carried volume⁶. Transshipment may also grow through industrial incentives such as the interception of cargo for intermediate processing⁷ which is labor intensive and attractive for investment from footloose industries.

A dilemma that arises within the transshipment strategy is if they should follow direct or indirect services. The feeder service is based on a direct service from the hub port to the various ports. Besides this strategy, there is an indirect strategy which can be adopted as well.

The direct strategy results in shorter transit times but requires more feeders and the number of transshipped containers is smaller. It requires ships with small capacity which implies lower economies of scale. Other negative factor is related with the total transit distance, thus increases the transit costs. The indirect strategy implies to serve a number of ports during one voyage. This strategy evolves longer transit times but it is required fewer and larger ships which increases economies of scale. Also the overall transit distance is lower when comparing with the first strategy.

There is not a correct answer for which would be the best strategy to be applied. All the factors previously mentioned must be considered. Also the localization of the hub port is relevant in order to determine the total transit distances.

⁵ Economies of scale can be maximized when the port has a large share of the local market

⁶ Empty containers is the largest category of cargo transported by container shipping

⁷ Sorting, repackaging, labeling, sampling, inspection, valuation.

1) Introduction

Shipping Activity: Tendency towards bigger ships

Over the years, shipping activity is experiencing crucial changes. As long as the worldwide volume keeps increasing, the companies must choose between two strategies: to grow or to remain small⁸. The main shipowners are clearly seeking to move towards very large container ships.

There are two main reasons behind it: technology forward and economies of scale. The technology advances enabled the ships to increase their capacity without a proportional increase of the deadweight (empty slots)⁹. Regarding economies of scale, studies were made where it showed that bigger container ships have clearly lower costs per container (Figure 1). Larger vessels are more cost efficient and better suited to the current market conditions if it is properly used. In order to survive within shipping industry, the shipowners must be able to offer the lowest rates. By deploying more modern and larger ships, the companies may also reach slow steaming¹⁰, smaller crews¹¹ and lower capital costs¹². Companies within the big ships segment must be quickly to adapt to the new market conditions otherwise its ships will become obsolete for two reasons: they cannot compete in prices against their main competitors and their ships are not suitable for regional trades as a feeder would be. A hub and spoke network was developed to reduce a ship's berthing frequency and cut down the operational costs – it also represents a significant barrier to entry for new companies. A trunk route of bigger mother ships joined a number of branch routes, which are served by feeder ships in the same zone. The port where a trunk route joined many branch routes or services is connected to two inter-continent liners in different areas to form a transshipment hub. The transshipment port selection is influenced by total handling costs, geographical position and feeder connections.

2) Methodology

Shipping activity is growing and it presents fierce market conditions. In an industry where it is difficult to differentiate, the companies will allocate their

⁸ There are many small companies, a considerable number of medium-size companies and a very small number of large companies. The medium-size ships are not considered because the tendency shows that they must grow in fleet size otherwise they would be forced to merge to remain competitive.

⁹ After the closure of the Suez Canal, the companies seek to increase the capacity of their ships but they were not successful due to the big increase on deadweight. As companies verified it, they return to the smaller ships.

¹⁰ Sailing ships at slower speeds does significantly reduce fuel consumption. Lowering engine speed by 10 percent cuts engine power by 27 percent, and reduces the overall energy needed for the voyage by 19 percent.

¹¹ Modern vessels require fewer people to operate them.

¹² The cost per slot of larger vessels is lower

efforts to offer lower tariffs. As mentioned in the introduction chapter, the strategy adopted by the main shipowners is the transshipment activity by acquiring larger vessels.

The dissertation tries to answer to the question that if there is enough evidence to build one more transshipment terminal in Portugal. So to accurately respond to this question there are several sub-questions that need to be clarified:

- Is there enough cargo to support pure transshipment activity?
- What are the port requirements towards an efficient performance? How to attract the main investors (shipowners or port authorities)?
- Where it make more sense to develop other terminal?
- What are the main advantages of doing transshipment activity besides the increase in volume?
- How to forecast the adjustment of routes when implemented more capacity?

The approach research methods were mainly two: literature regarding transshipment activity and interviews to several experts in shipping field¹³.

It is depicted an analysis towards the requirements for the transshipment activity. Firstly, it is necessary to acknowledge if the ports are sustainable for pure transshipment otherwise the port most always bet on a mix of transshipment plus gate cargo. In Portugal, there are a few places would have feasible conditions to build one more transshipment terminal. Due to the lack of conditions comparing to other important transshipment ports it is possible to conclude that there is only one region in Portugal where it makes sense to expand capacity: Sines.

In order to justify if Sines port presents good conditions, it is import to analyze the worldwide market and it is main routes. Sines benefits from its excellent coast and location which enables to cross with important transshipment routes. For instance, it is close to the Mediterranean market which it become a strategic transshipment area since the opening of the Suez Canal.

So to develop an efficient hub and feeder networking it is relevant to depict the main terminal competitors to Sines in the three critical areas: Mediterranean, Atlantic Seaboard and North Europe. As transshipment activity dictates, a megavessel sail towards a big hub and it distributes its cargo through several feeders so it reaches its final destination. So in the North European Market, Sines is competing with a distant port such as Rotterdam since the shipowner will use only one port as its hub, then the smaller vessel will scale all the local ports. Hypothetically, if Rotterdam is the port that presents better conditions, then the

¹³ The interviewers analysis is on the chapter 'Discussion and Results'

shipowners will choose to invest and scale in that port in every route that crosses with the North of Europe.

Other important issue is the competition within one terminal. Currently, only one main shipowner operates in Sines. In an economic overview, the clients' welfare is always better when there is competition among companies. So there is a detailed analysis of the possible entrants into Sines port.

