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An Assessment of the Future Competitiveness of Port of
Piraeus

by

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Abstract

This study aims to provide an estimate of the current and midterm performance of port of Piraeus container terminal. To be more specific, the purpose of this thesis is to assess the competitive position of Piraeus in 2030 compared to other major European container ports and propose suggestions that would make Piraeus one of the leading ports in Europe. Even though the competitiveness of a port can be expressed by quantitative indicators such as, the throughput of its container terminal, this study will assess Piraeus's competitiveness by examining the potential and the prospects of Piraeus as a container port. Thus, this study begins with a literature review on previous studies which have examined the topic of port competitiveness and came up with conclusions on which are the most important characteristics that make a port competitive and more attractive to its users in comparison to other ports. This enables us to have a clearer view on which of these criteria does the port of Piraeus already satisfies and which not, but should, in order to enhance its competitive position. After that, scenario planning analysis is conducted, which is the main methodology we deploy in order to assess the future of Piraeus container terminal. This analysis will point out the strengths and weaknesses of such a methodology and justify its use for the purposes of this study. Along with the latter it is important to also analyze the current trends that are most likely to affect the future of Port of Piraeus. Those trends are not only happening on an industry level (i.e. container shipping) but also on a country level like the general economic situation in Greece or it could concern initiatives by private companies in Asia that could disrupt the global trade and the global economy. Therefore, it is clear that this research is rather qualitative than quantitative, and the results are not based in any statistical forecasting methods such as regressions or time series models. In contrast, this study will explore different future scenarios that port of Piraeus might face in the future but also develop strategies that will help Greece's largest port to successfully encounter them and become a highly competitive container port. To make our analysis more complete, our main method of research (i.e. scenario planning) is accompanied by a content analysis which have been used to extract the opinions of the industry experts regarding the container port of Piraeus.

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Chapter 1: Introduction

1.1 Introduction

The evolution of logistics along with the increased customer needs for cheaper and faster transportation of goods have made the supply chain more complex than ever. Container ports in their turn, have gone through several changes that transformed them from areas where the imported and exported goods are handled, to an important link in the supply chain network with a wider range of services and customers. (Montwill, 2014). Container ports are not anymore just places where ships load and unload their cargo but economic entities that affect in a high degree the flow of the supply chain network and its operational efficiency. Nowadays, ports are functioning in a highly competitive globalized economic and logistics environment. (Robinson, 2002). This transformation, made them strongly interdependent not only with shipping liners but also with shippers and third party logistic providers who are seeking to capture value within the supply chain. Container ports have integrated more functions than before, especially when it comes to inland distribution activities. (Notteboom and Rodrigue, 2005). This port expansion in a bigger part of the hinterland is what is called in the work of Notteboom and Rodrigue as “Port Regionalization”. This evolution has significant implications for the container port industry as it brought changes to the number and the type of its services, clients and to the style of management under which they operate.

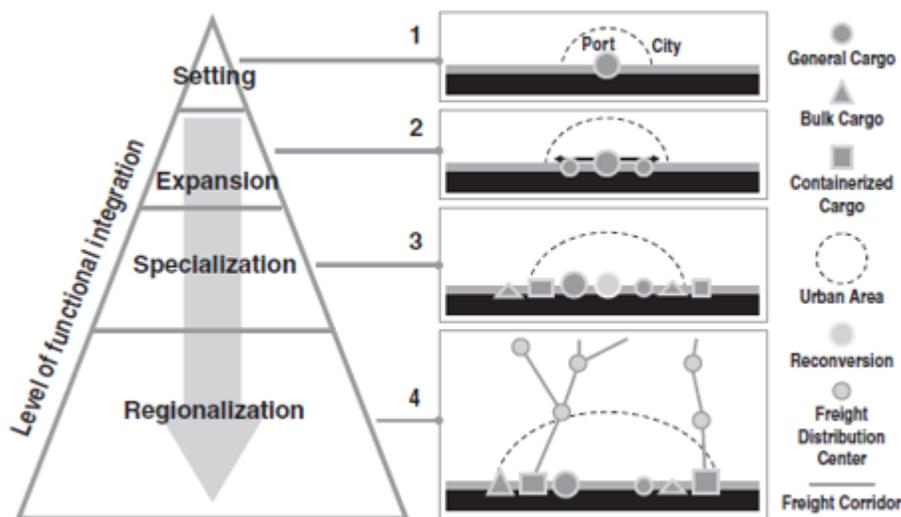


Figure.1: The evolution of a port. Source: Notteboom and Rodrigue,2005

1.2 The Piraeus Container Terminal

Port of Piraeus is the main port of Greece and the largest container terminal port in eastern Mediterranean region. Its geographical location along with its physical characteristics (deep waters, with the absence of tides) make the port able to serve large container vessels which are feeding the European market. What really makes Piraeus an interesting case as a container port, is the growth that the port witnessed in the past decade. Piraeus container terminal handled around 3.7 million TEU's in 2016 which made it the 8th busiest port in Europe. The latter was a jump of 167.7 % in total throughput from 2007 where Piraeus was only handling a mere 1.4 million TEUs. Of course, such an increase is based on radical changes that the port has undergone during that timeframe. In 2009, the China Ocean Container Shipping Company (COSCO) leased one of the two container terminals that were existing (Pier II) after an agreed concession from the Greek government with a horizon of 35 years with the condition of continuous investments on the port each year (Van der Putten, 2014). After that concession and COSCO's investments, Piraeus container terminals are witnessing an overall constant growth each year with the throughput following a steep and constant increase. The container port is consisted by three container terminals, where the third one was completed just in 2016 by investments made by COSCO. The whole capacity of the terminals in total sums up to 6.7 million TEUs which makes Piraeus a considerable opponent in the port competition within the European region. Nowadays, 51% of the container port is owned by COSCO, where the Chinese company aims to increase its influence on the port even more in the future. Reason for the Chinese involvement in port of Piraeus in the recent years has been the plans of China which aim to disrupt the logistics industry and the worldwide trade. The One Belt One Road is a Chinese initiative aiming to build inland trade corridors between Asia and Europe to improve connectivity between the two regions. With that, China aims to penetrate the European market and achieve stronger presence and more direct supply of Chinese goods. The location of Piraeus makes the port a really valuable asset that will support these plans. The port, located on the crossroad of the continents of Europe, Asia, Africa, close to the Suez canal would be the perfect gateway for the Chinese products that will supply the markets. All the above, make Piraeus a quite interesting port case, which may have important implications not only for the Greek economy but also for the global port industry.

1.3 Research Questions

The aim of this research is to assess the competitiveness now and into the midterm future, of the Piraeus container port, in order to provide key stakeholders with strategic options and actions. Meeting this goal would first require to answer the following fundamental questions that arise.

1. What defines a container port's competitiveness?

This basic question relates to the certain conditions that should be met for a container port to be competitive. A series of external factors (social, political, economic, environmental) but also internal ones, are necessary in order to have a competitive port. This question is being answered in the literature review section where the results of recent researches on the topic of port competitiveness are being discussed. Since it is clear what makes a container port competitive, the focus can be narrowed down on Piraeus by demonstrating the below question.

2. What is the current competitiveness of Piraeus container port?

Which is a question of how successful the port of Piraeus is nowadays considering the competition that the port is currently facing. This would allow us to assess the potential of the Greek container port and move forward in identifying the port's future prospects. Then, the following question arises:

3. How will the competitiveness of Piraeus look in the midterm future?

Providing an answer to this question would require estimates regarding the future of the container port. For this reason, there are four possible scenarios that have been elaborated which the Greek port will most likely face based on the analysis we have conducted. In order to reach its full potential, the port's stakeholders should take certain measures for giving Piraeus the opportunity to succeed. This brings us to the last question that we need to answer in order to reach our research's objective.

4. What are the actions the stakeholders should take to make Piraeus succeed?

These suggested measures are extracted from the findings of the analysis conducted in this context. Having a clear overview on the strengths and weaknesses of the port, the forces that are impacting it, in combination with the views of experts in the field, allow us to suggest certain measures that will enable Piraeus to reach its maximum potential in the midterm future.

1.4 Thesis Outline

This structure of this research is the following. In the next chapter, we present a literature review on container port competitiveness. This theoretical review will contribute on having a clear overview on the attributes and characteristics that make a container port appealing to its users and thus being more competitive. Chapter 3 discusses the methodology that we use in assessing the future of Piraeus container terminal. That chapter focuses on identifying the strengths and weaknesses of scenario planning and gives the viewer a better overview of the method which is applied to analyze port of Piraeus. Chapter 4 is the core of our analysis, since the method of scenario planning is being deployed and the possible future scenarios for the Greek port are being assessed. These scenarios have been extracted through a content analysis that was based on the opinions of the industry's experts. Conclusions and the results of the research are discussed in Chapter 5 along with the limitations and suggestions for further research.

Chapter 2: Literature Review on the drivers and forecasting methods of container port competitiveness

Port competitiveness is consisted by several attributes that affect the port choice of shippers, shipping lines, forwarders and terminal operators. Retaining and strengthening the competitive position of a container port is a matter of utmost importance not only for the port authority and the involved stakeholders but also for the whole state in which the port is located. That is, because the economic activities related to the transportation of goods can have a big impact on the country's welfare (Goss, 1990). The characteristics that contribute in the competitiveness of a port are not bounded to be only quantitative indexes. In their studies on container ports, researchers such as Tongzon, Song, Pardali, De Langen and other scholars, have identified numerous qualitative

attributes that define the competitive position of a port. Some of the drivers that define the attractiveness of a container port to potential or existing users can be, the total throughput handled by the port terminals (in TEU's), operation costs and the reliability of port's operations. Attributes which characterize the natural quality of the port are often mentioned in several studies on port selection criteria. In this category there is the geographical location, the size of the area, sea depth and accessibility to intermodal transport for a container port. Furthermore, there are factors that can be studied in order to produce estimations regarding the future competitiveness of a container port such as the economy's growth rate, port's adaptability to new challenges and investments on physical and technological infrastructure. Time series analysis and the opinion of the experts are some of the forecasting methods that have been used on container port competitiveness. Examples of such quantitative forecasting methods can be found in the studies of Veenstra and Haralambides, 2001 who used vector autoregressive models in order to predict the growth of seaborne trade flows among four major routes. Hui et al. in an attempt to forecast the future cargo throughput for the Hong Kong Port, used an error correction model which relies on historical data between the period 1992 – 2001. However, in most of the cases, qualitative methods have been employed, which use the opinion of people who are experienced with the port industry and are considered experts in the field. Examples can be found in the studies of De Langen (2006) and Tongzon (2008), who both surveyed major stakeholders such as freight forwarders and shippers through questionnaires, in their research on port selection criteria. Last, simulation is another method which has been introduced in the literature (Michalopoulos, 2006). The application of simulation methods in ports makes possible to identify the potential in terms of productivity for a container terminal and can be used to estimate the port's competitiveness in the future.

The first part of this chapter is focusing on presenting the competitive drivers of a container port that have been identified in the recent literature. At this point we should highlight that the relative importance of those factors has changed throughout the years due to major changes that the port and shipping industry underwent. That is why in this section our literature review will focus on most recent works that are more relevant to the purpose of this study instead of listing the complete literature on container port choice. These papers are examining the container port choice while taking into account the most recent trends in container shipping, such as the concentration of the shipping market, mainly due to the introduction of shipping alliances and the increased use of larger container vessels by ocean carriers. In order to have a complete literature review on

container port choice, we have concluded most of the main studies regarding the container port choice to an appendix at the end of this chapter. The second part of our literature review is devoted on several methods introduced in the past literature that can be used to forecast a container port's competitive position in the future.

2.1 Container Port Choice Under the New Shipping Era

The strong competition and the overcapacity issues that the shipping industry has witnessed in the recent years have forced shipping carriers to form strategic alliances with their competitors in order to retain and strengthen their competitive position in the market. These alliances have taken the form of cooperative agreements among liner shipping companies. The overcapacity issues and the smaller profit margins in container shipping are some of the factors that led to ocean carriers form these alliances. In addition to that, through the alliances, the ocean shipping companies would face less competition, less risks and would have greater bargaining power in negotiating with port authorities. This transformation of the container shipping industry could not have left unimpacted the container ports and their terminals which need to be able to offer solutions to the new demands of their users if they want to survive the strong container port competition. Under these circumstances, focusing solely on the costs of their provided services or focusing only on improving their connectivity to hinterland may be not enough for today's container ports to keep attracting the volumes of the containerships to their terminals.

Notteboom et al., (2017) analyzed the implications of shipping alliances on container port choice and the change in the patterns that port choice underwent over the past decade. The authors recognize that the competition between container ports has become stronger as the shipping market has become more concentrated than in the past. Such a conclusion is only logical since the fewer number of liner services makes each ship approaching the port accountable a greater part of the port's container throughput than in the past. These circumstances make it imperative for port authorities to improve the physical and technological infrastructure of their container terminals, so they can host and serve effectively the increased demands of these alliances. The larger vessels are now requiring enhanced accessibility and more sophisticated information systems by the hosting ports. In addition to that, the authors examine the relationship between the private terminal ownership and port choice by shipping liners. The latter can be translated in the likelihood for a

container port to be the port of call by a member of the alliance, if one or more liners by the same alliance are operating their own container terminals in that port. By collecting data on weekly calls in Northwestern ports and the private terminal presence in these ports, the researchers are exploring the causal relationship between these two factors. While analysis was based on binary and non binary data, the non binary data showed that there is no clear proof that the existence of a dedicated terminal by a member of the alliance is guaranteed more port calls from the rest of its members. However, based on binary data, the results show that if two or more members of an alliance have a dedicated terminal at the same port there is increased likelihood for that port to be the chosen port by the rest of the alliance. Such a conclusion is logical since shipping liners will be more inclined to use ports where they have higher negotiating power making them able to achieve lower port fees, decreasing the costs of the services being provided to them by the container port.

