Erasmus University Rotterdam

MSc in Maritime Economics and Logistics

2009/2010

The Determinants of Port Competitiveness: The case of Valencia

by

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" If you cannot measure it, you cannot control it. If you cannot control it, you cannot manage it. If you cannot manage it, you cannot improve it."
Dr. H. J. Harrington, 1991.

Acknowledgements

A year passed since the journey to the completion of this Master started; this thesis is the final step towards it and I would like to hereby thank all of those that have helped me, supported me or just been with me during this experience.

First, my family; to my wonderful father, not just for the financial support but mostly for the unconditional love he shows me every day, no matter how far or close we are. To my sister, for all the things that need not to be said; and to my grandmother, the person who taught me the value of culture and education.

Second, I would like to express my gratitude to my supervisor, Prof. Haezendonck, for the precious advises and for the time dedicated to me throughout the writing of this thesis. I would also like to thank the MEL staff for sharing their knowledge and expertise with me and for inspiring me. Last, but not least, thanks to all those in the Port of Valencia for having spared some time to fill in my questionnaire; these industry experts have added valuable information to this study.

Finally, I would like to express a special thank to my colleagues: we studied, we laughed and we studied some more together. These are memorable times that make me grateful to have met you, and to have shared so much with you. Thanks also to my “opinion leader”, for being there even when you are not.

This thesis constitutes a very important part of my academic career, and without all of you, it would have not turned out this way. Thank you.

Sara Scaramelli

Abstract

Port competition has dramatically increased in recent years. This is due to the dynamic environment in which ports operate, which has been shaped by numerous and interrelated forces.
In order to achieve survival and success, strategic planning has become of paramount importance. One of the most relevant aspects of strategic planning is indeed the analysis of competitiveness. What is the current competitive position of a port? What is the future position the port can achieve? And most importantly, what are the determinants of competitiveness?
This thesis aims at identifying the determinants of competitiveness for the Port of Valencia.
After having framed the subject of the research in the broader context of the shipping and port industry, the issue of competition is dealt with in details. The methodologies used to answer the research questions are first explained, and then applied to produce the results to analyse. A combination of competitiveness study techniques has been applied in order to produce a comprehensive and valid answer. In the end, the Port of Valencia has been positioned in its competitive setting; following, the determinants of its competitive standing have been detected and analysed. 16 determinants of port competitiveness have been identified, of which eight seem to be prominent. The study has also highlighted the existence of four elements which may undermine the competitiveness of Valencia, and are thus areas in which strategy should focus in order to enhance competitiveness.

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List of Abbreviations

APH	Analytical Hierarchy Process
APV	Autoridad Portuaria de Valencia
BCG	Boston Consulting Group
CI	Containerisation International
CEYD	Centro de Estrategia y Desarrollo de Valencia
COSCO	China Ocean Shipping Company
CNEL	Centro Nazionale dell'Economia e Del Lavoro
DEA	Data Envelopment Analysis
ESPO	European Sea Ports Organisation
FE	Features (Quantitative Variables)
GDP	Gross Domestic Product
GIL	Global Institute of Logistics
GRA	Grey Relational Analysis
ICT	Information and Communication Technologies
MCDM	Multi Criteria Decision Methods
MSC	Mediterranean Shipping Company
OPPE	Organismo Publico Puertos del Estado
PCA	Principal Component Analysis
PCD	Port Competitiveness Degree
PPA	Port Portfolio Analysis
QC	Quality Criteria (Qualitative Variables)
SPA	Strategic Positioning Analysis
SPTE	Sistema Portuario de Titularidad Espanola
SWOT	Strengths, Weaknesses, Opportunities and Threats
TEU	Twenty Feet Equivalent Unit
UNCTAD	United Nation Conference on Trade and Development
WTO	World Trade Organisation

1 Introduction

In 1981, Dr. Harrington provided a quote that serves as the research philosophy for the present study: "*If you cannot measure it, you cannot control it. If you cannot control it, you cannot manage it. If you cannot manage it, you cannot improve it"*.
This quotation implies that in order to measure, control, manage and improve whatever subject matter, one needs a thorough understanding of it.
The subject matter of this thesis is port competitiveness, with particular reference to the port of Valencia, Spain, and containerised cargo. The quest relates to the identification of the determinants of competitiveness in the above mentioned port.
This chapter will introduce the impetus for the research and will frame it into the broader shipping and port context. After this, the port of Valencia will be introduced, with relation to its main characteristics, its organisation and the traffic growth registered in recent years. Moreover, the strategic plan of Valencia, which served as a sort of inspiration for this study, will be outlined.
After having illustrated the above, the aim of this research is explained and the research questions that the study seeks to answer are presented, followed by some limitations to the research.
The chapter is concluded with a presentation of the structure of the thesis.