Lastly, there are references to unsuccessful ports and terminals that failed due to lack of requirements mentioned through this paper.

Is there enough evidence to encourage the construction of one more transshipment terminal in Portugal?

Within shipping industry, there is no excess of demand. The investors (private sector) decide to invest in another terminal when there are still no available clients. Supply is created so then the demand comes after it. In this context, it is difficult to justify an enlargement of supply based on the growth of volume every year. The transshipment terminal construction will always depend on the decision of the shipowners since they are the ones who will invest and own the terminal. Following this reasoning, the country must present favorable conditions in order to attract the main shipowners. Natural conditions of the ports, well developed infrastructures and efficiency within the port administrations are relevant factors in order to the investor take a decision.

To better understand the requirements for a transshipment terminal, it is relevant to do a brief analysis of the biggest hub in the world: the Port of Singapore. Its position is a major advantage towards transshipment activity: it enables to be connected with more than 600 ports and it carries 80000 containers per day where 85% come from transshipment movements. It is 16 meters depth which allow hosting Megavessels. Due to an efficient management on container operations, it is able to connect a single deepsea vessel into more than 222 short sea and feeder vessels in less than 48 hours. In short the factors that make Singapore port the biggest hub in the world are the location, the anticipation of demand due to the investment in berths and cranes; the increase in efforts to develop a deepsea and short sea effective network; a fast and reliable inter gate haulage and an efficient container management.

Pure transshipment cargo or Mix of transshipment plus gate cargo

Accordingly to the interviewers, a Portuguese port is not able to survive based only on transshipment activity. This activity does not generate revenue, only costs that are supported by the shipowner. Despite transshipment activity reduces the costs of short sea shipping it will still represent a loss unless there are enough revenues to surpass those costs. In order to have a pure transshipment terminal: it must be very well located, present lower costs comparing to the terminals and operate a

high level of cargo. It is relevant to note that a pure transshipment port carries high levels of risk since it will depend on a few clients. The supply is extremely rigid and expensive. The investment must be amortized in the long-run. If the clients that are operating in the port decide to move to another one, the investment will be a waste. So to ensure some risk protection, the port must count with local cargo: in the Portuguese scenario, the cargo from Madrid represents a huge opportunity towards the Portuguese logistics and maritime business.

Portugal port activity does not present enough conditions to support a pure transshipment terminal. So there is motivation to embrace a mix of transshipment cargo plus local cargo.

If Portugal was able to sustain a pure transshipment terminal, the preferable areas would be Sines, Trafaria and Açores (Terceira). All these areas present enough depths and space to host big vessels addressed to transshipment activity. The problem is Trafaria lacks of rail infrastructures and road access. In Açores there is no relevant local cargo. Given all these aspects, Sines is the only region in Portugal where it makes sense to invest in one more terminal of transshipment.¹⁴

Due to its proximity from Sines port, it is relevant to mention the ports of Aveiro and Setubal regarding the local cargo, especially the hinterland from Madrid. There is installed capacity in both ports that will be useless in the case that all the gate cargo moves directly to Sines.

However, Aveiro presents several seacoast problems: dredging work, ripple, inefficient berths. Shipowners cannot afford to wait until the sea presents favorable condition. The maintenance costs for these matters will be much higher than the hypothetical value of the volume that would be commercialized. So Aveiro does not have any chance to compete with Sines.

Regarding the Setubal port the conditions are much better. It benefits from its local cargo and it has a powerful client - Grupo Portucel Soporcel - which allows it to be sustainable. Due to the union labor problems in the port of Lisbon, port of Setubal is seeking to catch the cargo addressed to Lisbon since the operational costs will be lower (more benefic for the clients). It presents reasonable condition but not good enough to attract cargo that is meant to go to Sines. Its draught is significantly lower, 9-10 meters depth and there is the dredging work variable. A second terminal in Sines will require a huge long-run investment but after it will not require dredging labor due to its favorable natural conditions. The dredging costs must be carefully analyzed in terms of time and depth¹⁵. The creation of a new terminal in Sines brings more value rather than constant maintenance in Setubal port since this are costs that will remain every year (or every two years).

¹⁴ Sines already operates one transshipment terminal so there would be two hypotheses: to expand the existing one or to build a brand new one.

¹⁵ How often would be dredging work? And how depth should it be?

Also, it is much more benefic for the Portuguese economy that a second shipowner operates in Sines so it would not make sense to develop the second terminal elsewhere. Clients are risk averse regarding delivery all the service to the same shipowner. It is perceptive all around the world, there are more than one shipowner operating in the majority of ports.

Port of Sines

The port of Sines is the national leader and a deepwater port that due to its natural conditions it is not subject to dredging work¹⁶: it is the major hub within Ibero-Atlantica area. The region of Sines is not an urban area which enables the expandability of the terminal in the long-run. It represents the main door of energetic supply¹⁷. It has adequate road access for current traffic and a road-rail development plan that enhances growth projections regarding the port and also its hinterland area¹⁸.

The port has until the moment one terminal for containers, Terminal XXI that started its activity in 2004. It is operated under concession conditions by the company PSA¹⁹ Sines.

Sines benefits from its Industrial and Logistical area (ZILS²⁰): an international logistic platform that is able to receive the great players from the maritime, logistic and industrial activities. It will also include a full integration of the national urban platform in Poceirao and Elvas which will facilitate the connections with cargo from Spain. In order to respond to growth expectation, a logistical plan is being developed in order to link the hinterland between Portugal and Spain²¹.