In the 4th annual report of the Italian Maritime Economy (2017), the authors recognize that the afore mentioned disruptions in the container shipping industry have major implications for container ports since the increased size of container ships, affected the global shipping routes due to the smaller number of container terminals which can efficiently serve the needs of larger vessels. Now, the shipping liners are demanding a more efficient handling of the increased number of containers that they bring into the terminals, in combination with the appropriate infrastructure that will allow them to move the goods faster into the hinterland and further transshipment points. Considering this, it can be clearly stated that port users are now looking into ports that can provide them integrated solutions for their containers, through cutting edge technology and improved handling procedures, that will allow them to feed as many locations with decreased costs and short transit times. An example of the increased need for a more technologically advanced ports can be found in the port innovation ecosystem initiative as was introduced by Rotterdam's Port Authority, which aims at upgrading the port's operations by applying more sophisticated technologies that will offer greater solutions while enabling a more efficient handling of the hosted vessels.

The concentration in the container shipping industry through alliances made it harder to distinguish who is the real decision maker when it comes to ports. In the past, port authorities were arranging their businesses with container carriers by addressing to each shipping liner separately. Now with the presence of alliances, it is logical to assume that port authorities are looking to attract the group of carriers that will bring the carried containers into their port's terminals. Said this, ports are now

aiming in offering a wider set of services that will allow them to be the most competitive choice against other container ports. This issue is addressed in the research of Moya and Valero (2017) on the *Port Choice in the Container Market*, where the authors state that the changes that shipping industry went through the last decades, makes the analysis of the port choice more complex than in the past due to the increased number of parties that are involved in the supply chain. Although there is no clear evidence on who the real decision maker is, the concentration of the shipping industry through mergers, the form of alliances and the increasing size of container vessels are indicating, that the preferable container ports are, and probably will be, the ports which are characterized by developed infrastructure able to serve the increased needs of their users. At this point we can see a cohesion with the rest of the reviewed literature, where connectivity and port efficiency through technologically sophisticated practices are considered as the latest main characteristics that determine the competitiveness of a container port.

It can be observed that the above researches on container port competitiveness are giving a lot of weight on the effects of the concentration of the ocean shipping market and how this phenomenon affected the port choice of the port users. The main focus of these works is how these trends have transformed the needs of the container port users and what measures the port authorities must take in order to be competitive under the intensified competition they face. We can realize that all recent works recognize the fact that container ports need to offer an integrated set of logistic solutions to their users since they demand an efficient overall handling and forwarding of their cargo to additional transshipment points. Of course, it is under questioning if these results are applicable on every container port in the market and on which degree. Our opinion is that since the container market is a highly globalized market, the conclusions that were drawn on the above studies are certainly related for the majority of the container ports. It is true that there are container ports that are affected by different external forces mainly due to their distinctive geographical location or other unique characteristics they might possess. Since the main focus of this research is the container port of Piraeus, we consider it important to dig in further into more specific factors which may affect Piraeus and other ports that share similarities on regional or even financial level.

2.2 The One Belt One Road initiative

China's initiative to establish a transportation route for goods between Eurasian countries through rail connection, can be prove to be a major disruption that could change the global trade in its entirety for the years to come. Such a disruption is having major implications for container ports since it will affect the major routes and the modes of transport, that shippers use for transporting their products. With the OBOR (One Belt One Road) initiative, the logistics map of the the current transshipment hubs will change and new trading patterns will appear putting container ports in a new phase where they need to adjust to the new market conditions in order to be attractive to shippers, shipping lines and forwarders. The implications of this initiative to container ports is also discussed in the report of the Italian Maritime Economy (2017) we introduced earlier in the current chapter. In the research, it is recognized that China's vision to use container ports such as Piraeus, Venice or Gdansk as gateways to source the country's products, can prove to be a challenge for the North-Western European ports and a serious threat for the volumes handled by these ports. However, the port authorities of Piraeus, Venice or Gdansk need to take the right measures in order to be able to absorb such an important part of the volumes of ports like Hamburg or Rotterdam. Investing in hinterland infrastructure and services are examples of such of measures that these ports should concentrate on if they want to fully exploit the opportunities that the one belt one road initiative brings to their local container ports.

Fardella and Prodi (2017), in the "Belt and Road Initiative Impact on Europe: An Italian Perspective" discuss the impacts of the OBOR initiative on the European region and the aspects that European container ports should focus on, in order to exploit the advantages of such an initiative and stay ahead of the competition faced by other well established container ports. It is clear that China's vision is based on two key ingredients which are infrastructure and connectivity. Therefore, it is imperative for the container ports to engage in investments in the appropriate infrastructure to create transportation corridors that will be aligned with the OBOR plans in order to be able to attract the volumes generated by the Asian continent. These investments are mainly referring to the development of the appropriate railways that will be a competitive alternative against the current method of carrying the goods by sea up to the current European gateway ports before supplying the European mainland through trucking or using the existing rail connections.

While analyzing the impact on the European countries from the OBOR project it should be stated that geographical location is the key. The countries that are positioned in key locations of the China's initiative are most likely the ones that will absorb the larger investments on infrastructure and connectivity. Therefore, this analysis is quite important on our study on Piraeus container port due to its geographical relevance with OBOR. The strategic positioning of Piraeus has led China in planning to make the Greek container port a hub connecting Asia, Europe and Africa. Under these circumstances we are pretty sure that the Greek port will be affected massively in terms of expected volume and port calls. The Chinese aim in creating a rail connection between Piraeus and Budapest with high speed trains that will allow them to feed central and Eastern Europe with their products (Figure 2). The authors state that if China's efforts on Piraeus succeed the container port will see a rise in port calls by shipping companies that want to feed the Balkan, Eastern Europe, North African and Western European markets.

However, this doesn't mean that container ports such as Piraeus will be able to absorb the volumes of the well established leaders in Europe such as Rotterdam or Hamburg. As stated earlier, its only logical to assume that the implementation of the OBOR initiative will make port users to seek container ports that can offer integrated logistics solutions that will allow the continuous flow of goods further in the hinterland with low transportation costs and faster transit times. Nevertheless, we are confident to believe that the new windows that China is creating through the one belt one road initiative, are affecting the port choice of shipping liners which seek the most time and cost effective way to move their cargoes from Asia to the European and North African markets.



Figure.2: Rail connection between Piraeus and Central Europe. Source: Pan and Wang, 2017

Prodi (2015), agrees that the prevalence of the Mediterranean over the north western container ports requires a lot of work from the side of the port authorities to become a reality. In his work, “A Sea of Opportunities: The EU and China in Mediterranean” the author recognizes that Mediterranean is not the only way to transport the Asian products into the central Europe. If the new sea route through Arctic becomes more utilized by the shipping lines, then the northern European ports will continue be highly competitive. To be able for the Mediterranean container ports like Piraeus to poses a real threat on the leading ports of Northern Western Europe they have to invest in a modern logistics infrastructure in order to be able to cope with the increased volumes caused by the concentration that the ocean shipping market experienced. If the Mediterranean container ports succeed in a more efficient handling and customs clearing operations, they will improve their chances on being the port of call by container carriers that want to source the central Europe. In addition to that, improving their rail connections to central Europe is again considered as a crucial measure for the container ports that want to take full advantage of the opportunities that one belt one road initiative is offering them.

Focusing on container ports like the Piraeus we can safely argue that although the above proposed measures suggested by the scholars would enhance the competitiveness of the port, it is still unclear if these improvements can be achievable and on which extend. There are certain external factors that define in a high degree the potential of a container port to develop. Considering the proposed investments that Piraeus Port Authorities should make under economic crisis that Greece is experiencing for almost a decade makes us question on which extend the Chinese giant COSCO is willing to invest in rail connection projects that will enable Piraeus to compete the Northern Western European ports. In the case that the Greek economy remains stagnant and COSCO decides that making huge investments under an uncertain economic environment, then how possible is for the Greek port to find the financial resources that will support the required investments that will enhance its competitiveness? Therefore, we believe that the reviewed literature on port competitiveness is lacking in judging how realistic all those measures are and how applicable they are for a group of container ports. In addition to that, we believe that it would be wise to look at the necessary measures not only on a port authority but also on a national scale. Since several Mediterranean container ports are important contributors to the local economy, we believe that each state should participate in the effort of improving their important container ports. An example

could be tax incentives or certain policies that the governments could follow to attract investments and support the local port authorities on improving their container terminals.

In the next page, we present a summary of the port choice determinants as they have been identified in the broad literature on port competitiveness. While the container industry has experienced several major changes from the time that some of these works were published, we consider it useful to present an overview with the results of most of the studies on container port competitiveness.

Study/Factors	Infrastructure	Damage Risk	Ship Visits	Costs	Annual Operation	Volume TEUs	EDI	Delays	Location	Hinterland Connectivity	Time Efficiency	Management Quality
Murphy et al. (1992)	√	√										
Nir et al. (2003)				√								
Tiwari et al. (2003)	√					√			√			
Lim et al. (2004)	√			√			√		√			
Koi (2006)	√			√							√	
De Langen (2006)	√		√						√	√		√
Ugboma and Ogwude (2006)		√	√				√				√	
Lee at al. (2007)										√	√	
Jacobs (2007)	√				√	√					√	
Chou (2007)				√		√			√		√	
Song and Panayides (2008)					√		√	√	√			
Wiegman et al. (2008)	√	√		√					√			
Chang (2008)	√			√		√			√			
Pardali and Michalopoulos (2008)						√						
Pallis and Vitsounis (2009)	√			√	√					√	√	
Tongzon (2009)	√	√	√	√			√		√		√	
Tang et al. (2011)	√			√	√						√	
Steven and Corsi (2012)			√								√	√
Notteboom et al. (2017)	√						√		√	√	√	
Moya and Valero (2017)	√						√	√	√	√	√	
Ferrara et al. (2017)	√									√	√	
Fardella and Prodi (2017)	√						√			√		

Table 1.1: Port competitiveness determinants. Elaborated by the author.

2.3 Quantitative forecast methods

Due to the quantitative nature of several of port competitiveness factors, more than a few quantitative forecasting methods have been used in the past literature to assess the competitive position of ports in the future. Since container throughput can be considered one of the most representative factor of a port's competitive position these quantitative methods aimed in assessing the total throughput in TEU's for specific ports. These methods are in majority econometric and time series models which make use of historical data that affect the port's competitive position.

According to Pardali and Michalopoulos (1996), the most used forecasting method especially for long term forecasts, is the application of single or multivariable regression models for assessing the future demand. For short term forecasting the most broadly used method is the time series analysis (Ernst 1987). Time series analysis implements models where the variables are not only change because of time but also because of other factors which results in different changes of time series data. (Pardali, 1994). The overall effect of those factors causes some certain patterns in the variation of those time series such as:

- i. Trends
- ii. Seasonality
- iii. Cyclic fluctuations
- iv. Irregular fluctuations

The general form of the models that are used in forecasting a port's container throughput in the future is the quadratic form. The quadratic form is expressed as:

$$Y_t = \beta_0 + \beta_1 * t + \beta_2 * t^2 + \dots + \beta_k * t^k$$

2.4 Qualitative methods

The forecasting methods that are qualitative are mainly two. First is the expert opinion method for demand forecasting while the second is the Delphi method.

The expert opinion method is perhaps the oldest method used in forecasting and uses the opinion of experts and stakeholders of the industry under study. Although the opinion and wisdom of experts in the field can be a quite important input in making forecasts the downside is that those opinions are characterized by the subjectivity and the personal preferences of the interviewed experts.

The Delphi method is a modern alternative of the expert opinion method where each one of the interviewed experts expresses their opinion and then the results are presented to everyone in a brief statistical form without disclosing the identity of the respondents. After the presentation of the results, the experts are asked to reconsider their opinions by taking the overall results into account. The whole process is repeated until the point where consensus is achieved.

Another forecasting method is the simulation method. This method records all the operations that are held in a port, assesses the optimal level of operations and calculates the degree of responsiveness in comparison with the optimal level². The simulation model estimates the maximum productivity that a port can achieve and assesses the future container throughput.

The simulation model is consisted by three main characteristics which make the model able to produce fair estimates regarding the future throughput in a port. First, a simulation of a standard container terminal is conducted in terms of infrastructure and operations that taking place. Second, is the forecast which is based on historical data and third, a design model which optimizes the operations regarding container handling. Some of the included variables in the simulation model are: the design of the port, its scheduled operations, the container handling methods that are used and the expected flow of vessels and containers. This method is useful in the evaluation of alternative ways that the containers are handled and the respective costs in each method.

2.5 Conclusions on the literature review

In the current chapter, a literature review on the port competitiveness was conducted, which helped us understand which factors are important and influence the container port choice of a port's customers. The research showed that, port competitiveness is not single dimensional and instead there is a group of factors that define the competitiveness of a container port. While past researches are focusing mostly on, costs, port tariffs and the geographical location of container port, recent researchers seem to highlight more the importance on the technological infrastructure, connectivity and time efficiency that a container port can offer to its users. This shift in the factors that the container port users can be explained by the changes in the dynamics of the container shipping industry. As the container market became more competitive, more concentrated and the margins of cutting costs became smaller, the container carriers are requiring increased efficiencies at the container terminals they visit. Said that, the container ports that have the ability to offer this, mainly through their technological equipment are the ones that are considered competitive among others. However, even for a European container port with cutting edge technology, it still remains questionable if it will be able to compete directly the established gateway ports of Rotterdam or Hamburg. The main issue for that is the high degree of accessibility that these North Western European ports can offer to their users for their goods in central Europe. We believe that to be able to overcome this competitive advantage that these ports have to offer there would need to be a major disruption that could transform the global trade and change the main lanes that the shippers prefer to export their goods to Europe. As hard this might sound we have already discussed above that there are some ambitions in this direction coming from the Asian continent. Through the one belt one road initiative the Chinese giant COSCO aims to reinvent the silk road connecting Asia and Europe through rail aiming to offer faster transit times for the Chinese goods with less logistics costs seen from an integrated perspective. The reviewed literature supports our view that if this project succeeds that would have major implications on container port competition. However, it should be mentioned that COSCOs vision cannot make the container ports that fall in their plans become one of the busiest in Europe without the appropriate measures taken by the port authorities. Port authorities have to be willing to invest in measures that will enhance further the efficiency of their container terminals in order to take advantage of the opportunities that the one belt one road initiative will offer to their container ports.