1.1 The Impetus for Research

In the last 40 years or so, the port and liner industries have undergone profound change. In the literature, virtually all academics agree that these changes have taken place on a stage in which globalisation, the liberalisation of trade; containerisation, technological advances and the logistics revolution perform as the main actors and promoters of change.
Such wide consensus is also given to the fact that these changes and the new trends that have come into existence as a consequence have revolutionised the way ports are operated, financed, managed, governed as well as the way port compete.
In essence, as a result of the transformations in the global economy, and subsequently in the liner and port industries, the level of competition between ports has dramatically increased. Port authorities and port operators need to **understand** their present competitive standing and the forces shaping their business environment in order to formulate and apply strategies that can help them maintain and **improve** their competitiveness.

The issue of port competitiveness, particularly in the field of containerised cargo, is a complex one, because of the number of stakeholders involved (Van de Voorde and Winkelmans, 2002). It has been approached by many different points of view, but a comprehensive, exhaustive and updated review of the subject seems to be lacking in the literature. Undoubtedly, port operators and port authorities need to be aware of methods to **measure** competition, so that they can **control** it and take future-led steps to improve the competitiveness of their ports.
Surely, the methods addressed to measure the competitiveness of a given port very much depends on what are the objectives of such measurement, as well as on the availability and quality of data (Basta and Morchio, 2008). This is why this study first presents methods used in the past 20 years or so, and then moves to illustrate the methods used to answer the research questions.

Given the transformations taking place in the port industry and their impact on the way port compete, coupled with the complexity of port competition itself, the *impetus* for this research stems from a basic question: what are, in actual facts, the determinants of port competitiveness?
This question cannot be answered in an abstract manner, nor is it possible to establish universally valid determinants of port competitiveness, for each port is a unique case, and no two ports are the same (Haralambides *et al.,* 2002).
Hence, it was decided to choose the case of the Port of Valencia, for its dynamic nature as well as for the leadership it has recently been recognised with in Port Cluster Performance by the Global Institute of Logistics.

1.2 The Port of Valencia

1.2.1 The Port of Valencia in the Context of the Spanish Port System

The Port of Valencia is one of the 28 Port Authorities that constitute the Spanish Port System. When talking about the Spanish port system, one needs to distinguish between commercial ports, on one hand, and leisure and other non-commercial ports on the other hand. The "Administracion Central del Estado" (Central State Administration) is the body responsible for all the commercial ports (SPTE, i.e. Sistema Portuario de Titularidad Espanola), whereas the Autonomous Communities are responsible for the ports that have other purposes (Caudeli *et al.*, 2009).

The Ministry of Development (Ministero del Fomento), through the State Ports Public Body (Organismo Publico Puertos del Estado – OPPE) coordinates and controls the efficiency of the SPTE, although ports are autonomously managed by individual port authorities. Therefore, the role of the port authorities in the Spanish Port system is that of ensuring the maximum quality and efficiency of the ports they operate, but this role is part of a broader context in which organisms such as the OPPE provide broad guidelines for all National ports (Caudeli *et al.*, 2009).

Port authorities have their own juridical identity, management bodies and organisations. The governance model in place in Spain is that of the "landlord port", although more and more, lately, the willingness to convert into a "Main Port Manager" model has been voiced, and various initiatives have been promoted in this direction by some ports, among which Valencia.
The recognised mission of port authorities is to maximise social benefits through the optimisation of the mobility conditions of cargoes and people, and to promote the social and economic development of the area served by their ports, while at the same time trying to reduce import costs and make exports more competitive.
This mission has been embraced in the "Marco Estrategico" (Strategic Framework), which has the objective of improving the competitiveness of the Spanish port system in a context of growing internationalisation and liberalisation of economic activities (Caudeli *et al.*, 2009).