ZILS – Industrial and Logistical Zone in Sines

As it was mentioned, in economical terms the added value from pure transshipment is not significant: basically the creation of a small amount of jobs. ZILS is endowed with great access to every type of transportation: maritime, rail, road and air²². It is necessary to explore the logistical parks where there are assembling factories. Since Portugal lacks in raw material and it presents low levels of production, it must make the efforts to bring non-national cargo²³ that

¹⁶It is the only one in Portugal that is not subject to dredging work which means lower operational costs.

¹⁷ Oil, coal and natural gas.

¹⁸ Its hinterland passes throughout southern and central Portugal: 150 km from Lisbon, 125 km from Evora, 100 Km, 182 Km from Beja and Faro. As a wide hinterland, the Port of Sines is very well positioned in the Spanish Extremadura and on across the hallway to Madrid.

¹⁹ PSA - Port Singapore Authority

²⁰ ZILS stands for “Zona Industrial e Logística de Sines”

²¹ IC33 links - Sines / Evora / Spain; IP8 - Sines / Beja / Spain and rail link Sines / Elvas / Spain).

²² Due to the proximity of the airport in Lisbon.

²³ Attract cargo into the port of Sines so it can be re-exported

still requires doing the final assembling before the final customer. This way, Sines re-exports cargo which generates wealth and benefits the commercial balance. This activity represents a big opportunity for the development of Sines and the country. There are already important players from several industries that are performing in the area²⁴.

Also if the plan to link Portugal and Spain through rail gets accomplished, the amount of cargo towards Sines will significantly increase due to the high productivity from Madrid.

Main markets and routes

Firstly, it is important to stress out how it works the decision of which ports are meant to be scaled: the shipowner will decide which ones are worth to invest in. Although the localization is a central point to bear in mind, the shipowners are prioritizing the logistical systems rather than ports: it will reduce the need of being close to a port. In this context, a faraway port with a developed logistic system may be as competitive as other strategic located port due to its hinterland conditions.

Portugal must take advantage of its great coast and localization to catch cargo from the main maritime routes plus it should benefit from the existing hinterland factors. So to better understand where it would be the best suitable place to build another terminal, it is imperative to analyze which are the main distribution areas around the port of Sines²⁵. In a perspective of short sea shipping, the Mediterranean presents currently high levels of maritime activity and there are great growth expectations for this market.

For liner shipping companies the Mediterranean is no longer a simple linking channel but instead a strategic localization for transshipment. It is a growing market that can offer and absorb containers and it is the shortest route to the rich countries in the southern Europe: France, Italy, Spain, Greece and Portugal. Also, the Mediterranean is bordered by several countries that present great levels of growth, such as the North African and those bordering the Black Sea²⁶.

Regarding trunk lines, the routes that must be carefully analyzed are the following: Far East-Europe, USA-Europe and South America-Europe (South Atlantic). Regarding the route Far-East, there is special interest in the cargo that goes to Angola.²⁷ Angola imports machinery and electrical equipment, vehicles and spare parts; medicines, food, textiles and military goods. Portugal is the main supplier of

²⁴ Examples of companies: Repsol and Artlant (petrochemicals), C.L.C (fuel logistics), SCIAL (cement), Petrogal (refinery) or EDP (energy)

²⁵ It is required to be aware of which are the final destinations of the cargo that scales in Sines.

²⁶ North African: Morocco, Egypt and Algeria/ Black Sea: Ukraine, Russia and Romania

²⁷ One of the routes is as following: the vessels scale in Singapore, Suez and Sines. Then the feeder will scale Las Palmas first until finally reaches Luanda.

the Angolan economy (18% of total imports) followed by China, United States, Brazil and South Africa.

Terminal Competition in the Mediterranean

Within a view of competition among terminals in the Mediterranean the more obvious competitors are Valencia²⁸, Algeciras, Tanger, Gioia Tauro and Marsaxlokk.

Valencia benefits from its localization and its hinterland conditions due to its close distance to Madrid and also its position within Mediterranean market. Currently, approximately half of the volume comes from the local cargo and the other half is transshipment cargo. Since it can generate high revenues from local cargo, Valencia is more than able to afford the transshipment costs.

The port of Algeciras is more focus on transshipment but it also has some gate cargo. It managed near to 4.3 million TEUs²⁹ of container traffic in 2013. It is the Spain's number one port and it is the one better located which enables it to be a main hub platform in the Mediterranean. Its position is its main advantage which allows crossing important routes that will link the port with North Europe, West Africa and Asia. Other favorable feature stands for the natural conditions of the port. It is relevant to point out that the huge growth experienced by the port was mainly due to the passenger ferry that is linked with Africa.

The Tanger-Med port start operating in 2007 and it grows every year. It is strategically positioned in Straits of Gibraltar and it is 15 kilometers far from Europe Union. Over 200 vessel a day pass through this region which links trades between Asia, Europe, Africa and America. It includes a free zone with more than 5000 hectares that is addressed to connect industrial areas through intermodal networks (rail and road). Despite all these factors, Tanger-Med offers lower rates due to its customs regulations.³⁰

Gioia Tauro is classified as a commercial and industrial port and its focus is transshipment activity. In the beginning, the port was intended to be a centre of production of steel and iron. Though, it never actually happened due to the national and global crisis within the sector. Its depth ranges from 12.5 to 18 meters accordingly to the dredging work and its annual volume is rounded in 3 million TEU. The port has seven loading docks with an extension of 4646 meters. In 2007, before the world economic crisis, Gioia Tauro was the premier transshipment hub in Mediterranean territory. It provided 22 intercontinental

²⁸ *Valenciaport* (comprising the ports of Valencia, Sagunto and Gandia) is one of the largest and most important maritime cargo gateways in Spain and the Mediterranean. Its depth is 15-16 meters and it counts with an annual throughput of nearly 4.5 million TEU of container traffic and 66 million tons of cargo

²⁹ TEU stands for twenty equivalent unit and it is the standard measure for the containers.