In the second part of the literature review we saw the main forecasting methods that can be used in order to make projections about the competitive position of a port in the future. This competitiveness can be expressed in terms of the total throughput of a container port. The majority of those methods are quantitative which is reasonable since a lot of the variables that are correlated and affect the volume handled in a port are quantitative. Those methods are econometric regression models, time series and auto regressive integrated moving average models. Qualitative methods used in the literature were also identified which are based on the opinion of experts in the industry but they suffer from the characteristic of subjectivity due to the different personal perspectives of each expert. Last, we should state that the identification of the port competitiveness characteristics along with the methods that can be used in forecasting competitiveness, will be useful for our research in determining the current and, assessing the future competitive position of port of Piraeus.

Chapter 3: Methodology

The current chapter is devoted in illustrating the proper methodology that will allow us to give comprehensive answers on the research questions that have been put forward in the beginning of our research. In order to keep an organized and well structured framework, this chapter is divided into the following three sections. First, we discuss the main characteristics of scenario planning as research method, its strengths and weakness but also the reasons that we believe it fits well with our research purposes. Second, we review two main cases that scenario planning was implemented. In the last section, we provide a detailed description of the methodology we are deploying along with a description of the inputs we used in order enhance the reliability of our results.

3.1 The Scenario Planning Process

As has been stated in the early stages of our work, the main purpose of our research is to provide an assessment of the competitive position of Piraeus container port. As this leads to the necessity of making forecasts about Piraeus, one could argue that we should employ statistical forecasting methods in order to assess the container port's ranking among other European ports based on certain indexes. However, we have already concluded from our reviewed literature that the drivers of port competitiveness are not being expressed solely in quantitative indexes, but they are also consisting of several qualitative attributes such as the quality of the terminal operation services. Thus, we primary consider appropriate, a qualitative forecasting method able to account for factors that cannot be directly translated in numbers. An example could be the political environment in Greece and how it can impact the future of Piraeus container port. There is no doubt that providing future estimations under such a context is quite challenging. Therefore, we believe that it is necessary for our forecast to account for more than one plausible future for Piraeus container port. This would make our projections to be more realistic and more accurate than in the case of providing just one possible outcome for the future of the Greek port. Considering the large number of dynamics that are affecting our estimates and the need to provide a set of the most possible outcomes for Piraeus, we have chosen to employ the scenario planning method. Since the core foundation of scenario planning as a method for strategic planning is based on exploring different possible futures, we are able to assess a set of the most likely to happen futures for Piraeus. Scenario planning is built on specific interrelated stages which are enabling us to set a clear

objective while considering the relevant forces that can lead in different plausible futures, depending on the direction of those forces and the consequences resulting from their combination. Thus, the initial step of scenario planning is to determine the focal issue that we are called to investigate. By stating the main issue that we are called to address, we can define the scope and limits of our research while this stage is also a starting point for the sub questions that are being raised right after that. An example can be found in the early stages of our work where our main problem of how to make Piraeus one of the leading European container ports is followed directly by the question on what the potential of the Greek port is in order to become one of the biggest. After defining the focal issue, it is necessary to thoroughly analyze the endogenous factors and external forces that can have an effect on the future development of Piraeus. The drivers that can influence Piraeus as a container port are covering a wide range of categories such as social or ecological factors. The next stage is devoted in narrowing down to the most likely critical uncertainties that can impact our focal issue. In this part it is important to further analyze the size of the possible impact of each uncertainty to our system. The numerous factors and dynamics can affect our framework in numerous different ways and lead to an infinite number of possible scenarios for Piraeus. Therefore, the stage of scenario logics is necessary before engaging in the creation of future scenarios. With scenario logics as a stage of scenario planning process, we can narrow our scope to an effective number of possible outcomes that will enable us to reach comprehensive conclusions and avoid making the analysis more complicated. With the completion of scenario logics, the conceived scenarios are being elaborated where the different possible futures are being described and followed by the implications stage, where a set of options and suggestions related to each scenario are being presented. The options in each given scenario have given solutions and opportunities not only for the positive scenario but also for the less optimistic ones. Scenario planning is completed with the early indicators stage which are signals which are implying the upcoming of a predicted scenario. This is a quite important stage as it allows taking advantage of opportunities that might arise or take measures that will mitigate exposure to potential losses on time.

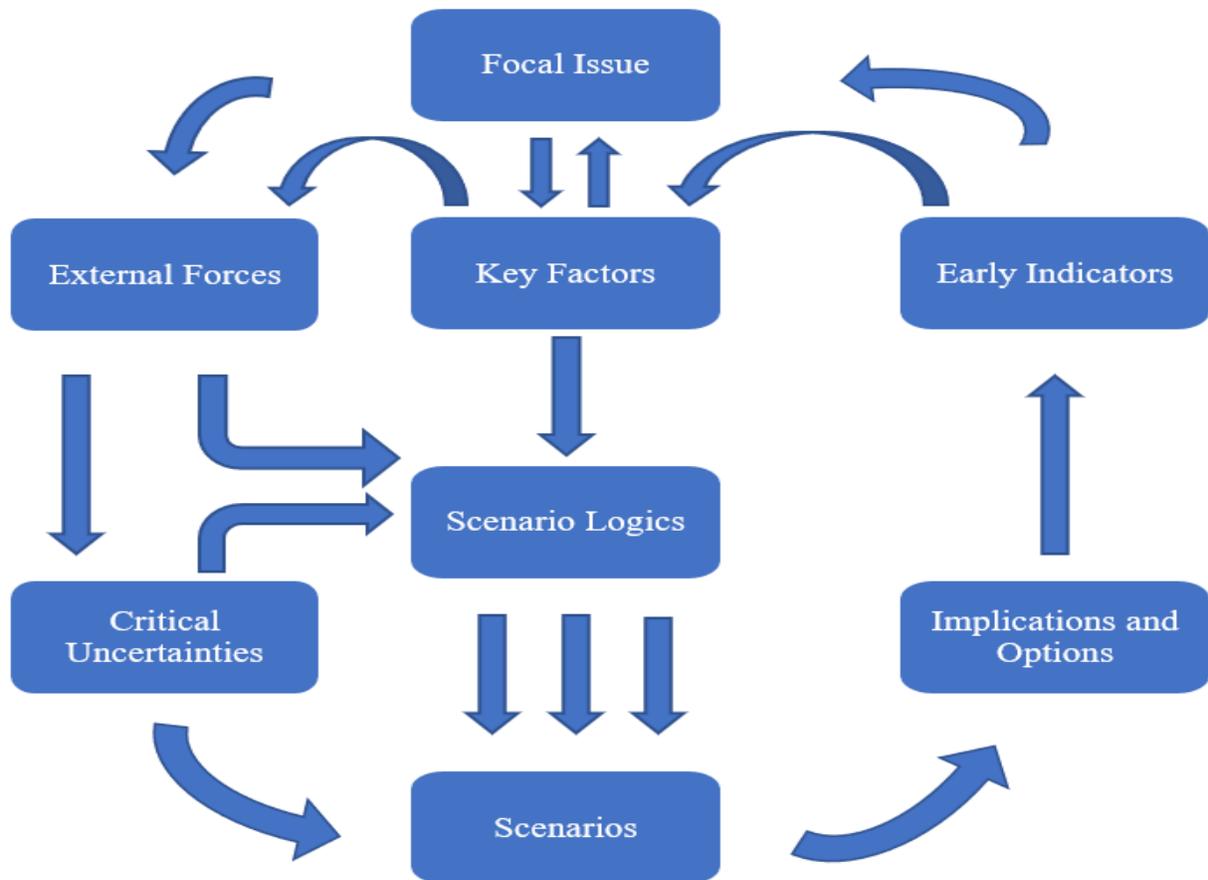


Figure.3: The Scenario Planning Process. Elaborated by the author based on Stratfor (2015)

As expected, scenario planning does not represent a flowless technique with no limitations for the researchers. One visible weakness as a method is the over simplification of the impact of external or endogenous factors on the future scenarios. Since each scenario is dependent on numerous external factors that can be potentially determined of, and since all these factors can take different directions, each possible combination of those forces could potentially lead to a different future scenarios. This increases the probability of excluding scenarios that have good chances to occur. The latter leads to a reduction of the degree of robustness of scenario planning as a forecasting method. It is logical to assume that the number of scenarios should be adjusted according to broadness of the focal issue and the forces that can have a potential impact on it. But even though this over simplification increases the probability of possible futures that have not been forecasted, it is necessary to keep the analysis coherent while avoiding of becoming too complex for drawing useful conclusions. An example is the container port of Piraeus and the numerous factors that can

have a direct or indirect impact on the port's current and future state. The highly globalized port industry under which the Greek port is operating, makes Piraeus vulnerable to more forces from the external environment than the ones we can cover in the current research. However, even from a theoretical perspective, including all the possible factors would indeed help in making accurate projections about the port's future, in contrast with the usual form of scenario planning. Another weakness of scenario planning method related to the drivers, is its tendency of avoiding describing in depth, swifts of the external factors while not reviewing more thorough the causes that led to these swifts. As Derbyshire and Wright (2017) have highlighted, scenario planning lacks the ability of discovering the initial reasons and mechanisms that caused these external factors to take place. The latter leads to a shallow view of the planner regarding the external forces and does not make them able to understand in depth, the dynamics that characterize these external forces. Once again, this weakness of scenario planning is caused due to the need of making the analysis efficient in terms of size and context. To illustrate an example, in case of the Greek container port, the further decline of the Greek economy as an external factor will probably have direct effects on Piraeus future. This trend could be a result of several different factors, ranging from a wrong political move, to other inefficiencies that might exist in the Greek market. However, investigating the reasons that could lead to these to forces, even though it would make our analysis more thorough, it would increase the complexity and it would make the current research less clear in terms of focus and goals.

3.2 Scenario Planning Examples

The Royal Dutch / Shell Group

The oil and gas giant Shell, is a profound example of a company that has employed the scenario planning by implementing its practices for more than thirty years, in order to limit their exposure in future risks and take advantage of possible upcoming opportunities in the market. Cornelius, Van de Putte and Romani (2005) in their paper "Three decades of Scenario Planning in Shell" are giving an illustration of how the Shell Group has evolved their scenario planning methods. Scenario planning is highly appreciated in Shell as a strategic planning method and determines the organization's investments a high degree. The first set of scenarios generated by Shell were aiming on assessing the impact of indexes such as the economic growth or the oil supply on the market while analyzing the geopolitical drivers. Despite the healthy and expanding market, Shell's

scenarios had successfully forecasted major disruptions in the oil market such as the Oil Embargo of 1974. This success was the main reason that scenario planning was established as a strategic tool for Shell's decision making. After the first implementation of scenario planning, the oil group developed their methods even further, so they could be used for long term forecasts. This made scenario planners to give more weight on societal and geopolitical drivers and by 1990, external forces such as globalization and even environmental change were considered in Shell's scenario planning context. With several social, political, and technological phenomena taking place in the next years, Shell's scenario planners developed a handful of scenarios in their effort to predict as accurate as possible a list of plausible futures for the group and the market. On one hand the rapid growth of technology, in combination with growing numbers in term of population led to a more optimistic scenarios while incidents such as the breakdown in the world trade organization negotiations gave rise to a more moderate scenarios about the future. Now, governmental and market regulations seem to gain more weight as external drivers that can determine Shell's future scenarios. Observing the gradual development of Shell's scenario planning processes, we can argue that as the scenario planning was becoming more sophisticated and more integrated, the presence of geo political, social, and technological factors in their analysis became more intense. The way that the scenario planning process was developed in Shell, shows that scenario planners believe that a broader view on the social trends and technological or industrial advancements, is the right path to take, in the effort of predicting longer term futures that will let the business take full advantage of future opportunities and hedge their risks in uncertain future environments.

The Italian Ports Case

Scenario planning has been employed by a considerable number of companies and researchers in their efforts to provide strategic planning solutions. A recent and quite relevant example to the context of our research, is the scenario planning that was developed by the Italian Maritime Economy research team in their attempt to assess how the Mediterranean and Italian ports will be affected by major changes in maritime transport but also in the global geopolitical and economic scene. In this case, there is a wide range of macroeconomic drivers that are related with the current and future performance of the Italian ports which have been analyzed in order to capture the possible impacts of the current global trade trends on the shipping and port industry. The approach of assessing the current geopolitical and economic forces, is a combination of analysis of quantitative indexes, a critical view on the recent geo political phenomena while reports on

forecasts by large organizations have been also considered. After presenting a comprehensive overview of the current and possible future geo political and economic future, then a more specific approach is being applied on the characteristics of the ocean shipping industry. Therefore, there is a closer view on how the ocean shipping sector has evolved through the years and on the forces that are likely to shape its performance in the future. An example is the analysis of the actions that mega container carriers took in the recent years, as their actions have an impact on the future of the shipping industry. Focusing even more closely into the dynamics and the role of port industry, the scenario planning process continues by analyzing in depth, the local economic and political characteristics that are closely related with the Italian ports. The critical uncertainties stage is then being presented with Asia's One Belt One Road initiative being considered as a major disruption in the logistics industry and in the European port system. An in-depth analysis of the One Belt One Road initiative is being conducted as a starting point for the elaboration of scenarios where these scenarios are presenting the potential future impacts of OBOR on the Italian ports. This is where the potential benefits but also challenges that OBOR might bring are being discussed. As in every well-structured strategic planning, the employed method involves a series of options and measures that have to be taken so the Italian ports can get the maximum benefits from the opportunities that China's visions can bring.