1.2.2 Characteristics of the Port of Valencia

The port authority of Valencia, APV (Autoridad Portuaria de Valencia) is made up of three commercial ports, Valencia, Sagunto and Gandia, and develops for 80 kilometres along Spain's east Mediterranean coast. The commercial name of the

port of Valencia is Valenciaport, and it is geographically situated as illustrated by the figure below.

Figure 1: Geographic Position of Valenciaport

Source: Valenciaport, 2010a

Thanks to its geographic position, Valenciaport has a direct influence area of 350 km radius, where as much as 55% of Spain GDP is produced.
Due to its proximity to Madrid, and to the efficient connections to it by road and rail, Valencia is argued to be the natural port of the Spanish capital.
Valenciaport allows for the efficient distribution of goods in a radius of about 2,000 km, which comprises not only South Europe, but also countries in North Africa (Morocco, Algeria, Tunisia and Lybia) which constitute a market of about 243 million consumers (Valenciaport 2010b).

Moreover, Valencia is connected by sea to more than 850 ports of the world, thanks to more than 140 regular lines, among which figure the main ones, i.e. Maersk, MSC, COSCO, Hapag-Lloyd etc. There are also many regional services in place.

Due to its natural position and to the land and sea connections offered, Valencia argues to have a geo strategic location, which enables it to be the main hub in the West Mediterranean; with particular reference to the containerised traffic coming from the Far East, vessels can save four sailing days when choosing Valencia over Barcelona or Marseille, and eight over Genoa or La Spezia (figure 2).
Besides, Valencia lies at the core of the European Mediterranean Arch, a European region with a great economic potential (Casas *et al.,* 2009), which the CEYD (Centro de Estrategias y Desarrollo de Valencia) argues finds its main engine exactly in the Valencia's region and economic activities (CEYD, 2005).

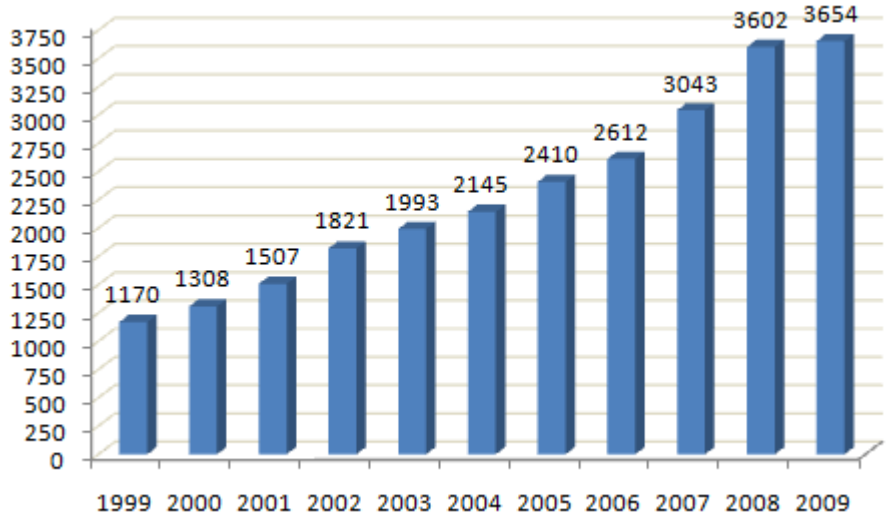
Figure 2: Strategic Location of the Port of Valencia

Source: Valenciaport, 2010c

Valenciaport handles primarily construction materials, agriculture products and foodstuff, fuel, chemicals, vehicles, woods and furniture, machinery, textiles, and footwear. However, it is argued that it is in the field of containerised traffic, which is the focus of this thesis, that Valencia finds its main strength and excellence (Valenciaport 2010a).

The above statement is substantiated by the impressive growth of containerised cargo that Valenciaport witnessed in the past few years. From just over a million TEU registered in 1999, 2009 saw this number reaching almost four million, which corresponds to a year-to-year growth of 9.78% (Figure 3). Moreover, containerised traffic counts for about 70% of Valencia traffic structure, as will be demonstrated in Chapter 5.

Figure 3: Growth of Containerised Traffic (thousands TEU)



Source: elaboration of the author based on Valenciaport 2010a

Containerised cargo is handled at four terminals, i.e. the MSC dedicated terminal, the Valencia Public Container Terminal, a multipurpose terminal with ten modern

quay cranes, and Terminal "Muelle de Levante" (Containerisation International, 2010).