³⁰ Exemption of the tax of license and the urban tax during 15 years, unlimited exemption of the VAT (value added tax) and corporation tax (0% over the first 5 years and 8,75% over the following 20 years).

services, 6 services for North Europe and 28 for the Mediterranean.³¹ Nowadays the port is facing difficult times. Its growth rates are lower than the Mediterranean and European average for the period 2003-2009. Despite the economic crisis, the rising of Algeciras and Tanger-Med also negatively affected the volume of containers operated in Gioia Tauro.

Terminal Competition in Atlantic Seaboard

In this area, the main competitor is Las Palmas. It works as a transshipment centre and logistics platform for containers on a regional, national and international scale. It is the first port located in the Mid-Atlantic and in the geographical area of West Africa: it allows it to cross routes between Europe, Africa and America. It is 11.5 meters depth and it is able to host vessels of 14.000 TEUs. It currently moves 1.3 million TEUs approximately. It enjoys unlimited storage, processing and distribution of goods without incurring in customs duties or indirect taxes. Despite there is some significant container volume, there are activities that are more prioritized within this port: ship repair, deepsea fishing and bunkering.

Las Palmas is increasing its capacity. It is being developed a new port in the area: its depth will be slightly profound (15 meters) and its quay length is being enlarged. There will be a construction of a new terminal as well.

Las Palmas port is an important port for regional development³² and international route convenience. Its main focus is not the container cargo (only 13.5%) and that may represent an opportunity for Sines. Also Sines depth is higher so it is able to host bigger vessels

Terminal Competition in North of Europe

In this market, there is a much diversified capacity supply. The powerful players are Hamburg and Rotterdam.

Hamburg port is located between the North Sea and the Baltic Sea. It is 16 meters depth and it is able to receive and last year it carried approximately 6 million TEUs. It commercializes almost all kinds of products: containers and cars, general and bulk cargo, dangerous goods and project cargo. Around 25 % of the goods handled in the Port of Hamburg have their origin or destination in the greater Hamburg area which represents the strong port's strong hinterland for local cargo. The port is an important cornerstone in Hamburg's economy with the creation of 176.000 jobs in the whole industrial. It is endowed with four well developed terminals.

³¹ Among which 18 were feeders

³² Port activity represents 6% of total production in the region. It created about 9500 direct jobs which it was a main contributor for the port to enter in the Free Trade Zone of Gran Canaria.

Lastly, the port of Rotterdam it is other considered gate of Europe, it has great access conditions, good hinterland connections and it benefits from the industrial complex that operates around the port. Its terminals are automated container terminals entirely operated by machines through computer which represents a significant decrease in the overall costs: it does not pay wages and there are no problems associated with union labors. In 2013 it handled 11.5 million TEUs approximately which stands for the biggest volume carried within north European market.

Besides these ports, there is one more that is moving its strategy towards transshipment activity: Zeebrugge. It is positioned on main shipping route and it is the closest port to United Kingdom, Ireland and France. It is a young seaport with modern port equipment suitable for the largest ships (17 meters depth). It was subject to the construction of an outer port³³ which due to the good access it facilitates the movement of the containers from/to the vessels. The existence of an outer port with entrance to an inner port plus the other factors already mentioned boosted Zeebrugge to reach a container volume of nearly 2 million TEUs (it almost doubled compared to the volume in 2004). As it is depicted, there was a slightly decrease in the volume since 2010: this may be related with the need of the port to grow local cargo base.

It is important to mention this port since it presents great conditions to be a transshipment hub in the future. The shipowners MSC and CMA-CGM currently scale Zeebrugge port in the Far-east-Europe route. Antwerp will be subject to a negative impact if these companies decided to move their cargo to Zeebrugge.

Entry of more Shipowners into Sines Port after the expansion/construction of another terminal

The three main candidates would be the three worldwide leaders within shipping industry: Maersk Line, Mediterranean Shipping Company (MSC) and CMA-CGM Group.

Maersk invested and keeps investing in the terminals in Tanger-Med and Algeciras so it will be unlikely that the company chooses to change its strategy towards Portugal. Maersk vessels scale Portugal through feeders from Tanger-Med and Algeciras to port of Lisbon and Leixoes. It would be interested in the construction of a terminal in Lisbon³⁴. Maersk allocates some containers into MSC vessels in Sines³⁵.

MSC decided to bet in Sines, when it was inoperable. Since 2004 that Sines

³³ As a result of the large-scale development of Zeebrugge as a deepsea port in the seventies and eighties, the port consists of 3 major parts: outer port, inner port and seaport of Bruges. The seaport of Bruges handles mainly bulk conventional cargo

³⁴ Trafaria would be the most desirable one

³⁵ Slot charter: A voyage charter whereby the shipowner agrees to place a certain number of container slots (TEU and/or FEU) at the charterer's disposal.

corresponded to the expectations and it keeps growing. So it does not make sense that they would be willing to share its profits. CMA-CGM also uses MSC vessels from Sines to the Middle East. The company already did investments in Tanger-Med and Algeciras (as Maersk). Besides it has been done big investments in Malta Freeport Terminals (Marsaxlokk)³⁶ which requires a considerable volume to remain sustainable. This way, there are no much incentives for the company to enter in Sines. Apart from these three, G6 alliance³⁷ could be considered a good candidate. But for now, this entity does not make any investments and that represents a problem within the view of building another terminal.

Unsuccessful Terminals due to lack of conditions

In order to appraise the risk of building another terminal, it is useful to observe the behavior of some terminals that were not well succeed. Firstly, it is necessary to bear in mind that terminals require time to be productive.