3.3 Our Approach

In the beginnings of this chapter we put forward some arguments regarding our choice to employ scenario planning as method through which we can achieve the purposes of our research. After describing the characteristics of scenario planning and providing examples of implementation in other researches, we can provide a detailed description of the analysis that we follow in the next chapter to assess the future of Piraeus container terminal. Since determining and stating clearly the focal issue of the analysis is a vital part of any scenario planning process, we start our analysis by stating the main issue that we aim to address which is to assess Piraeus current and midterm competitive position. More details on the focal issue and the questions arising from that, are being provided in the next chapter where we conduct our main analysis. After stating the main problem of our analysis, we dive in the key factors and driving forces that will most likely shape the future of Piraeus container port. Since, container port industry is characterized as a highly globalized industry, and Piraeus is located in a key location in the global trade map, there is a wide range of factors we analyze, as every single one of them can have a potential impact on our focal issue.

Some of these drivers are belonging in the macro-environment such as the current political situation in Europe, while there are several factors that can have a more direct impact on the container port of Piraeus. An example of a more direct drivers is the current economic situation in Greece or the relatively new trend of privatization of Greek ports. As this analysis is a crucial part for the construction of our scenarios, we are analyzing in depth, the possible future of these trends and the size of their impact on Piraeus. Then, based on the analysis we have discussed above, we present four alternative scenarios that are most likely to take place in the future for Piraeus. At this point we should highlight that the analysis of the drivers and the development of scenarios has been based on the opinions of industry's experts, that were published in famous journals, specialized in this field from 2016 till today. Even though there are several journals on shipping and port logistics, we have selected mainly four namely: Lloyd's List, Seatrade Maritime, Port Economics and JOC, as our selection was based on the credibility, relevance and recentness of the published material. These opinions acted as a base for our content analysis since they helped us to identify certain factors that can affect the future of Piraeus, as well the possible directions of those factors in the future. Nevertheless, we should state that, the original aim was to conduct interviews with the two port authorities in Piraeus but both parties kindly refused to participate in the research. Nevertheless, we strongly believe that the opinions we are citing in our analysis does significantly improve the validity of our research and therefore, the reliability of our results. The analysis of the external forces is also supported from critically analyzing relevant researches that discuss those trends and provide conclusions on their possible impact on attributes that affect Piraeus. Therefore, we could characterize the input of our analysis as a set of opinions of major stakeholders and researchers of the container port industry. The assessment of those scenarios follows a set of options and measures that we suggest the port Authorities of Piraeus should follow so it can benefit as much as possible from opportunities that might arise and limit their exposure in potential losses in the less favorable scenarios. This is in direction of one of our initial problems we have stated in the current research which is "How to make Piraeus one of the leading European ports". Therefore, even in less optimistic scenarios, we consider important to provide suggestions that will help to increase the container volumes handled by Piraeus terminals, even when the situation and the external forces are not in favor of the Greek container port.

Chapter 4: Analysis

4.1 Key Factors of Piraeus Container Port

The Piraeus Container Port

This chapter consists of the main analysis we have conducted in our effort to draw comprehensive conclusions on the future of the Greek container port. As stated in the early stages of this research, the goal is not to just provide a midterm forecasts for the competitive position of Piraeus, but also to identify measures that can make Piraeus one of the most competitive ports in 2030. Therefore, a first step of the analysis is to investigate Piraeus potential through the analysis of the key factors and drivers that characterize the Greek container port.

Terminal Container Throughput

The trend that the container volumes handled by Piraeus terminal follow and the dynamics behind their sharp increase over the past decade, are definitely an interesting issue to investigate for our research's purposes. In the past ten years, there have been radical changes in the structure and management of the container port that have certainly played a significant role in the increased number of containers handled in the port's container terminals. To visualize that, it is best to describe the background of Greece's main port. At first, the container handling facilities in Piraeus were three namely, Pier I, II and Pier III. In the past, all three piers were managed by Piraeus Port Authority (P.P.A) where in 2008, the Greek Prime minister agreed to a long term concession of Pier II and Pier III to a division of the China COSCO Shipping Group. As P.P.A at that time was a public owned authority, the concession of a big part of the container port to a private group like COSCO brought in important changes making the port a mix of partially private and partially public container port. Thus, from 2008 the container port has been divided into two parts where Pier I is being managed by P.P.A and Piers II & III are being managed by the Piraeus Container Terminal, as a subsidiary of the China Ocean Shipping Company (COSCO). Based on data published in the websites of these two terminal operators we have elaborated the below graph which visualizes the trend that container throughput in the Greek container port followed the past decade. The graph provides a distinction between the two different operators, showing a wide throughput gap between P.P.A and P.C.T. The causes to such a difference are being discussed in the following section. What is more striking however, is the great jump in the container throughput

over the past decade. Based on the collected data, port of Piraeus has achieved an approximate 168% percent increase in container volumes over the past ten years.

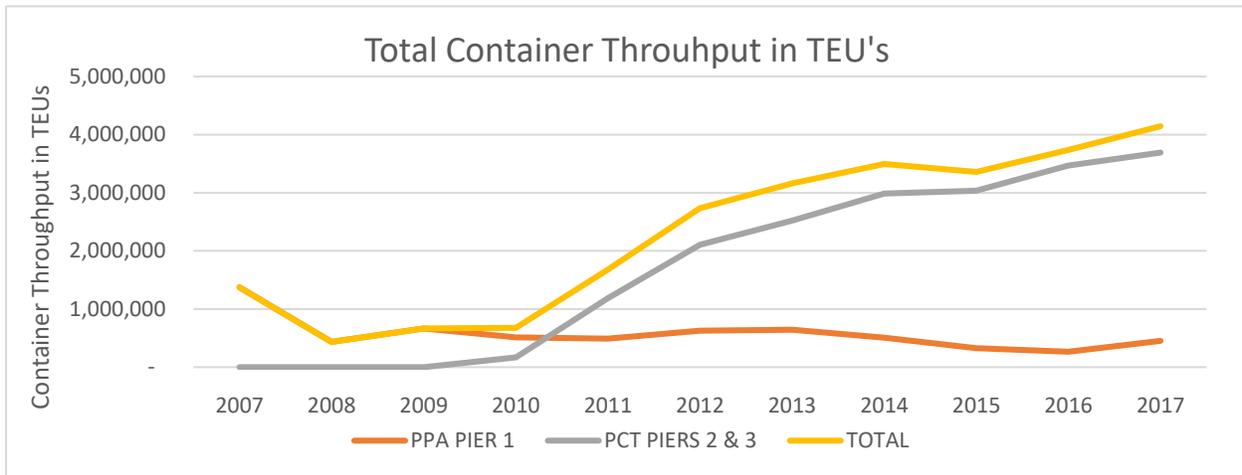


Figure.4: Piraeus Container Throughput. Based on data from PCT & PPA.

Investments in Piraeus

Container ports are relying heavily on investments to increase the efficiency of their terminal operations and improve the quality of their services. Upgrades in the port’s infrastructure and handling equipment are requiring quite heavy capital investment to which Piraeus never had an easy access, especially when the Greek economic crisis broke made it even harder for the port authorities to finance any port investments. However, there have been some quite significant investments which aimed to improve the container port’s facilities in the past ten years due to the concession of a big part of the container port to COSCO. This led to an upgrade of the port’s facilities through the creation of deep-water docks and the purchase of more modern cranes, so that the container terminals could host the biggest container vessels (Meunier, 2015). However, these were not the only investments by COSCO, as there were additional investments of 230 million euros announced by the Chinese group in 2013. This is a part of the agreement of the concession of the port to COSCO who is obliged to invest a total of 350 million euros in the port during the concession period. The good news for the Greek port is that COSCO has announced an additional 500 million euros in investments in the container terminals on top of the latter (Naftemporiki, 2016). According to the managing director of COSCO Shipping, this will result in a terminal capacity of 7 million TEUs in Pier I with a possible of extension to 10 million TEUs in

the future. If Xu Lirong's predictions become reality, we can safely argue that Piraeus has fair chances to become the predominant container port in the Mediterranean Sea.

Administrative and labor structure

The major ownership changes that the container terminals of Piraeus went underneath in the past years could not have left unimpacted the labor and organizational structure of the Greek port. PCT was the first terminal that implemented these changes as it was the first between the two (the other is PPA) terminals that COSCO was involved in. At first, there was a major movement of workers that were already working in the PPA terminal, to PCT terminals as this was one of the terms that COSCO set during the concession (Meunier, 2015). While COSCO did not proceed in hiring Chinese port workers, the new Greek workers encountered a different employment status to what was previously held, as they were hired through an intermediary company with short term contract terms with less working benefits than the ones these workers were enjoying before the privatization of the terminal. The working hours setup became also different, with COSCO demanding to have a certain number of laborers on standby in case of extra workers are needed, while PPA was employing the shift system in its terminal (Neilson, 2018). The more flexible working conditions of PCT compared to those of PPA have also captured the attention of Greek researchers. Kambouri, 2004, highlights that the Greek crisis was the main reason that forced the Greek port workers to be less resistant to the tough working terms opposed by COSCO. As the Greek crisis continues with Greek workers having small bargaining power, the number of strikes in PCT is quite small and the duration of each strike being quite short. There was just one significant strike that is also mentioned in Neilson, 2015 where during 2014 the Greek workers went on striking against the sixteen-hour shift, low wages and the small number of workers employed for operating the terminal's cranes. Even though the strike was resolved in the same day, the working regime that COSCO has implemented is quite different to the standards that the terminal workers have been used to work under or at least different from what the laborers were expecting. Regarding the managerial positions, even though the management continued to be held by Greek employees, the administrative structure of PCT witnessed several changes with the top management being consisted exclusively by Chinese directors that were placed by COSCO. After the concession of 51 % of PPA to COSCO in 2016, there have been some rotation between key managerial positions between the two container terminals. Captain Fu Cheng Qiu has been appointed as the managing director of PPA after being the managing director in PCT. Even though the labor conditions in

PPA have not been affected by the recent involvement of COSCO in the terminal it remains a question of how long the working regime can still hold against the Chinese working standards that COSCO brought together with its presence in the Greek port.

Competition scheme

To conceptualize the competition that the container port of Piraeus is facing, it is necessary to make a distinction between the different classes of container port competition. In the top class, there are the three leading north western continent ports namely Rotterdam, Antwerp and Hamburg. The leading European port Rotterdam handled around 13,7 million TEUs in 2017 while the container ports of Antwerp in Belgium and Hamburg in Germany handled around 10,5 and 9 million TEUs respectively. All these three ports together make up for 45% of the total volume that is being handled by the top 15 European container ports. Piraeus belongs in the second tier of container ports ranking as the 10th busiest container port with an annual handling of 4 million TEUs right below the Spanish port of Algeciras (4.3 MTEUs in 2017) and followed by the British container port Felixstowe which handled 3.8 MTEUs in 2017.

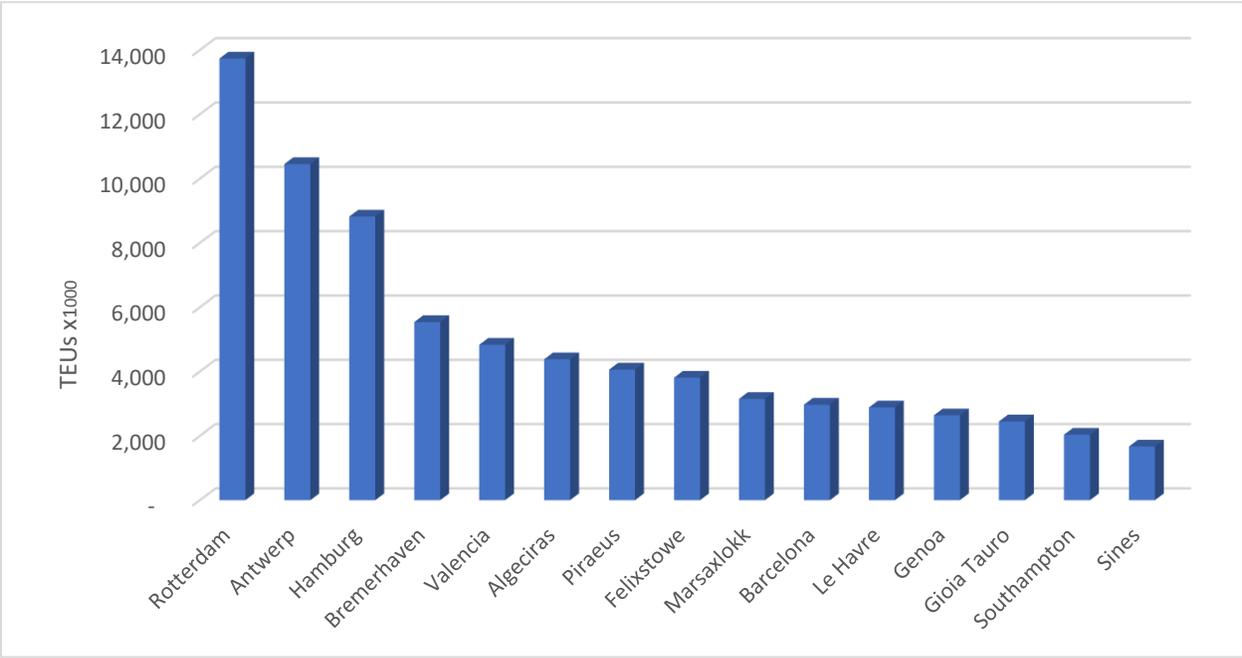


Figure.5: Container Throughput of 15 Busiest European Ports. Based on data from the port authorities' websites

While the top north western ports are quite ahead of Piraeus in terms of container throughput, the Port of Piraeus seems to be a direct competitor of the Mediterranean transshipment ports of Valencia and Bremerhaven. Even when considering the sizeable investments that COSCO has

been engaged in the container terminals of Piraeus, the Greek port does not seem to consist a realistic threat for the busiest north western ports of the graph for the time being. Those container ports have been established long ago as the main three gateway ports for the majority of the imports destined to the central and eastern Europe.