1.2.3 The Valenciaport Strategic Plan 2015

In Valencia, the relationship between the city, local and regional governments and the port is strategically valued, because it is recognised that one of the factors that most contributes to the economic and social development of the Valencian region is indeed transport and logistics, where the port plays an essential role (Generalitat Valenciana, 2007).
Indeed, the mission of the Centre for Strategy and Development of Valencia is to improve the coordination of the economic and social stakeholders involved in the strategic development of the area: Valencia is recognised as the European sea city that has the greatest potential to become an intermodal and logistics hub for the West Mediterranean, and as the driving force of the system of cities and regions at the heart of the Iberian Peninsula. This potential can be realised through the promotion and improvement of the port logistics capabilities of Valencia, as well as through the promotion and improvement of its hinterland connectivity, communication technologies and through the quest for excellence in the provision of maritime services and infrastructure (CEYD, 2006).

In line with these principles, the Port Authority of Valencia launched in 2002 a strategic plan aimed at converting the port into the main intermodal logistics platform of the West Mediterranean, and in the most competitive port of South Europe.
In order to develop this plan, a series of steps were taken; first, a SWOT analysis was carried out in the process of environmental scanning; as a result, three factors that are supposed to be the key to increased competitiveness were identified, i.e. infrastructure, cargo concentration and port logistics services. Subsequently, strategic aims and projects were formulated and incorporated into the final Strategic Plan 2015.
The **Mission** is to favour competitiveness through a competitive offering of infrastructures and services, aligned with the European Transport Policy. The **Vision** is to convert Valencia into the "Mainport" of the Iberian Peninsula, and into the leader multimodal logistics platform. Vision and mission are enforced in a context of customer orientation, ensuring best quality, safety, sustainability and security.
The strategic plan is embedded into the governmental "Marco Estrategico", i.e. Strategic Framework, an element which stresses the continuous cooperation and involvement of economic, public and social stakeholders for the development of the Valencian community (Caudeli *et al.*, 2009).

The three key strategic objectives of the plan are (Valenciaport 2010d):

1. Consolidate Valenciaport as the main entry and exit point of the Iberian Peninsula;
2. Convert Valenciaport into the leader distribution centre and intermodal logistics platform of the Mediterranean;
3. Have enough capacity to handle 68 million tons of traffic and 4 million TEUs by 2015.

The effort towards collaboration and cooperation, not just among economic, social and public stakeholders, but also among port stakeholders - terminal operators, stevedores, lines, hinterland transport operators, port authority etc – is one of the main aspects of port clustering.
In this respect, the Port of Valencia has recently been awarded "Best in Class" as a port cluster by the Global Institute of Logistics (GIL). The award comes after a two years worldwide investigation, within the program "20/20", promoted and conducted by the GIL itself. The criteria on which this award is based is that the Valencia region demonstrates an "*exceptional level of maturity and demonstrates a culture which indicates that stakeholders (...) are truly engaged in a collaborative process"* (GIL, 2009, pp.14).
The GIL detected elements of integration of the whole supply chain in the port cluster, supported by such elements as a Quality Committee, an advanced IT portal connecting all port stakeholders and a Quality guarantee on service levels. The award recognised the effort of Valenciaport in promoting and putting into place a culture of co-operation and integration among all port stakeholders.
Among the elements that won Valenciaport the award, it is possible to identify (GIL, 2009):

- The strategic plan, whose objectives demonstrate the willingness of Valenciaport to be a facilitator of trade in the context of logistics supply chains;
- The "Fundacion Valenciaport", a body constituted for the creation and transmission of knowledge about the logistics and port community, which is at the same time a research and a training centre;
- The governance structure and its modernity;
- Typical Cluster aspects: "Marca de Garantia", which is a quality framework for the services offered; integrated IT portal (Valenciaportpcs.net); good and extensive hinterland connections; port-city relationships (America's cup Port).

1.3 The aim of the Study and Methodology

Having stated the above, the general aim of this study is to identify the determinants of port competitiveness for the Port of Valencia; to reach this, a first aim is to position relevant competing ports in the competitive setting, which constitutes the first phase of the analysis. Secondly, the criteria underlying the competitive position of Valencia are analysed more in depth, in the second and third part of the analysis.
The contribution of this thesis aims to expand the existing knowledge base by combining different techniques in order to provide a comprehensive and valid answer to each research questions.