Amsterdam terminal was subject to heavy investments towards technology which cause a big increase in the cost structure. There is fierce competition due to the proximity of big ports such as: Rotterdam, Hamburg and Antwerp. Amsterdam terminal was never able to offer competitive prices comparing to Rotterdam (the closest one). It is expectable that if Lisbon decides to open other terminal, it would be likely to experience the same problems due to its proximity with Sines and due to the limitations of expansion since it is an urban zone.

Malaga started its operations when Algeciras was at its full capacity. Its focus was also pure transshipment since it did not managed local cargo. When Malaga opened, Morocco still was not endowed with a terminal. The shipping line Maersk decided back then³⁸ to move all the excess of cargo from Algeciras to Malaga. In the meantime, it was constructed a new terminal in North of Africa and all Malaga's cargo was moved towards that terminal, Tanger-Med.

It was three years ago that Ferrol port was inaugurated and it required a big investment³⁹ as well. It is a low depth port (12.5 meters) which disables to host big vessels. The terminal had a port operator during the first year, but it left due to lack of clients. So far, there are no still relevant clients and that is why it is still not officially opened.

³⁶Terminal targeted for pure transshipment. In 2008, the government of Malta granted CMA-CGM an extension of the concession for the terminal from 30 to 65 years. Ever since the terminal has been subject to heavy investment mainly in the port's infrastructure and equipment.

³⁷ The new Far East-Europe alliance brings together six carriers - NYK, Hapag-Lloyd and OOCL (from the TGA) and APL, HMM and MOL (from the NWA). They are endowed with more than 90 vessels and covers more than 40 ports in Asia, Europe and Mediterranean are involved and it includes Bohai and Baltic loops.

³⁸ From 2004 to 2007

³⁹ 900 million euros

In a long-run perspective, the port of Antwerp could be facing a threat as well. Currently it operates a significant amount of volume but the growth of Zeebrugge port may cause a big negative impact in the neighboring port. The main shipowners could opt to move their cargo which it can jeopardize the sustainability of the terminal.

All these examples reframe one more time the one of the major problems in shipping: excess of capacity supply.

3) Discussion and Results

Variables	1	2	3	4	5	6	7	8	9	Average
Location	●	●	●	●	●	●	●	●	●	●
Pure transshipment	○	◐	○	○	◐	○	○	○	○	○
Capacity to attract shipowners	●	●	●	●	●	●	●	●	●	●
Mix transshipment plus gate cargo	●	◐	●	●	◐	●	●	●	●	●
Port and hinterland conditions	●	●	●	●	●	●	●	●	●	●
Gate cargo impact	●	◐	●	●	●	●	●	●	●	●
Market potential	◐	◐	◐	○	◐	◐	◐	◐	○	◐
Shipowners' competition in Sines	◐	◐	◐	◐	◐	◐	◐	◐	◐	◐
Terminal Competition	●	●	●	●	●	◐	○	○	●	◐
Main markets: North Africa, Mediterranean and Atlantic	●	◐	●	●	●	◐	◐	◐	●	◐
P3 project	◐	◐	◐	◐	◐	◐	◐	◐	◐	◐
Alternative to Sines	○	○	◐	◐	○	○	○	○	○	○
Labor union	◐	●	●	●	●	◐	◐	◐	◐	◐
Panama Channel	◐	◐	○	○	○	○	○	○	○	○
ZILS	●	●	●	●	●	●	●	●	●	●
North Europe terminals comparison	●	◐	◐	◐	●	○	○	○	○	◐
Negative impacts	○	○	◐	◐	◐	○	○	○	○	○
Economical benefits	●	●	◐	●	◐	◐	◐	◐	◐	◐
Creation of new services/routes	◐	◐	●	●	●	◐	●	●	◐	●
Port authorities and concessions	◐	◐	●	◐	●	◐	◐	◐	●	◐
Bulk transshipment	○	◐	○	◐	○	○	○	○	○	○
Importance of logistic service (rather than pier-pier)	●	◐	●	◐	◐	◐	●	●	◐	◐
Berthing time	◐	◐	◐	●	◐	◐	◐	◐	◐	◐
Environmental issues	○	○	○	○	○	○	◐	○	○	○

This dissertation tries to justify the construction of one more transshipment terminal within Portuguese territory.

The previous table depicts nine different interviewees and its contributions regarding each one of the chosen variables. All the interviewees agree that within Portugal, Sines is the most suitable port to invest in it.

Many interviewees stressed out their concerns regarding if Sines is able to be chosen by the shipowners as its final hub. More precisely, it is unlikely that a shipowner decides to change from any hub from North Europe or Mediterranean to Sines. Despite there is a feeder route from Hamburg to Sines, it represents a significant deviation for the larger vessels and the Mediterranean ports are super-equipped which represents a competitive disadvantage towards Sines.

Regarding pure transshipment activity within the Mediterranean market, Sines' most powerful competitors are Tanger-Med port and Algeciras port. The port of Sines as mentioned already presents great conditions and it grows every year. The expectation in 2014 is to achieve one million TEU. This volume is not enough to compete with the other ports in pure transshipment. Algeciras and Tanger-Med count with volumes superior to 4 million TEUs⁴⁰. Algeciras benefits more from its great position and Tanger-Med from its lower costs which it makes really hard for Sines to compete only in pure transshipment.

The opening of the Panama channel responds to the expectable increase in the worldwide volume. It could represent an opportunity for Sines although there are some limitations that create uncertainty. Accordingly to what have been published, the focus of this channel is the North American market. It is unlikely that the route from Far-East to Europe is done through the Panama since it is much longer than the one through Suez.