4.2 Forces Impacting the Piraeus Container Port

The Suffering of the Greek Economy

Before the start global financial crisis of 2008-2009, Greece’s entrance in the European Union brought several changes and reforms in the Greek economy that triggered the deep crisis that the country currently experiences. As the country entered in a club of countries that was consisted by financially healthy members, the enhancement of the country’s financial credibility brought cheap loans that have been used excessively by the Greek governments over the years. The huge amounts of capital that were flowing into the Greek economy resulted in higher labor costs and a vast increase of private consumption which were not matching Greece’s productivity indexes. In the meantime, the Greek external debt was constantly increasing along with the country’s public deficit. After the global financial crisis broke out, the available capital became less available and the markets became more conservative to the countries they were financing such as Greece. This resulted in a sudden drop of the loans which broke the bubble of the Greek economy. Since then, the funds that EU members continue to inject in Greece came with strict measures and austerity programmes that caused a worsening of the Greek economy forcing the country to fall into an even deeper economic recession (Karanasos et al., 2017).

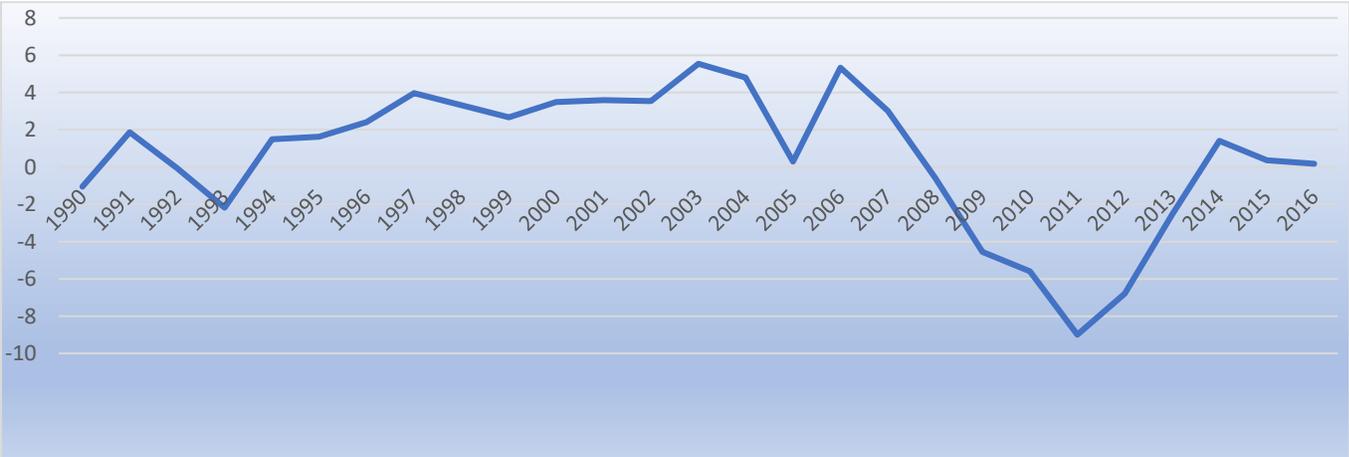


Figure.6: GDP per capita growth (% change) for Greece. Source: Hatgioannides et al., 2017

Greece's Current Political State

The suffering of the Greek economy and its consequences in the social welfare have inevitably created an unstable Greek political environment and a certain degree of distrust against the political party that is in power. During the summer of 2015, the prime minister Alexis Tsipras called the Greek people to vote for or against the conditions proposed by IMF and Eurozone in order for Greece to be able to receive the bailout package and continue being a member of the eurozone. Even though the Greek people voted against these measures with 61% against, the Greek government ignored the decision of its people by making an agreement with its lenders only eight days after the referendum. However, the agreement was involving even harder austerity measures than before the announcement of this referendum which led in a deeper recession. The numerous wrong political moves made by the government resulted in a further worsening of the crisis not only on economical but also on a social level. The fiscal issues that came to the surface from all these years of excessive spending of the governments that came into power, has made most of the Greeks lose faith in the political parties that consist the political scheme in the country. The limited financial liquidity in Greece has shrunk the domestic investments that could potentially assist in the improvement of the Greek economy.

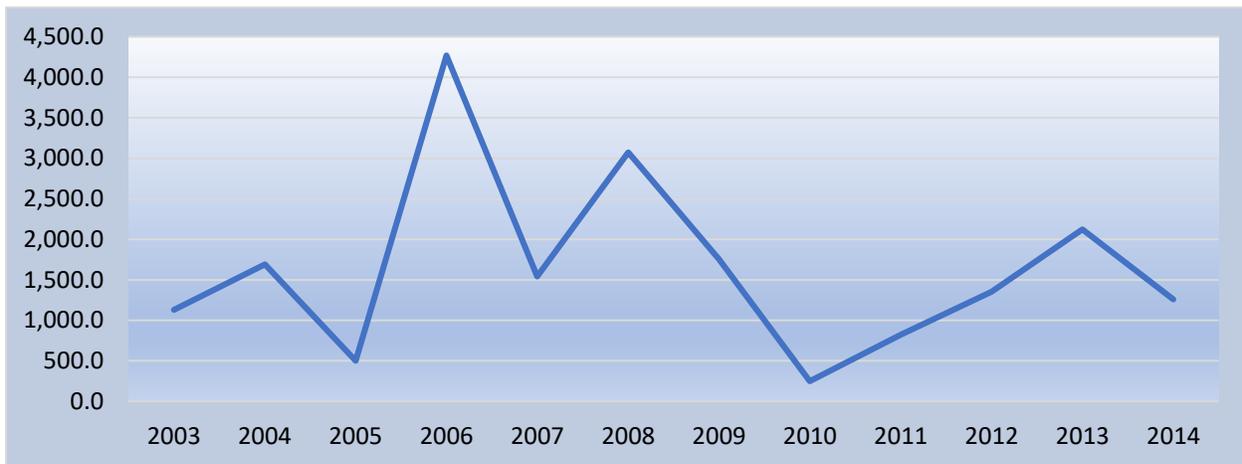


Figure.7: Foreign direct investment in Greece in million euros. Data source: Bank of Greece, 2018

Rail integration in the Existing Logistics Maps

The rapid growth of intermodal transportation has brought new trends and changes in the traditional logistics networks and on the execution of operations by the carriers. The growing demand for shorter lead times of the shipped goods on one hand, and the increased need of carriers to cut down their operational costs, has established intermodal transport as the most effective solution for goods transportation. The establishment of intermodal transport had inevitably caused major changes in the logistics map and transportation infrastructure. Nowadays, freight transportation businesses aim in cutting their transportation costs by creating their shipping hubs that will allow them to consolidate their shipments and get full advantage of the geographical location of those hubs. As rail is becoming more utilized in logistics there is a need for the appropriate infrastructure in order to integrate it even more in the freight transportation business. This can be observed also in the OBOR initiative by COSCO as we have discussed earlier in our research.

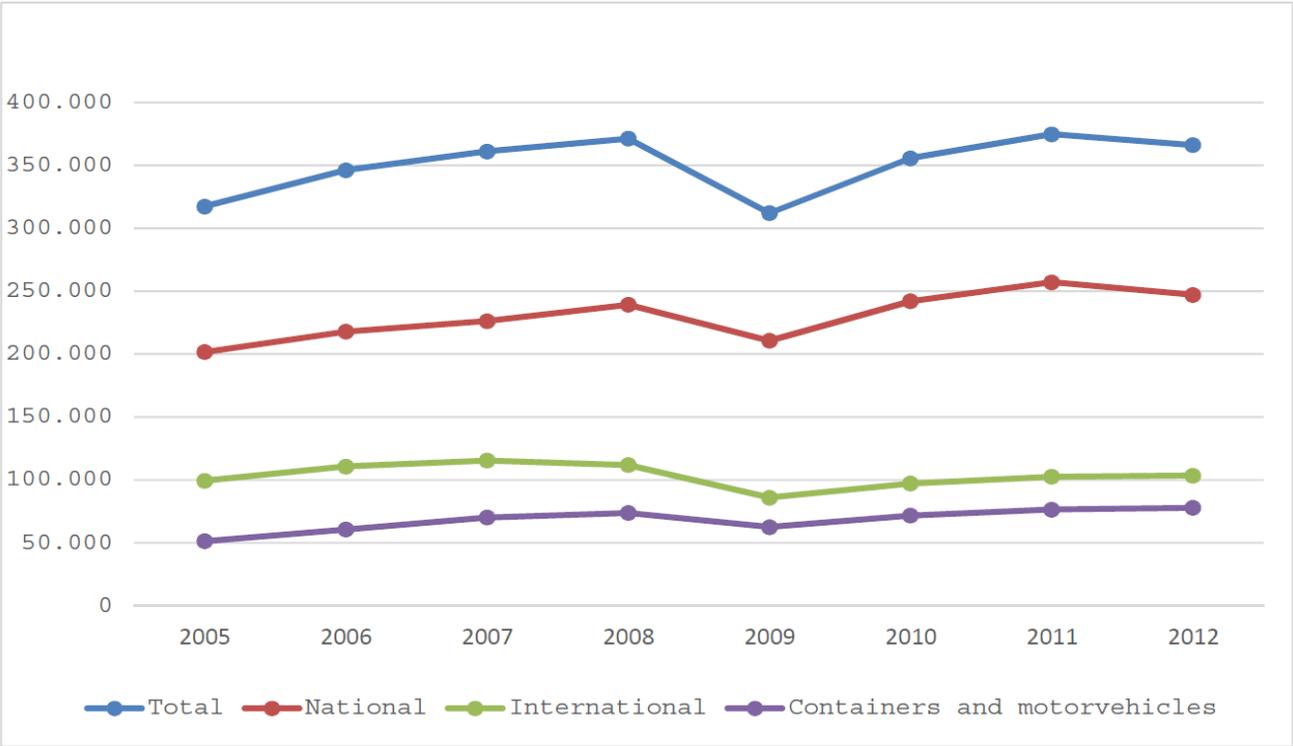


Figure.8 : Transport Volume in Intermodal Transport Involving Rail in 1000 tons. Source: Centre on Regulation in Europe (CERRE), 2014

These forces led to the introduction of rail gateway networks. As Kreutzberger and Konings (2016) mention, there are several rail terminals in Italy operating as gateways that connect Italy with the north part of Europe. Several other examples of the use of rail terminals as hubs are the intermodal terminal in Dourges in France which is connected with train services of Belgium, Netherlands and United Kingdom. Rail hub terminals have also been set in Hamburg which connects Germany with Scandinavian rail terminals making more visible the fact that the logistics networks are experiencing an important restructuring.

4.3 Uncertainties and Impacts on the Container Port Industry

Port and logistics industry is operating under times of considerable changes in the global scheme. As discussed earlier in the key factors section, there are several disruptions that will most likely have an impact on the port industry and subsequently on the container port of Piraeus. The selection of these uncertainties has been based on the opinions of experts that are related to Piraeus container port's future. The analysis of the opinions showed that there are specific uncertainties that are more frequently mentioned than others hence, more crucial regarding the future of Piraeus.

Will the Chinese vision become a reality?

We consider that the biggest disruption that will most likely have uncertain effects in the future of the Greek container port is the One Belt One Road initiative and the success of China in its effort to reinvent the silk road. As mentioned in the previous chapters, the OBOR initiative is a massive project requiring enormous amounts of capital that have to be invested, with a long-time horizon set for its completion. Thus, the successful implementation of this project remains quite uncertain and the completion of this vision can have significant implications for Piraeus and the global container port industry.

Greece's economic and political state

As already demonstrated, Greece's economic and political situation can be characterized as quite unbalanced nowadays. It is logical to assume that the inbound investments in Greece and its main port are correlated to the status of the country as the investors are more positive to invest in a country that shows marks of improvement in a financial and social level. In addition, it is a matter of question to which degree Greece can exploit the opportunities that may arise due to the unfriendly regulatory and tax framework that characterizes the country nowadays.

Other Uncertainties

Piraeus future is also dependent on several uncertainties that exist in the global scheme. China's economy growth rates, port regulation on global level, environmental regulations can all affect the Greek container port's future in different scales. The below uncertainty matrix shows the estimated degree of uncertainty for each factor in relation with their potential impact to the future of Piraeus container port. This estimation was based on the views of experts, which are cited at the end of this chapter. This means that the factors that have been mentioned more frequently in the opinion sample, are most likely to be considered as the most important with the largest impact to Piraeus future. Large proportion of these opinions contain doubts on a possible success story for Piraeus. As these concerns are based on factors that might not go in the direction with Piraeus success, the most commonly mentioned ones have been selected as the most uncertain for the port's future.