Taking into account the ambitions declared in the strategic plan and the award as Best in Class for port clustering, the research questions are:

1) Is Valencia really the leader port of the West Mediterranean?
2) Is Valencia really the most competitive port in the Mediterranean?
3) In this respect, is the Port Authority right in identifying the key competitive strengths in infrastructure, cargo concentration and port logistics services, in relation to its Mediterranean competitors?
4) What are the determinants of its competitiveness, based on the perceptions of port stakeholders?

5) Is Valencia really the main access gateway to the Iberian Peninsula?
    5a) What is the quality of the road/rail connectivity?
    5b) What is the role of the logistics services offered in this respect?

The focus of the study is on containerised traffic only, because it is on this traffic category that Valencia identifies its main strength.

In order to answer the first research question, a Port Portfolio Analysis will be conducted. This technique has the objective of positioning the Port of Valencia with respect to other competitor ports in West Mediterranean, i.e. Barcelona, Algeciras (Spain), Genoa and La Spezia (Italy) and Marseille (France). At the end, it will be possible to infer whether Valenciaport can be actually classified as a "Star Performer", and whether others are positioned better or worse in comparison.

To answer the second and third questions, instead, a Benchmarking analysis will be conducted; thanks to this technique it is possible to indentify the Leader Port in the West Mediterranean and build a Competitiveness Degree Index. It is also possible to study variables related to Infrastructure, services etc to ascertain where the strengths of the Leader and other ports considered lie. The ports included in this analysis are the same as for PPA, but with the addition of Marsaxlokk and Gioia Tauro.

Finally, the fourth and fifth questions will be answered with the aid of a questionnaire, self-administered online to some 75 operators in the port of Valencia. This method was chosen because it is not possible to rely exclusively on the press or on the voice of the Port Authority to answer, in order for the final results not to be biased.

1.3.1 Limitations of the Research

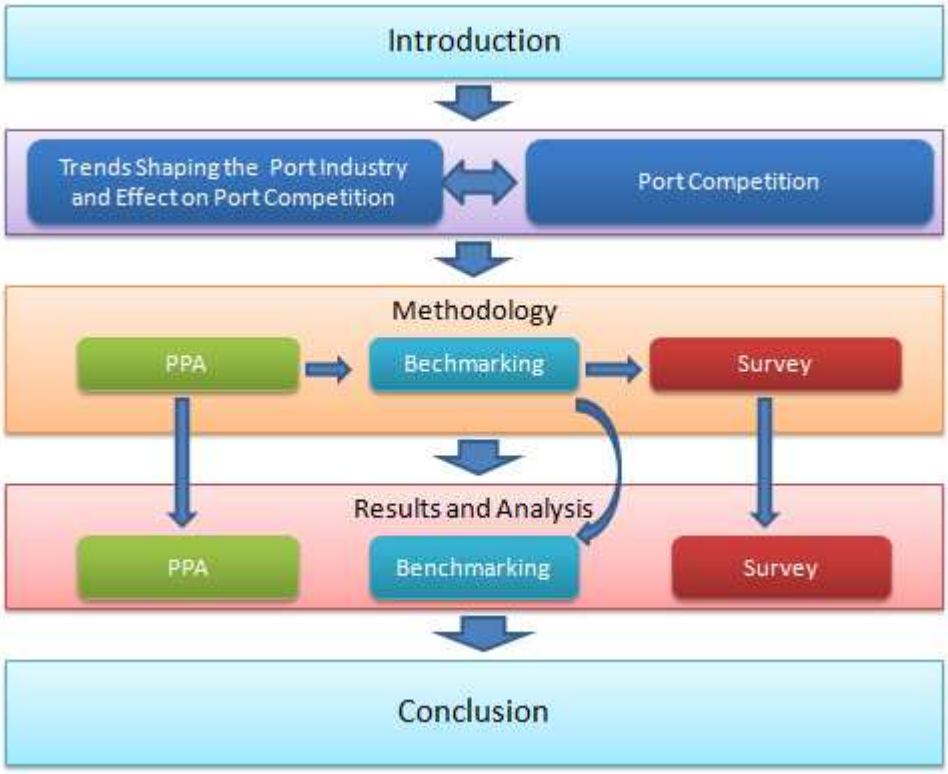
Like for every research, not everything that the author planned to do or achieve was possible, in the end.
A first important constraint was the relative unavailability of traffic data or its lack of homogeneity. For the PPA analysis, results would have been more meaningful if the period analysed was at least 10 years, but traffic data since 1999 or 2000 was not possible to trace and some port authorities would not provide them by emails. Given the geographical dispersion of the ports analysed, it was not possible to visit them in person, so the analysis was carried for a period of 7 years, and the ports of Gioia Tauro and Marsaxlokk were eliminated from the analysis. For the Benchmarking Analysis, the port of Tangier would not provide data, so it could not be included. These ports would have enriched the analysis in a truly meaningful way: Gioia Tauro is a competitive port that can serve the Iberian Peninsula by transhipment, being one of the most important transhipment hub in the Mediterranean; Marsaxlokk, for the very same reason, is a potential threat for Valencia being the main hub of the Mediterranean, and Tangier is a port with a great growth plan and a brand new management which aims at capturing the same cargo for which Valencia is competing. The inclusion of these ports would add relevance and significance to the analysis and could thus constitute an opportunity to expand the present research.
Finally, the response rate of the survey was relatively low, i.e. only 14.6%, and this can be attributed to a) the time of the year in which the research was conducted and