Clearly, Sines must bet towards the mix between the transshipment cargo and local cargo. Sines have been presenting reliable solutions. It is convenient due to the proximity to some main routes and it offers lower rates comparing to some competitors. Liner companies already move significant cargo from Valencia to Sines. Despite there is a huge difference between operating volumes as well, there is a big interest to invest in the expansion of 'Terminal XXI'. Recently the government and PSA Sines finally reached an agreement to enlarge the terminal. Accordingly to the recent news this expansion predicts an increase in the annual capacity from 1.7 million to 2.7 million TEUs. It is expected that the port will be able to host three big vessels of 18.000 TEUs at a time and it is estimated to create 200 additional jobs. This project requires a public investment: that is why it is so

⁴⁰ Following this reasoning it would be unwise to build the second transshipment terminal in Lisbon (Trafaria) due to the necessity of new railways.

important to create favorable conditions to attract the main shipowners, especially within a country that presents austerity conditions.

Other project that is being considered is *Vasco da Gama* that would mean a second terminal in Sines. Dubai Port World (DPW) is interested on investing in this project which it estimates that the new terminal will be 4.5 times bigger than the first one so it will present a capacity to operate 4.5 million TEUs which is a significant volume that is able to compete with the main ports within the Mediterranean area. DPW is a strong entity whose runs more than 60 port terminals spread throughout the world and it employs more than 30.000 people.

The wealth model has been changing dramatically from the last ten years until the present: the main production areas are losing business due to the existence of different consumption patterns in other countries. This implies that the multi-polar model of production and consumption will reconfigure the traffic networking. That is why Sines must invest even more in ZILS in order to attract projects of significant volume such as European-Iberian projects. Through the acquisition of more services, there is potential to invest in more distribution centers. This would be the field that was able to create more value to the Portuguese economy. For instance, the construction of new assembling factories are able to present high levels of productivity in case there are enough incentives to bring raw materials from other countries. This way it is possible to increase exports without increasing imports by assembling non-national products. This means Sines receive transshipment cargo and instead it goes directly to its final destination, the cargo leaves the port towards the assembling production lines and when the products are finished, it are re-addressed to the port. These movements generate gains from two sources: increase the exports and it enhances the production lines. Since Sines does not have the conditions of the great hub ports, it must take advantage of the logistical circuits.

The issue of the union labor was mentioned by the majority of the interviewers: there are terminals facing productivity problems originated by the labor force. The union labor is an important factor so the terminal to be successful. Often in Portugal, they are not correctly appreciated. Stakeholders' interests should be in consonance. The union labor must be aware that the likelihood to attract more cargo depend on how efficient is the management of the terminal.

It was unavoidable for the interviewers to mention 'P3 Network Alliance' when faced with the question of other shipowners operating in Sines. On June 2013, Maersk, MSC and CMA-CGM made an agreement to establish a long-term operational alliance to cover Asia-Europe, transpacific and transatlantic trades. The initial capacity would be 2.6 million TEU (255 vessels)⁴¹ deployed on 29 routes. The main focus is to ensure that the big vessels sail fully loaded in order to

⁴¹Ship contributions: Maersk – 42%, MSC – 34% and CMA-CGM – 24%.

explore reduction in costs towards economies of scale. The alliance requires approval from regulators and anti-trust agencies from Europe, U.S. and China. Presently, this project is only waiting for the Chinese authorities' approval. There are many concerns regarding the bargaining power of the P3 alliance: accordingly they would control 42% of Asia-Europe capacity, 24% of transpacific and 40-42% of the transatlantic⁴². In response to it, Cosco Container Lines⁴³ would be other entity interested in construct a terminal in Sines so to be able to sail directly to Portugal where it would have easier access to the Iberian and European market. This way, China could gain more market share and contradict the enormous power of the P3 alliance. Disregarding whoever might be the perfect candidate to operate in Sines, it is advantageous for the Portuguese economy to have a second shipowner operating in the port.

Conclusion

Transshipment by itself represents a cost for the shipowner so in order to be worth it there are several factors to be considered. There is no way to predict the adjustment of the routes after the supply enlargement since it will always be a shipowner decision.

Portugal needs to take advantage from its great coast. The only region where it would make sense to expand the container capacity is Sines. It crosses the main routes: Far-East-Europe, Transatlantic and Europe-North America.

In a small economy as Portugal, there is not enough evidence to support the construction of a pure transshipment terminal. The port does not handle enough transshipment cargo to justify it. So, the terminal must count with additional gate cargo and it should develop the conditions to receive that same cargo. The real opportunity here is the ability to attract cargo from Madrid.

Given this, Sines must allocate its efforts to keep developing its industrial and logistical area. It should create conditions to keep attracting big players from several industries so to keep increasing production and employment levels.

It must focus also on re-exporting products that were not made in Portugal. The production levels of this country are low and Portugal lacks of several raw materials. So it is wise to take advantage from the transshipped cargo that is destined to other country and do the assembling work within Portuguese territory. In case, it is able to retain unfinished products to be completed in Sines, the port and the terminal were able to earn revenues without incurring in excessive costs due to the proximity of the industrial area from and to the port. If the production and consumption patterns increase, it will draw the attention of investors.

⁴² Accordingly to the Federal Maritime Commission (FMC)

⁴³ Chinese supplier of shipping and logistics services

Terminal XXI is almost reaching to its full capacity so it becomes imperative to enlarge it so the port accurately anticipates the demand and this way remain growing. There are already a pre-agreement between the government and PSA to develop the expansion of the terminal space which will be benefic but not enough in the long-run because the capacity will still not be able to compete with its main competitors and the worldwide volume will keep increasing. *Vasco da Gama* project must be taking into account as well. So, there is space within Portuguese territory to build one more transshipment terminal that has the conditions to receive the gate cargo as well.