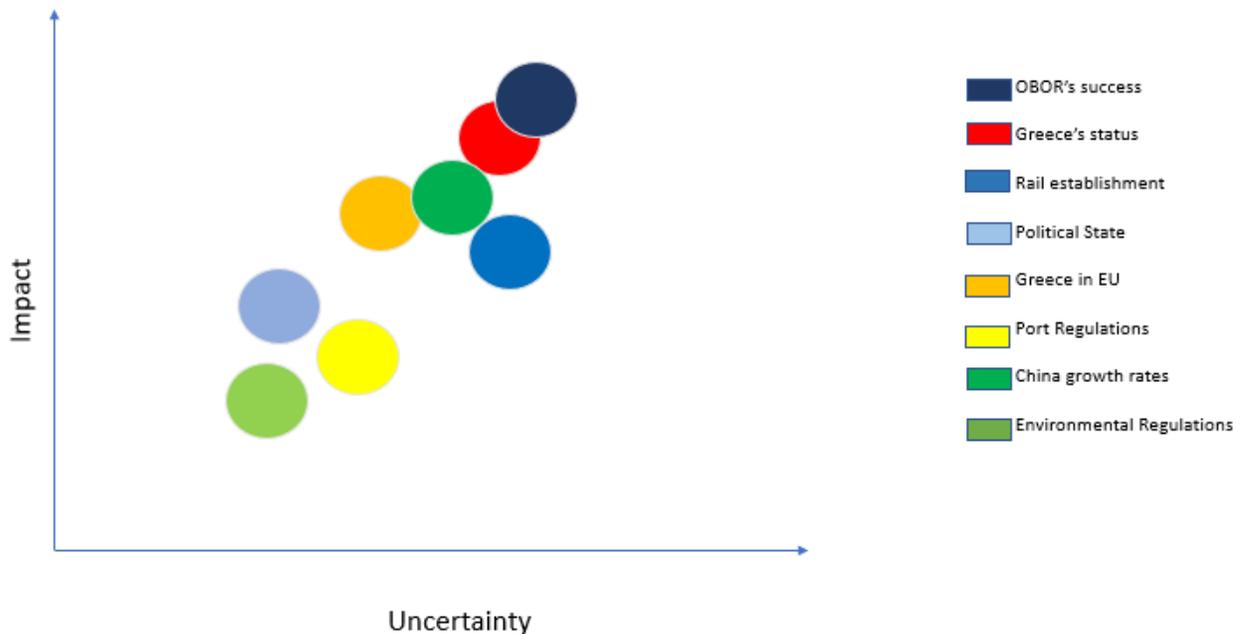


Figure 9: Critical uncertainties matrix in terms of Impact and Uncertainty. Elaborated by its author.

4.4 Possible Future Scenarios for Piraeus

Based on the above uncertainties for the future of Piraeus, there are four possible scenarios that have been elaborated in order to assess the future of the container port. As the opinions of the experts and the findings of the literature suggested, the factors with the higher degree of uncertainty but also with the highest impact are mainly two. First is the successful implementation of the One Belt One Road initiative globally and second, is Greece's and Piraeus's ability to take the maximum benefit of the opportunities that arise from this project. An overview of the elaborated scenarios can be seen in the following page.



Figure.10: Scenario Planning Matrix. Elaborated by the author

The Calm Waters Scenario

The current scenario is related to the case that OBOR's implementation is not quite successful, while Greece shows signs of recovery and stabilization. In this case, OBOR has not succeeded to fulfill the original expectations, but the Greek economy has been recovered after the sacrifices of the Greek citizens during the crisis period. This led to a more stabilized political state with a subsequent improvement of Greece's image to foreign investors and stakeholders. While COSCO's vision to make the Greek container port the busiest in the Mediterranean, surpassing the ports of Valencia and Algeciras have not been materialized, Piraeus growth rates are slow but steadily positive. In this case Piraeus, continues to be an important transshipment container port for the shipping lines. Piraeus's direct competitors have not witnessed much growth either. Since COSCO has not brought as much impact as initially was expected in the Mediterranean ports, the Spanish ports are outcompeting Piraeus in terms of container throughput. As the Greek economy is becoming more stabilized the faith of international markets against Greece is being restored. COSCO is still owning the biggest portion of the container terminals in the Greek port and continues to invest in infrastructure while improving the operations in the container port. The stabilized political situation in Greece after the optimistic economic results is making the Greek container port a profitable business for COSCO which is willing to keep being the owner of the largest portion of the container business in the port. The failure to achieve all the preset goals is forcing COSCO to continue investing in the port while it is more conservative regarding on the amount of invested capital, compared to the time that the concession first took place. Therefore, the investments in the port are still ongoing but in a smaller scale than during the time when the concession first took place. However, the goal for the Greek port to be one of the biggest in the Mediterranean and a key hub for sourcing the eastern European markets is still realistic even though the expected time frames for these goals to become a reality have been revised. The administrative structure of Piraeus does not face radical changes either. As COSCO still retains the biggest portion of the ownership, the higher management is still composed by Chinese managers while on the labor part, there are not major changes either. The vast majority is still being consisted of Greek workers that work in both terminals (P.P.A and P.C.T). Concluding this scenario, we could say that Piraeus is still considered as a competitive alternative to other big Mediterranean ports even though it failed to fulfill the premises of the past. The long-established

north-western ports of Rotterdam, Antwerp and Hamburg continue to be the most competitive and attractive ports for the majority of the goods flowing into the European continent.

Achille's Heel Scenario

The case of an unstable economic and political environment in Greece along with the persistence of COSCO to keep investing and trying to make Piraeus the biggest port in Mediterranean is a quite interesting scenario as it also shares similarities with the current situation of the Greek port. The period that this text is being written, COSCO has engaged in serious investments in the container terminals of Piraeus while the economic and political status of the country is not as friendly as it should be to the Chinese investments. While COSCO is still owning the majority of the container port and being profitable, the Greek economy does not show any signs of recovery by keep having high fiscal deficits and low productivity indexes. The austerity measures have not resulted yet to any serious improvements and another set of reforms would need to be set in order to expect different fiscal results. The economy's growth rate remains stagnant and as a subsequence the trust of the international markets to Greece is has not been restored yet. Greece keeps relying on loans from the EU which makes the crisis deeper than in the past. As a subsequence the political scene in Greece is in a turmoil which does not have a good impact on the eyes of foreign potential investors of the Greek port. These factors contribute to a worsening of the social crisis that Greece is experiencing for decades, making the future of the country in the eurozone uncertain. Considering the above, even though COSCO has been keeping investing and operating Piraeus port profitably, the Greek container port has not yet fulfilled the Chinese vision to become a key hub for feeding the eastern European markets with goods that are flowing from Asia. Hence, Piraeus is slightly becoming less competitive while the reputation of Greece regarding the financial and political situation remains a risk for shippers not allowing Piraeus to become more attractive compared to the Spanish ports of Algeciras and Valencia. The big north western ports along with the Spanish ports, remain to be one of the top choices of container port users in Europe and Mediterranean. COSCO's vision to make the Greek container port the biggest and the most attractive solution in the Mediterranean slowly faints even though is not completely impossible. It would take quite longer than the Chinese were forecasting and would be also dependent on the Greece's course in the next years. Last, we could say that in this case, the container port is almost similar in terms of competitiveness and throughput, with the first years that COSCO took over the operations of its terminals.

Mediterranean King Scenario

Operating within a country that shows clear signs of improvement and recovery, while COSCO has managed to promote the growth of the port and the quality of its operations through continuous investments is a great combination for the future state of Piraeus. Greece has managed to improve its regulatory and tax system by removing the obstacles that Piraeus and COSCO were facing in the past. In this case the container port has successfully developed under the Chinese ownership while the Greek state is getting back on its feet and thus restoring the trust of international markets. In this case, the Chinese investments regarding Piraeus not only have achieved the expected results but have even exceeded the expectations of the Chinese company. The continuous growth that the container terminals in Piraeus have witnessed, enables the port to surpass the container ports of Algeciras and Valencia making the Greek port the number one transshipment port in the Mediterranean. Given the above circumstances, the Mediterranean port has become a key hub for heavy flow of goods to eastern Europe coming from far east making itself one of Europe's major container port. In this case, the vast growth in the container volumes handled by Piraeus, would attract significant investments in new warehouses that could act as consolidation centers for re exporting the Chinese goods via Piraeus. This would lead to a rising number of warehouses forming a wide and modern logistics network in the country that can facilitate not only exports but also imports flowing from other countries. However, the big northwestern ports are keep being the most competitive container ports in the continent, due to their long before establishment and their ability to adjust in the new circumstances that have been brought after the successful establishment of the new silk road which led to important changes in the logistics map and in the ways that Europe was importing Asian goods. With the growth of Piraeus, the expansion of the operations of its container terminals and the increased demands of vessel operators, the need for extra workforce is becoming even stronger. Even though the workforce supply is still in high levels in Greece, the higher level of operations that are taking place in Piraeus might force COSCO to import Chinese workers who have experience in the big Asian ports to support the operations of the Greek port. This would have also a positive effect to the Greek workforce due to possible knowledge spillovers from the Chinese workers. On the other hand, COSCO is not expected to make any substantial changes in the organizational structure of P.P.A and P.C.T terminals. The upper management is expected to be still consisted of highly experienced COSCO directors which have proven to be a successful recipe during the development of Piraeus. We should highlight that

in this case the portion of COSCO in Piraeus is expected to increase making the Greek port almost fully privatized.

The Greek Tragedy Scenario

The failure of OBOR project to meet the expectations of the Chinese investors, while the Greek economy continues to be in a bad shape would have disastrous implications for the container port of Piraeus. The long-lasting economic crisis and the unstable political situation in the country have not given Piraeus the opportunity to grow through the investments of COSCO as much as it should under normal circumstances. The failure of Piraeus to become a key container hub in the Mediterranean could possibly lead COSCO to drop its ambitious project and leave the container port after the agreed period of the concession has expired. This would have major implications for the biggest container port in Greece as it would mean the end of investments in infrastructure and in the improvement of its operations at least for some period. As COSCO decided that the port would not worth any further investments the port's reputation would be hurt in the eyes of any previous potential investors making the future not looking quite promising. This would imply a negative growth of the port as its reputation would not give shipping companies any strong reasons to use it as a transshipment port, giving priority to the Spanish ports of Algeciras and Valencia. As expected, the competitive position of Piraeus would lead the container port to be excluded from the top ten European container ports in terms of throughput. Handing over the container terminals of P.C.T. and P.P.A to a public entity from COSCO, would bring several administrative changes in the port which will be managed by Greek managers that have been placed with the goal to manage the port under these difficult circumstances. The labor force in this case will decrease dramatically as less operations and unused cranes would be a possible in that state of Piraeus.

4.5 Expert Views on OBOR and Piraeus Container Terminal

As stated above, the elaboration of the key uncertainties and possible future scenarios for Piraeus was based on the views of experts that were published in well-known journals in the field of economics, shipping and transport. This content analysis made it possible to identify which factors are most likely to impact Piraeus future and the possible future outcomes for Piraeus. The views of the experts that are included in the current research are cited below.

- George Vaggelas, partner of Ports and Shipping Advisory has written an interesting article regarding the Greek ports during the years of economic crisis in Greece. Mr. Vaggelas mentions that the consequences of the economic crisis in Greece such as the decrease of private consumption brought many hurdles for the Greek ports which had to operate within a climate characterized by uncertainty. What Mr. Vaggelas highlights is the fact that the container Greek ports and especially Piraeus have managed to increase their container throughput despite the challenges they face. Even though there were Greek ports that witnessed a decrease in their throughput, almost all of them have managed to increase their profits due to adjustments they have made in their labor structure. Mr. Vaggelas concludes by expressing that while the Greek crisis has been proved to be a hurdle for its ports, it has also pushed them to be more extrovert by adopting new strategies in order to strengthen their competitive advantage. This direction can potentially make the ports to grab and take advantage of new opportunities that might come up in the future.
- The lack of developed shipping services such as insurance organizations, finance, chartering and trading companies has been also highlighted in a presentation of the Hellenic Chamber of Shipping which states that a friendlier and well-developed regulatory framework would lead to an overall upgrade of the shipping and port system in Greece. While Nigel Lowry states that the shipping industry has been an important contributor to the Greek economy, he mentions that the instability and the political uncertainty has made Greek shipowners seek alternative locations to relocate their businesses. Last the journalist, supports that the port city has not suffered any fatal blows as a maritime center while stability is the number one characteristic that the city must have in order to retain its fame.
- Aiswarya Lakshmi, editor for the MarineLink comments the importance of the OBOR initiative while raises questions regarding the plausibility of the Chinese project. Key question for the editor is if the demand will be adequate to absorb the Chinese output that will flow into Europe. An example is the gap between the production of steel which is almost double of the demand for steel in Europe. As according to the editor, the chance of matching the excess supply of steel is quite small, China must find funds somewhere else

in order to finance the two to three trillion per year that being required for the OBOR. The editor concludes that there are no obvious alternatives to find such enormous amounts as the investment funds are still small compared to the financing needs of the project.

- In an article of Bruce Barnard, the special correspondent comments the remarkable growth of Piraeus port and supports that Piraeus is a potential threat for the north ports of Rotterdam and Antwerp. According to his opinion, the north ports are running the risk of losing important container traffic to Piraeus and the measures their port authorities consider in order to retain their competitive position. The editor also mentions the statement of Port of Antwerp's CEO Eddy Bruyninckx regarding a potential development of joint facilities that can help the two container ports to attract volumes that were initially destined to pass through the southern European ports. In the same article, Van der Putten, analyst of Dutch Clingedeal Institutes supports that the Chinese transported goods would reach Europe much faster via the southern instead of the northwest ports which gives the latter an important advantage. Last the correspondent cites the Drewry advisors regarding the advantages that southern ports can offer especially for time sensitive goods. According to the advisors, the freight rates via Northern ports might be 100 \$ cheaper than via Southern ports but the lead times are longer which gives an advantage in the Southern ports.
- An editor of Seatrade Maritime News, Kent Gray recognizes the potential impact of OBOR but also is questioning the feasibility of the Chinese project. His concerns are based on the opinion that the CEO of DP World group Mr. Sulayem expressed in the Asian Logistics & Maritime Conference hosted in Hong Kong. According to Mr. Sulayem, the success of the OBOR project is relying on several factors such as the vast amounts of capital required and the high-quality collaboration between the countries involved. The amounts required are indeed enormous as according to his words the estimated required investments are ranging between 2 - 3 trillion dollars per year. He explained that leaving the financial part aside, there are many complexities in the global supply chain to be sort out such as the custom operations and the different policies between the countries that are part of the project. Said

this, the editor expresses that he is quite prudent regarding the complete implementation of the OBOR project.