b) to the fact that the survey was sent by email. This low response rate reduces the validity of the results and as such can constitute an opportunity for further research. Moreover, since the survey was administered online, it was not possible to probe the answers of the respondents any further, in a way that would have been possible had the respondents been interviewed in person. This further reduces the validity of the results, but it was not possible for the author to carry out interviews in person because of the geographical location of the respondents.

1.4 The Structure of the Thesis

The remainder of this study is organised as follows:

Figure 4: Structure of the Thesis



Source: elaboration of the author

Chapter 1 – Introduction to the study, with the presentation of the research philosophy, the impetus of the research, general information about the Port of Valencia and the presentation of the research questions the study seeks to answer.

Chapter 2 – A summary of the main forces that have shaped the port industry, and consequently port competition, in the past 40 years or so. This chapter is needed to understand thoroughly port competition and competitiveness.

Chapter 3 – Port competition and competitiveness. The issue is dealt with in details, and after some definitions, the rationale to study port competitiveness is presented, together with a series of methods used in the past to measure it. The chapter ends with a review of the main determinants of port competitiveness found in the literature.

Chapter 4 – The methodology of the study is presented in this chapter. The first method used is the PPA, which aims at positioning the relevant competitor ports in their competitive setting. This is followed by Benchmarking analysis, which relatively deepens the analysis by identifying, on the basis of pre-determined criteria, why the port of Valencia is positioned in a certain way. Finally, a survey is administered to important port stakeholders to indentify the more relevant determinants of port competitiveness on the basis of their perceptions and experience.

Chapter 5 – The results of the analysis are presented and discussed, with relation to the PPA, Benchmarking Analysis and the survey.

Chapter 6 – It is the concluding chapter of this thesis. The research questions are answered and the main findings are summarised. The limitations of the research are reminded, as well as suggestions for further research.

2. Trends shaping the Port Industry and their effect on Port Competition

During the past four decades, the port industry has been reshaped by a number of trends that have changed the way ports are operated, managed, financed, governed, and that have had a profound impact on the way ports compete amongst themselves.
These trends are mainly driven by such forces as globalisation, containerisation, the so-called "logistics revolution".
All of this will be discussed in this chapter, with the objective of describing the trends and analysing the impact that they had on the port industry and on port competition.