References:

Primary source

Interviews

Name	Position
Dr. Carlos Vasconcelos	General Manager in MSC Portugal
Dr. Vieira dos Santos	President of Port Community in Leixoes
Dr. Belmar da Costa	Executive Director in Agepor
Dr. Jorge D'Almeida	Board director in Conteparque
Dr. Rui D'Orey	CEO at Horizon View – Navegação e Transitos, SA
Eng. Paulo Moutinho Neves	Vice-President in Grupo Mota-Engil
António Dias	Export Director in MSC Portugal
Prof. Eduardo Martins	Professor at Escola Superior Nautica Infante D. Henrique
Dr. John Phillips	Regional Head of Operations Europe, Mediterranean & The Americas at PSA International

Secondary sources

Books:

- Wijnolst, Niko; Waals, Frans; Bello, François; Gendronneau, Yves; Kempen Dennie Van – “Malacca-Max [2]. Container Shipping Network Economy”
- Caldeirinha, Vitor – “Textos sobre Gestao Portuaria 1999/2006”
- Hooydonk, Eric Van – “Soft Values of Seaports”
- Correia, Antonio Jose Dias – “O Mar no Seculo XXI”
- Seoane, Maria Jesus Freire - “El Puerto Exterior de Ferrol y la Cuarta Revolucion en el Trafico Contenerizado’

Articles

[Http://olharsinesnofuturo.criarforum.com.pt/t660-arabes-avaliam-novo-terminal-do-vasco-da-gama-em-sines](http://olharsinesnofuturo.criarforum.com.pt/t660-arabes-avaliam-novo-terminal-do-vasco-da-gama-em-sines)

<https://www.cma-cgm.com/news/1/cma-cgm-maersk-line-and-msc-to-establish-an-operational-alliance>

http://www.dn.pt/inicio/interior.aspx?content_id=984896

<http://www.publico.pt/economia/noticia/governo-e-psa-chegam-a-acordo-sobre-expansao-de-sines-1634689>

<http://www.sines.pt/PT/Negocios/zils/Paginas/default.aspx>

<http://www.tmeic.com/Repository/Media/Large%20Container%20Handling%20Systems-5.pdf>

Websites:

www.tradingeconomics.com

http://www.atkearney.com/paper/-/asset_publisher/dVxv4Hz2h8bS/content/balancing-the-imbalances-in-container-shipping/10192

<http://www.slideshare.net/rachidass/moroccan-port-tangier-med>

<http://www.portodigioiatauro.it/sviluppo.php?id=3>

http://ec.europa.eu/regional_policy/sources/docgener/evaluation/pdf/projects/port_gioia_tauro.pdf

<http://www.zamakonayards.com/eng/blog/laspalmasportreadyforthefuture/>

<http://www.hafen-hamburg.de/en/figures/facts>

http://www.portofrotterdam.com/en/News/pressreleases-news/Pages/20100624_01.aspx

<http://www.portofrotterdam.com/nl/Over-de-haven/havenstatistieken/Documents/Containers%20class%20of%20lenght%202013.pdf>

<http://www.portoverview.com/data/4.pdf>

Annexes

Figure 1 - Reduction in overall costs as the capacity increases: economies of scale

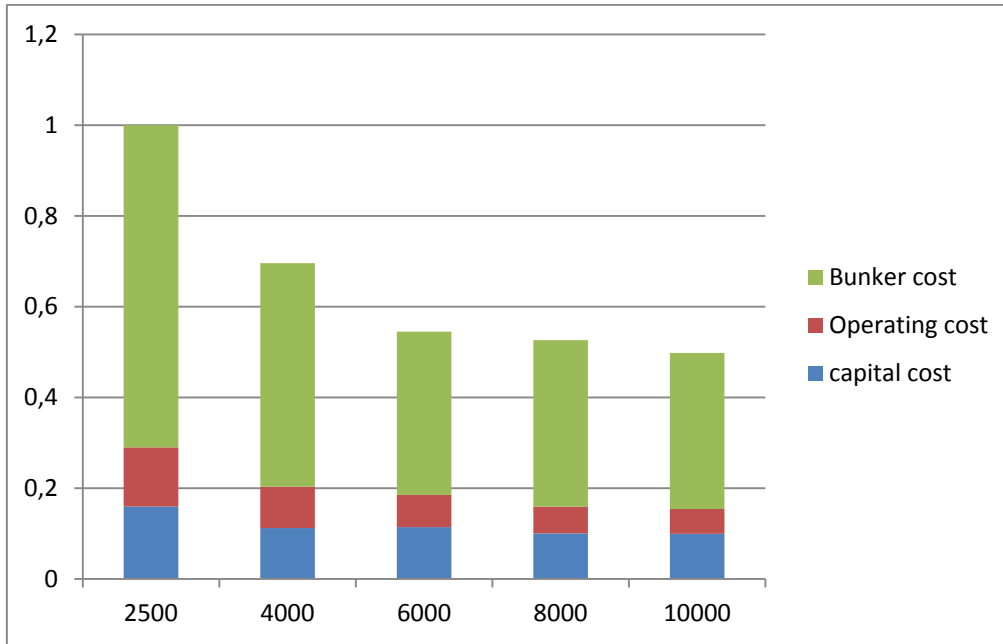


Figure 2 - Fleet capacity Breakdown per TEU (2013) vs. Orderbook Capacity Breakdown per TEU (2013)