- Turloch Mooney, senior editor of Global Ports gives his opinion regarding the potential impacts of OBOR and the actual investments that the Chinese have been engaged to so far. According to the editor, highlights that the assessment of the potential impacts for a project of this scale is quite complicated as we are not sure about the plausibility of all OBOR related projects. As he points out, the investments that China has made year after year are following a downtrend and represent less than 10% of foreign direct investments. This view is also supported by Tom Miller, researcher of Gavekal who mentions that the project might not be exactly the grand plan that the media headlines suggest. Despite that, Mr. Miller recognizes the fact that the actual investments of the project will improve the infrastructure of the smaller countries involved with their economies being benefited from the Chinese project.
- China's ambitious plans and statements regarding the OBOR project have been criticized by market experts and journalists in the shipping industry. Max Tingyao Lin, a specialized journalist of Lloyd's List suggests that we should be prudent regarding the expectations of the OBOR project. As Mr. Lin comments, the investments that China has been engaged in reality differs substantially from what was originally announced regarding the investments for the one belt one road initiative. In addition, Mr. Lin points out that at the Belt and Road forum countries such as France, Germany and United Kingdom raised their concerns regarding the sustainability and the transparency of the project.
- Important opinions regarding the success of the Chinese One Belt One Road initiative were expressed at the Asian Belt podium of Nor – Shipping forum. Ravi Mehrotra, the Foresight executive chairman, stated that the benefits through the investments that OBOR will bring will be seen in a long-term horizon. Regarding the container business, it is important to highlight the view of Khalid Hashim, managing director of Precious Shipping company, where he stated that OBOR is not directly competing the sea trade routes as it competes with

the already existing land transport solutions. While there was a positive view on the success of the OBOR project, Martin Stopford who is Clarkson's Research president mentioned that there are quite some obstacles that OBOR has to overcome which are mainly political. However, it is to be kept in mind that the time frame for the completion of the project can be quite long taking into consideration the view of Andreas Sohlen – Pao that the development of a proper infrastructure would take time before being completed.

- Vincent Wee, editor in Seatrade Maritime News shared some important insights regarding the factors that make the southern European container ports more competitive and the possible impacts of OBOR initiative as they were discussed in a webinar hosted by Contship Italia Group. As the senior shipping consultant of Dynamar, Dirk Visser noted, even though the connectivity of the southern container ports are lacking the connectivity of the north European ones, they can offer more competitive rates of about 60\$ per TEU. Adding on the latter, Jolke Helbing, Ocean Shipping Consultants project director, mentioned that the Trans – European Transport Network project can improve dramatically the inland connectivity from South to North Europe. Mr. Jolke concluded that the successful implementations of the projects that aim to improve the inland infrastructure will certainly make the southern ports of Europe like Piraeus even more competitive against the big Northern ports since they will be able to reach further into northern Europe while providing cheapest freight rates in their container terminals.
- Nigel Lowry in his article “Greece needs hard work to fortify itself as maritime center” cites a report of EY which analyzes the potential of Piraeus as an international maritime capital. While EY supports that the established ship owning network that has been developed over the years around the port is an important advantage, there are several weaknesses that Piraeus suffers from. The main weaknesses are the unstable legal and tax framework, the cluster mentality and the less advanced law and financial services which according the respondents would be the main reasons for them to relocate their offices in Piraeus. In the related survey that EY conducted, stakeholders in the Greek shipping community listed as main advantages, the availability of off shore personnel, the professional services and geographical location. The respondents listed the regulatory

environment, status of funding and financial institutions and infrastructure as the major weaknesses that Piraeus has to overcome to be a global maritime center. Looking at the future, almost half of the respondents were positive that Piraeus will be a leading maritime hub in the next ten years. Based on these results, EY states that there are four main attributes that Greece has to improve in order to be a global maritime center. The first two are, the improvement of the maritime educational system which will feed the industry with highly specialized professionals along with a more efficient regulatory environment for the shipping related businesses. Last is the infrastructure that will improve the port's connectivity and accessibility in combination with more initiatives by the private shipping businessmen towards a stronger shipping cluster that will promote Greece's image as a global maritime center.

Linton Nightingale shares his opinion on the competition between the main container ports of Spain and Greece. As the Spanish ports continue to be the busiest container ports in Mediterranean, Nightingale believes that Piraeus, consists of a remarkable success story in the past years. The deputy editor of Containerisation International supports that the Greek container port has overcome several obstacles since its privatization by COSCO with success, while the aggressive plans set by COSCO will lead the Spanish ports to seek for similar investors outside Spain in order to remain the busiest container ports in the Mediterranean.

Peter de Langen wrote an interesting article in PortEconomics regarding the geopolitics and their role in port development. He brings up a recent example in Sri Lanka where the Chinese financing of the port through the form of loan, did not succeed in meeting the initial expectations of 20 million TEUs throughput that the port should witness. According to De Langen, the main reasons of this failure is the absence of a solid business plan for the port as the key location that the port authorities were proud of was not enough to attract the expected volumes. This resulted in a difficulty to repay the Chinese loans as the port failed to create any revenues for the country's economy. De Langen is summarizing by saying that this is an important lesson for other countries as the financing of port

development without a concrete business plan is risky as they should carefully examine the potential of their ports and think long term before reaching for loans.

- Greg Knowler, European editor for the *Joc* journal, expresses his concerns regarding the ability of the rail mode to cope with the increased volumes that are destined to Europe during the OBOR's implementation. To explain his point, Mr. Knowler cites Pauline Bastidon, policy manager of the European Shipper's Council who mentioned that rail suffers from congestion issues which hurt the reliability and the service quality of rail as mode of transport. He mentions that recent works on the rail infrastructure have caused serious problems to shippers in the past which hurt the image of rail as a reliable mode of transport not only to its current users but also to other shippers that considering switching to rail. In addition to that, the opinion of Hans Reinhard, President of the Group of European TransEurasia Operators and Forwarders is mentioned as well. Mr. Reinhard supports that the European rail suffers from insufficiencies that need to be mitigated during the expansion of Sino-European rail service. Hans- Willem Vroon, Corporate advisor of RailGood believes that rail can become more attractive to shippers if the service costs are significantly reduced. The latter can be achieved by a more rail friendly regulation according to Mr Vroon. Despite this however, the journalist believes that rail has a long way to go as a competitive solution against truck and short sea shipping.
- Rail subsidies coming from the Chinese government is an important factor for OBOR's success supports Eugene Gerden, Russian correspondent for the *Joc* journal. According to Gerden, these subsidies assist to the growth of the rail network between Asia and Europe not only through the development of infrastructure but also it makes the freight rates more attractive to the shippers. This view has been published after rumors regarding a possible cut of subsidies by China on the Russia part of the OBOR project. The journalist supports that a possible cut of the subsidies will not only make the freight rates non-competitive compared to road transport but also will create issues regarding the speed and the reliability of rail which will hurt the growth of the rail system and subsequently the Chinese project.

- David Glass, Greece's correspondent for Seatrade Maritime has commented on the Chinese – Greek relations and their importance for the OBOR project as well for Greece in its attempt to attract further foreign investments. According to the journalist, COSCO has showed interest in investing in shipyards close to its container terminals which shows signs that the Chinese are positive on making further investments related to the shipping market. However, Mr. Glass expresses his concerns regarding the factors which are creating a not so friendly environment for those investments such as the regulatory framework, tax system and Greece's bureaucracy. An example is the statement of Mrs. Vourdoumi, legal counsel of PPA, regarding a possible violation of the PPA concession to COSCO due to practices regarding the port's waste. The journalist states also that the capital controls that Greece is facing at the moment can bring fears of potentially trapped Chinese investments into the Greek market.
- Indra Vonck, expert of Deloitte's port serviced team, gives his opinion regarding the future of the port industry and the points that container ports should focus to move forward under the changing circumstances in the industry. According to his article in PortEconomics, ports have to face the challenges of an increased complexity, increased need for cutting their costs even further, and energy transition that currently takes place in the port system. Mr Vonck, mentions that the ports should focus on innovation, so they can bring additional value for their customers and shareholders while the regulators should support the ports during this transitional period for the industry. For Mr. Vonck it is important for the port authority to prepare its workforce and its stakeholders, so automation and digitalization can be facilitated properly.
- P.P.A CEO Fu Chengqiu is also identifying the obstacles that some of the Chinese investments face in Greece which are also the main reason that these investments are being delayed. In a recent article of Seatrade maritime, Mr. Chenqiu's concerns are expressed regarding the bureaucratic issues in Greece. More specific, according to his words, the planned investments on the ship repair zone of Piraeus port by COSCO have been mostly delayed due to the pending approvals from the side of the Greek government. This makes quite clear the fact that the regulatory regime in Greece is not ideal for foreign investments

and it plays a major role in the future plans of COSCO regarding the upgrade of port related operations infrastructure.

- Francesco Parola gave an insightful recent interview at JOC journal regarding the benefits that OBOR has brought into Southern ports and comments their future potential. According to the maritime professor, China has made nine sizable investments in Greece and several others in Spanish port terminals. The rail development plans look positive and according to the professor this will allow ports like Piraeus to become more competitive after expanding their reach into the inland European markets. However, the professor remains prudent and supports that the well-established north western continent ports will remain in a leading position since it seems unlikely as the operating costs of the new corridors are quite high. However, the professor does strongly believe that the container throughput gap between the northern and eastern ports will close significantly in the next five years.
- James Baker, editor of Lloyd's list containers wrote a recent article on the challenges that container terminals as the industry becomes more concentrated in less container hubs than in the past. Baker, cites the Container Port Strategy report which supports that the port planning and policy making do not giving as much importance to their main exporters and importers as they should. The report highlights that the container ports of the future should focus on the needs of their shippers. The editor highlights that the increased size of container vessels and the larger volumes they transport, has brought issues regarding the labor and equipment performance which has caused increased waiting times for the vessels. Therefore, the emerging ports need to carefully include in their port planning cases where the volume has significantly increase so they can face these challenges effectively.
- Mark Szakonyi, executive editor of JOC journal, commented recently on the impressive growth that the rail network between China and Europe has achieved and gives his opinion on the subsidies that contributed to that growth. According to Szakonyi, these subsidies which may have brought this growth are not harmless since they have caused a considerable uncertainty into rail mode. While the editor recognizes that while the generous subsidies look attractive to shippers, governments are now competing each other for

subsidies by putting more trains on the rails than needed. As the utilization is not optimal this is creating serious congestions in the terminals which causing delays in rail shipments. The editor makes quite clear that even though the shippers can enjoy cheaper freight rates this comes at the cost of longer lead times which is a potential danger for the rail mode.

<i>Expert's Name</i>	<i>Main points</i>	<i>Publication date</i>
George Vaggelas	Greek crisis and its consequences on Piraeus port.	February, 2016
Nigel Lowry	Initiatives that would help Piraeus grow further.	August, 2016
Aiswarya Lakshmi	Concerns on the plausibility of OBOR project.	August, 2016
Bruce Barnard	Piraeus is a realistic threat for Rotterdam & Antwerp ports	September, 2016
Kent Gray	Concerns on OBOR plausibility.	November, 2016
Turloch Mooney	Impacts of OBOR to Piraeus container port.	March, 2017
Max Tingyao Lin	Doubts on the sustainability and transparency of OBOR	May, 2017
Lloyd's List	Positive comments on OBOR by various experts.	May, 2017
Vincent Wee	Strengths of Piraeus and impacts of OBOR on the port.	June, 2018
Nigel Lowry	Piraeus weaknesses and aspects that the port should focus on.	July, 2017
Linton Nightingale	Piraeus ability to grow during the Greek crisis.	September, 2017
Peter de Langen	Measures for successful port development.	September, 2017
Greg Knowler	Doubts on rail success based on OBOR's expectations.	October, 2017
Eugene Gerden	Factors that make OBORs success uncertain.	October, 2017
David Glass	Comments on Piraeus growth. Suggestions for further growth.	November, 2017
Indra Vonck	Suggested measures for future successful ports.	December, 2017
Turloch Mooney	Opportunities for Piraeus through OBOR.	April, 2018
David Glass	Piraeus importance for COSCO. Potential for further investments.	September, 2018
James Baker	Challenges and suggested measures for emerging ports.	October, 2018
Mark Szakonyi	Rail network growth and concerns on rail establishment.	October, 2018

Table 1.2: Experts opinions table. Elaborated by the author.

Chapter 5: Research Conclusions and suggestions

5.1 Findings of the research

The main purpose of this research was to assess Piraeus's current and future competitive position but also identify the measures that the port stakeholders should take to enhance its future competitiveness. Said this, the first step of the research was to determine the attributes that make a container port competitive under the latest port and shipping trends. After determining what makes a container port competitive nowadays, there were four possible future scenarios for the Greek container port. Basis for these scenarios was a content analysis on the published opinions of experts in shipping, logistics and ports, regarding the future of Piraeus. These opinions enabled us to have a better overview on the container port's current status but also its strengths and weaknesses compared to the Mediterranean and North-Western container ports. The findings showed that the success of Piraeus is not guaranteed, rather dependent on several factors and external forces. Considering this, it would be wise to restate the main questions that the current research aimed to answer.

What defines a container port's competitiveness?

The literature review combined with the expert's opinions, showed that the main characteristics that a competitive container port possess are connectivity, time efficiency and high-quality infrastructure. There is a notable difference between the recent and old researches as the previous researches were focusing on tariff and terminal handling costs as the main attributes that make a container port competitive. This shift is a result of the trends that predominate the port and shipping industry currently such as the concentration of the container market and the increased need of shippers to cut on their operational costs.

What is the current competitiveness of Piraeus container port?

The analysis showed that Piraeus is considered as a highly competitive port in the Mediterranean region and a direct competitor of the Spanish container ports of Valencia and Algeciras. While the Spanish ports are ahead of Piraeus in terms of container throughput, the Greek port does not seem to lack any of the major characteristics that these ports do possess. On the other hand, Piraeus

cannot be considered as an immediate threat for the large North-Western ports such as Rotterdam, Hamburg or Antwerp which are surpassing Piraeus in a high degree in terms connectivity, efficiency and innovation.

How will the competitiveness of Piraeus look in the midterm future?