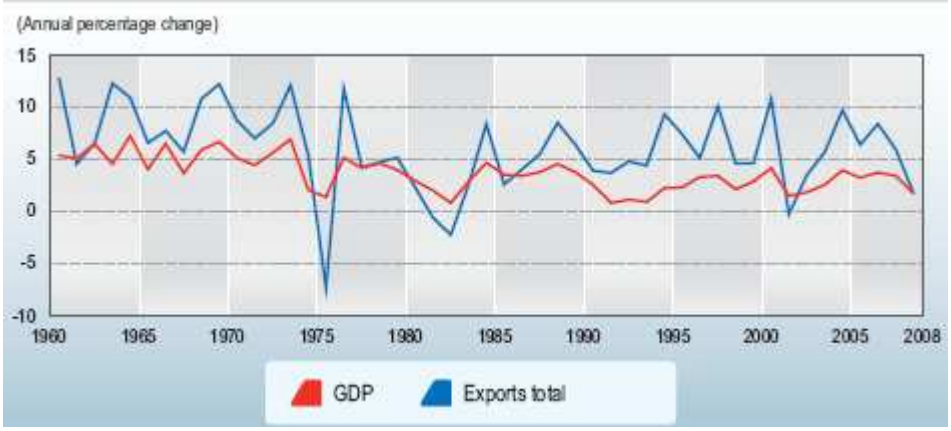
2.1 Globalisation: the World is Smaller

The word "globalisation" has been existing since the 1960s, but it was only the anti-globalisation movements that officially extracted it from financial and academic books and made it become a word of jargon, used by some to describe just about any current affair in the world (Jeffery, 2002).
In the '90s, globalisation became a buzz word (McCalla, 1999); nonetheless, there is no commonly accepted definition of it, to the extent that Pinder and Slack (2004) have estimated that there are over 35 definitions of the term.
However globalisation can be defined, it is certain that it has resulted in a world that manifests the "death of distances" phenomenon, in which outsourcing of raw materials, manufacturing, transportation, distribution and consumption take place on a global scale, rather than on a regional or national one (Basta and Morchio, 2008). This has been greatly aided by trade liberalisation and deregulation: new geographies of production and consumptions have come into existence and the world has become, in actual facts, smaller.
The effects of globalisation on the port industry has been considered by countless number of academics, among which is worth mentioning Notteboom (2004), Iannone *et al*. (2007), Fremont (2007), Notteboom and Rodrigue (2005;2007), Notteboom and Winkelmans (2001), Pinder and Slack (2004) and Wang *et al*. (2007). They all agree on the fact that globalisation has been first a trend in itself, and second a trigger for the changes that have taken place in the port industry, such as the integration of ports as nodes in global supply chains, the formation of global alliances, the phenomenon of containerisation, the creation of hub and spoke networks, and so on and so forth.
Because of globalisation, all countries compete on a global market and this has resulted in a generalised increased level of competition in international trade; in turn, there has been an increase in the level of competition for ports, because of their role as essential links in international trade (Song, 2003). The reasons and forces that have contributed in this are analysed in the next subsections.

2.2 The Growth of World Trade and Containerisation

With world regions becoming more and more interdependent, and markets becoming global in nature, it is little wonder that world trade has increased to the level it has. From 1958 to 1997, trade increased at an average annual growth of 13% (WTO, 1998), whereas on average the growth registered in the period 1990-2000 was of 7% (WTO, 2001), and from 2000 to 2008 it was of 5% (WTO, 2009). The figure below illustrates this point.

Figure 5: World Trade and GDP



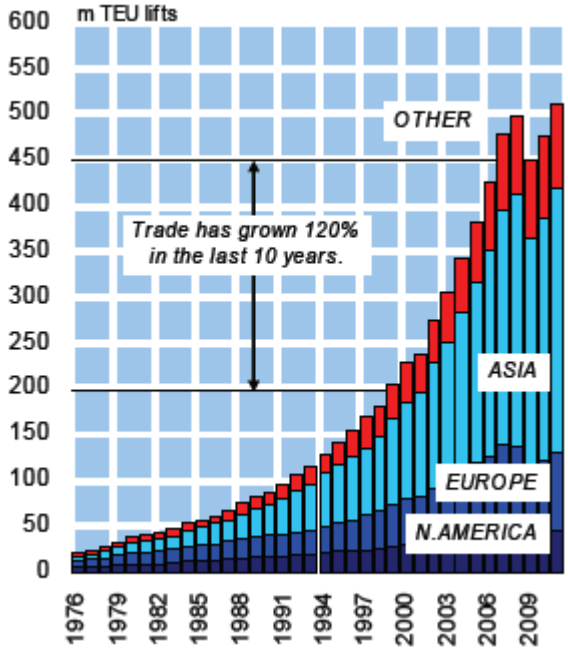
Source: WTO (2009)

Such a growth has been certainly facilitated by the liberalisation of trade, and by the advances of communication technologies, among other factors.
However, it is arguable that also containerisation has affected growth; indeed, as recognised by Pinder and Slack (2004), globalisation and containerisation enjoy a reciprocal relationship because without the benefits, efficiencies and economies introduced by containerisation the establishment of global manufacturing, transport and distribution functions would not have been possible.