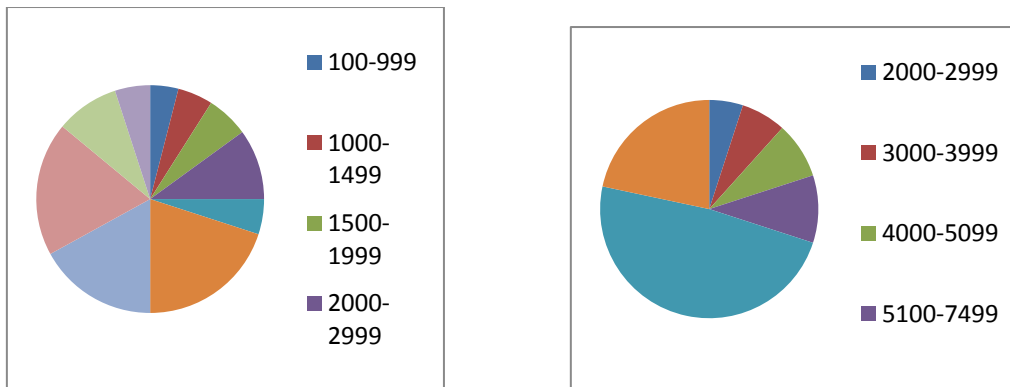


Figure 2 – PSA Singapore – Managing complex transshipment connections

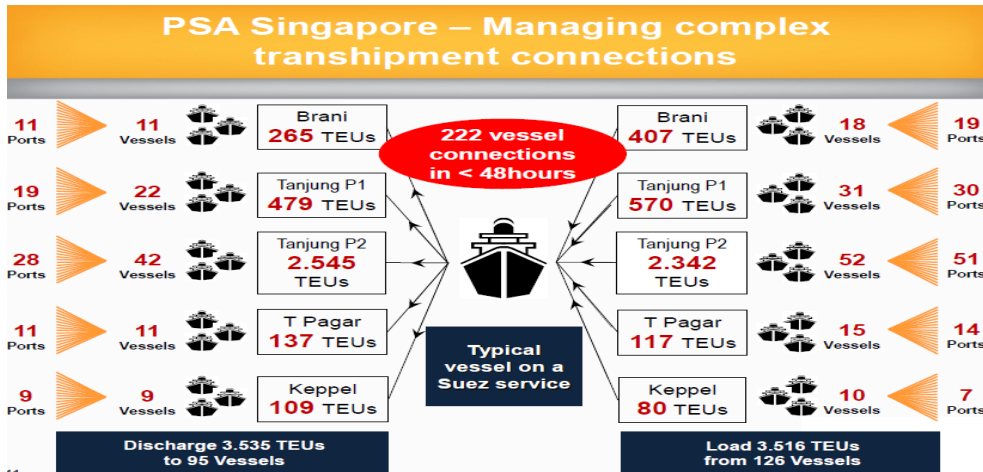


Figure 3 – Percentage share of gross income, costs and estimated return on capital employed in container shipping

Function	Percentage of Revenue	Percentage of Cost	ROCE
Customer Sales, Shipment routing, capital procurement, customer services, billing, tracking of cargo	15,6	16	50
Ownership of container storage, maintenance, repositioning	3,9	4	9
Ownership and operation of ships	49,8	50	3
Terminal control and operation, container handling	17	17	25
Inland transportation	13,7	14	34

Figure 4 - Global Transshipment Evolution

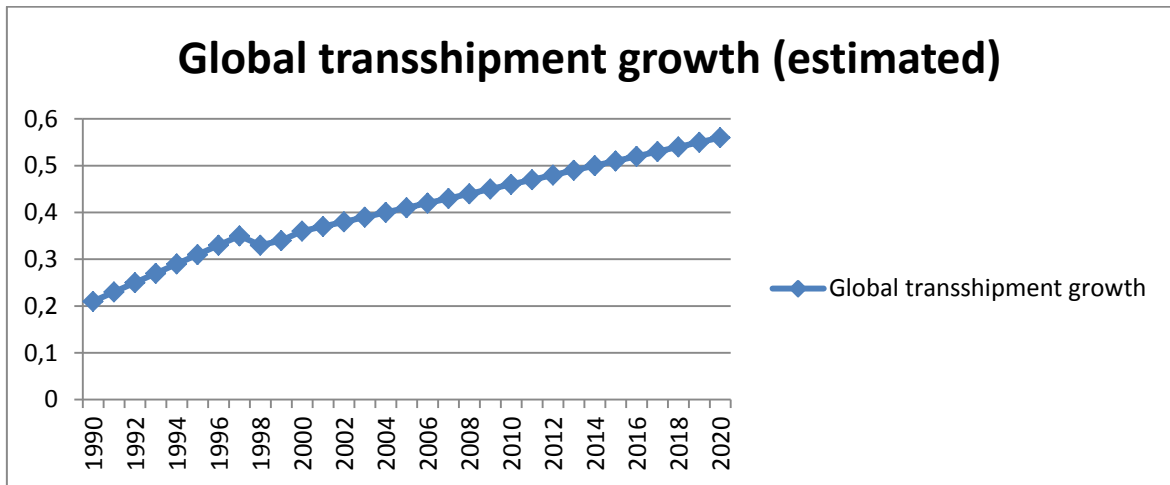


Figure 5 - Mainlane container trade 2008 (millions of TEUs)

Route	Eastbound	Westbound
Transpacific	17,7	6,8
Far-East-Europe	4,9	13,9
Transatlantic	2,9	3,9

*almost one third of global trade

Figure 6 - Regional Share of Global Container Activity (2012)

North America	0,076
C+S America	0,07
S. Europe	0,064
N. Europe	0,098
S. Asia	0,028
Middle East	0,061
SE Asia	0,138
Other NE Asia	0,092
China + HK	0,314
Oceania	0,016
Africa	0,043