According to the scenarios that were developed throughout this study Piraeus will not be able to be a direct competitor of the ports of Rotterdam or Antwerp in the midterm future. The Greek container port can absorb some of the volumes of the big north-western ports, but the latter have been established long ago as the main options for importing goods into Europe. On the other hand, we are positive that Piraeus will become the busiest European container port in the Mediterranean surpassing the Spanish ports of Algeciras and Valencia. This however, this is not guaranteed as it requires several favorable conditions on a national and a global level that will help Piraeus reach the top in the Mediterranean region.

What are the actions the stakeholders should take to make Piraeus succeed?

The stakeholders of Piraeus should take the following measures in order to take full advantage of the current market conditions and the Chinese investments that are flowing into the Greek port. Said this, the port's stakeholders should focus on improving the infrastructure, connectivity and time efficiency of Piraeus container terminals while the Greek state should lift the barriers that hurt Piraeus growth. The improvement of the stagnant Greek economy along with a more friendly regulatory framework would have a major positive impact for Piraeus growth and prosperity.

5.2 Research Limitations

The current research contains certain limitations that are mainly related to the main analysis and the methodology that was followed. To be more specific the main research limitations are the following:

- During the scenario planning process, there were limited number of external forces taken into account that can impact the Greek container port's future. As a container port, Piraeus is operating under a highly globalized environment where there can be numerous forces that can affect the port's performance in the future. However, for the sake of simplicity we choose to account for the ones that seem to have the largest impact in the future
- The uncertainties that the scenarios matrix was based on, had only two possible directions for example, a successful implementation of OBOR against an unsuccessful implementation of the project. As in real world these factors are not always black or white the above scenarios are not accounting for cases that the OBOR project's implementation could be characterized as something in the middle. For example, the OBOR can be successful in some aspects while not so successful in others. Since the project is involving many countries, it could be implemented well in some of them while still facing issues in other regions. This brings more possible scenarios for Piraeus in the surface which have not been taken into consideration in the current research.
- Last, another limitation is that the expert opinions have been extracted mainly from four specialized journals. This limited sample makes the results of the analysis to run a risk of potential bias. However due to the criteria that were set for the sample such as the recentness and the credibility of the journals, it was quite challenging to expand the sample to a larger number of journals/opinions.

5.3 Recommendations for further research

The current research can be expanded and improved in aspects that are mainly related to the main analysis and the input of this context. These aspects are can be summarized in the below two points.

- The opinions of the experts can be extracted from personal interviews may be conducted with these experts regarding their views on Piraeus and the One Belt One Road Initiative. That would make the sample as recent as possible and allow the researchers to focus and make questions on aspects that are clearly impacting the container port according to the interviewees.
- As has been already mentioned in the limitations section, the current research lacks in taking into account all the potential external forces that can affect Piraeus future. Accounting for all the potential forces would make the research quite complicated but an inclusion of more than the ones that have been already included in the current text, could lead to important findings regarding the possible futures of the Greece's largest container port.

Bibliography

- Baker, J. (2018, Oct). *Port planning faces increasing challenges*. Retrieved from Lloyd's List: <https://lloydlist.maritimeintelligence.informa.com/LL1124452/Port-planning-faces-increasing-challenges>
- Barnard, B. (2016, Sep). *Europe's transportation market undergoing transformation*. Retrieved from Joc: https://www.joc.com/maritime-news/europe%E2%80%99s-transportation-market-undergoing-transformation_20160911.html?page=1=2,3
- Chang, Y. T., Lee, S. Y., & Tongzon, J. L. (2008). Port selection factors by shipping lines: Different perspectives between trunk liners and feeder service providers. *Marine Policy* 32, 877–885.
- Chou, C. C. (2007). A fuzzy MCDM method for solving marine transshipment container port selection problems. *Applied Mathematics and Computation*, 435-444.
- Cornelius, P., Van de Putte, A., & Romani, M. (2005). Three Decades of Scenario Planning in Shell. *California Management Review*, 92-109.
- De Langen, P. W. (2007). Port competition and selection in contestable hinterlands; the case of Austria. *European Journal of Transport and Infrastructure Research*, 1-14.
- Derbyshire, J., & Wright, G. (2017). Augmenting the intuitive logics scenario planning method for a more comprehensive analysis of causation. *International Journal of Forecasting*, 254-266.
- Fardella, E., & Prodi, G. (2017). The Belt and Road Initiative Impact on Europe:. *China & World Economy*, pp. 125-138.
- Ferrara, O., Acciaro, M., Buonfanti, A., De Jong, O., Kuipers, B., Nan, Z., . . . Weirong, L. (2017). *Italian Maritime Economy: The Mediterranean as new key crossroads: outlooks, geomaps and Italy's role on the Silk Road*. SRM.
- Gerden, E. (2017, Oct). *China considers cuts to Belt and Road rail rate subsidies*. Retrieved from Joc: https://www.joc.com/rail-intermodal/international-rail/asia/china-considers-cuts-belt-and-road-rail-rate-subsidies_20171030.html
- Glass, D. (2017, November). *Cosco managed Piraeus Port becomes a must visit for Chinese investors*. Retrieved from Seatrade Maritime: <http://www.seatrade-maritime.com/news/europe/27110.html?highlight=ImNvc2NvIHByb2pY3QgZ3JlZWNIlg==>
- Glass, D. (2018, September). *Piraeus Port reports record profits but warns on development hold-ups*. Retrieved from Seatrade Maritime: <http://www.seatrade-maritime.com/news/europe/piraeus-port-reports-record-profits-but-warns-on-development-hold-ups.html>
- Goss, R. (1990). Economic policies and seaports: Are port authorities necessary? *Maritime Policy & Management*, 257-271.
- Gray, K. (2016, November). *OBOR key trade development for 21st century...but who's stumping up the \$3trn annual costs?* Retrieved from Seatrade Maritime: <http://www.seatrade-maritime.com/news/asia/24752.html?highlight=IlNpbGsgUm9hZCI=>

- Jacobs, W. (2007). Port Competition Between Los Angeles and Long Beach: An Institutional Analysis. *Tijdschrift voor Economische en Sociale Geografie*, 360-372.
- Kambouri, N. (2014). Dockworker Masculinities. *Logistical Worlds: Infrastructure, Software, Labour*, 1-12.
- Karanasos, M., Koutroumpis, P., Hatgioannides, J., Karanassou, M., & Hector, S. (2017). *Political Economy, Perspectives on the Greek Crisis: Debt, Austerity and Unemployment*. Palgrave Macmillan.
- Knowler, G. (2017, October). *Shippers fear Europe rail unable to handle volume jumps*. Retrieved from JOC: https://www.joc.com/rail-intermodal/europe%E2%80%99s-overloaded-rail-won%E2%80%99t-cope-any-major-transfer-road-volume_20171030.html
- Kreutzberger, E., & Konings, R. (2016). The challenge of appropriate hub terminal and hub-and-spoke network. *Research in Transportation Business & Management*, 83-96.
- Lakshmi, A. (2016, August). *A Bumpy Ride: China's New Maritime Silk Route*. Retrieved from MarineLink: <https://www.marinelink.com/news/maritime-chinas-bumpy413859>
- Langen, P. d. (2017, September). *The Analyst: geopolitics and port development*. Retrieved from Port Economics: <http://www.porteconomics.eu/2017/09/13/the-analyst-geopolitics-and-port-development/>
- Lee, S. Y., & Woo Lee, P. T. (2007). *Determinants of Port Selection: Heterogeneity Among Major Market Players*. Asia Pacific School of Logistics.
- Lin, M. T. (2017, May). *The Belt and Road Initiative and the importance of prudence*. Retrieved from Lloyd's List: <https://lloydslist.maritimeintelligence.informa.com/LL108416/The-Belt-and-Road-Initiative-and-the-importance-of-prudence>
- Lloyd's. (2017, May). *Good luck, One Belt, One Road*. Retrieved from Lloyd's List: <https://lloydslist.maritimeintelligence.informa.com/LL108476/Good-luck-One-Belt-One-Road>
- Lowry, N. (2016, August). *Athens: missing the boat*. Retrieved from Lloyd's List: <https://lloydslist.maritimeintelligence.informa.com/LL023322/Athens-missing-the-boat>
- Lowry, N. (2017, July). *Greece needs hard work to fortify itself as maritime centre*. Retrieved from Lloyd's List: <https://lloydslist.maritimeintelligence.informa.com/LL109150/Greece-needs-hard-work-to-fortify-itself-as-maritime-centre>
- Malchow, M. B., & Kanafani, A. (2004). A disaggregate analysis of port selection. *Transportation Research Part E*, 317-337.
- Meunier, S. (2015). A Tale of Two Ports: The Epic Story of Chinese Direct Investment in the Greek Port of Piraeus. *CritCom*, 2-9.
- Mooney, T. (2017, March). *Impact of Belt and Road big but hard to quantify*. Retrieved from JOC: https://www.joc.com/international-trade-news/infrastructure-news/just-how-big-chinas-belt-and-road_20170322.html

- Mooney, T. (2018, April). *Southern ports poised to grab European inland volume*. Retrieved from JOC: https://www.joc.com/port-news/european-ports/port-barcelona/southern-ports-poised-grab-european-inland-volume_20180403.html
- Moya, J., & Valero, M. (2017). Port choice in container market: a literature. *Transport Reviews*, pp. 300-321.
- Murphy, P. R., Daley, J. M., & Dalenberg, D. R. (1992). Port Selection Criteria: An Application of a Transportation Research Framework. *Logistics and Transportation Review*, 237.
- Naftemporiki*. (2016, July). Retrieved from Cosco: Additional investments of 500 million euros in Piraeus port: <https://www.naftemporiki.gr/finance/story/1124617/cosco-prosthetes-ependuseis-500-ekat-sto-limani-tou-peiraia>
- Ng, K. (2006). Assessing the Attractiveness of Ports in the North European Container Transshipment Market: An Agenda for Future Research in Port Competition. *Maritime Economics & Logistics*, 234-250.
- Nightingale, L. (2017, September). *Slowly does it*. Retrieved from Lloyd's List: <https://lloydlist.maritimeintelligence.informa.com/LL111122/Slowly-does-it>
- Nir, A.-S., Lin, K., & Liang, G.-S. (2003). Port choice behaviour from the perspective of the shipper. *Maritime Policy & Management*, 165-173.
- Notteboom, T., Parola, F., Satta, G., & Pallis, A. (2017). The relationship between port choice and terminal involvement of alliance. *Journal of Transport Geography*, 158-173.
- Onut, S., Tuzkaya, U. R., & Torun, E. (2011). Selecting container port via a fuzzy ANP-based approach: A case study in the Marmara Region, Turkey. *Transport Policy* 18, 182-193.
- Pallis, T., & Vitsounis, T. (2009). Greek container-port competitiveness: Perspectives of users do matter. *Naftika Chronika*, 66-67.
- Pardali, A., & Michalopoulos, V. (2008). Determining the position of container handling ports, using the benchmarking analysis: the case of the Port of Piraeus. *Maritime Policy & Management*, 271-284.
- Prodi, R. (2015). A Sea of Opportunities: The EU and China in the. *Mediterranean Quarterly*, pp. 1-4.
- Sanchez, R. J., Ng, A. K., & Alonso, L. G. (2011). Port Selection Factors and Attractiveness: The Service Providers Perspective. *Transportation Journal*, 141-161.
- Song, D. W., & Panayides, P. M. (2008). Global supply chain and port/terminal: integration and competitiveness. *Maritime Policy & Management*, 73-87.
- Steven, A. B., & Corsi, T. M. (2012). Choosing a port: An analysis of containerized imports into the US. *Transportation Research Part E*, 881-895.
- Stratfor. (2015, January 8). *Scenario Planning and Strategic Forecasting*. Retrieved from Forbes: <https://www.forbes.com/sites/stratfor/2015/01/08/scenario-planning-and-strategic-forecasting/#7c5c9fd6411a>

- Szakonyi, M. (2018, October). *Asia-Europe rail subsidies come with hidden costs to network*. Retrieved from JOC: https://www.joc.com/rail-intermodal/international-rail/china/asia-europe-rail-subsidies-come-hidden-costs-network_20181004.html
- Tiwari, P., Itoh, H., & Doi, M. (2003). Shippers' Port and Carrier Selection Behaviour in China: A Discrete Choice Analysis. *Maritime Economics & Logistics*, 23-39.
- Tongzon, J. L. (2009). Port choice and freight forwarders. *Transportation Research Part E*, 186-195.
- Ugboma, C., Ugboma, O., & Ogwude, I. C. (2006). An Analytic Hierarchy Process (AHP) Approach to Port Selection Decisions - Empirical Evidence from Nigerian Ports. *Maritime Economics & Logistics*, 251-266.
- Vaggelas, G. (2016, February). *PortGraphic: economic crisis and ports – the greek case*. Retrieved from PortEconomics: <https://www.porteconomics.eu/2016/02/18/portgraphic-the-greek-ports-lost-significant-traffic-during-the-economic-crisis-with-the-exception-of-containers/>
- Vonck, I. (2017, December). *Ports of the future*. Retrieved from PortEconomics: <http://www.porteconomics.eu/2017/12/11/ports-of-the-future/>
- Wee, V. (2018, June). *The beautiful South (European ports)*. Retrieved from Seatrade Maritime: <http://www.seatrade-maritime.com/news/europe/28188.html?highlight=InBpcmFIdXMi>
- Wiegmans, B. W., Hoest, A., & Notteboom, T. E. (2008). Port and terminal selection by deep-sea container operators. *Maritime Policy & Management*, 517-534.
- Yeo, G.-T., & Dong, S. W. (2006). An application of the hierarchical fuzzy process to container port competition: Policy and strategic implications. *Transportation*, 409–422.
- Yuen, C.-I. A., Zhang, A., & Cheung, W. (2012). Port competitiveness from the users' perspective: An analysis of major container. *Research in Transportation Economics*, 34 - 40.