In the academic arena, containerisation is considered as the *"industrial revolution of the general cargo and handling methods"* (Iannone *et al.,* 2007); it consists of packing cargo into a standard load unit at the consignor, and taking out the cargo directly at the consignee. In between, the load unit is mechanically handled, thus reducing handling times and costs in comparison to bulk, man-handled old fashioned techniques. Apart from these two benefits, containerisation also improved the efficiency and reliability of transport, as well as security and reduction in the rate of damage/pilferage to the cargo transported. The cargo loaded into containers mainly consists of finished products for consumption, but more and more there is the tendency to pack even commodities that are traditionally shipped in bulk (Middendorf, 1998).

It is just over 50 years since the first container ship, the *Ideal-X*, a converted tanker carrying about 30 TEUs (Wijnholst and Wergeland, 2008), made its first voyage from the port of Newak to reach Houston. The first international voyage was only 10 years later, from New York to Rotterdam. Since then, containerised trade has grown at an impressive pace, quickly becoming the prevailing technique in international general cargo trade (Levinson, 2006). The effects of containerisation on such things as port competition, the development of the load centre concept and the importance of Intermodalism are analysed in details by Slack (1985) and Hayuth (1981; 1987).
The growth of container trade for the period 1976-2011 is illustrated in figure 6:

Figure 6: Growth of Container Trade 1976-2011



Source: Clarkson, 2010.

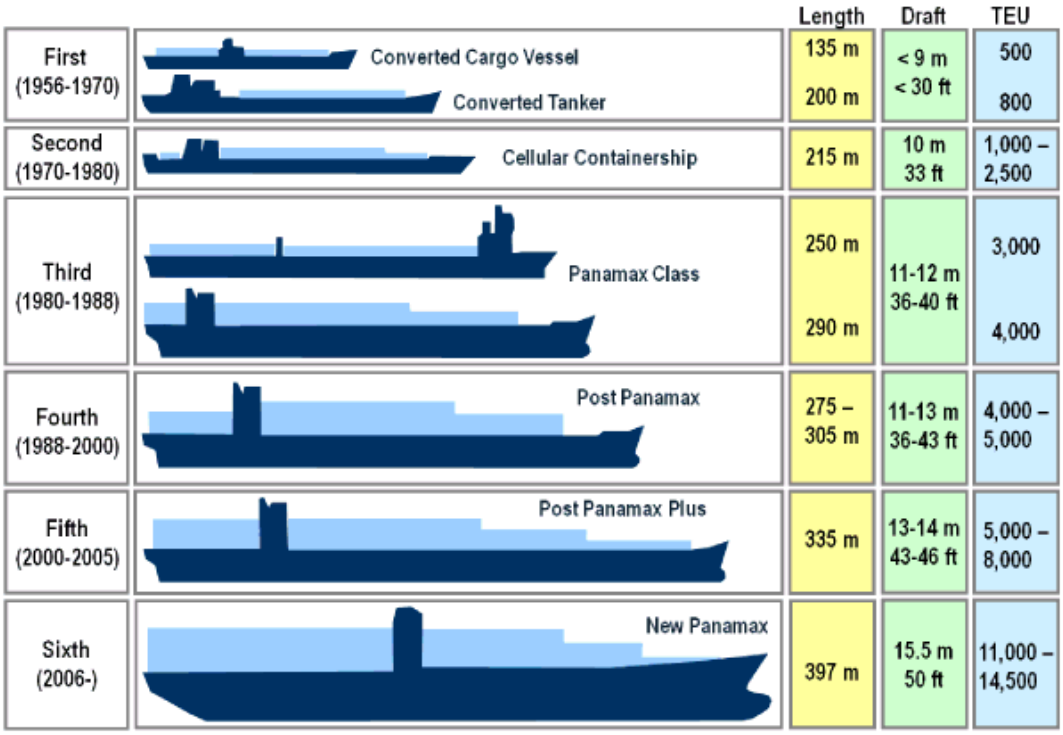
Moreover, the share of containerised cargo in the dry cargo market increased from 5.1% in 1980, to 25.4% in 2008 (UNCTAD, 2009).

The effect of this spectacular growth is two-folded. On one hand, liner shipping companies have responded by deploying ever-larger ships to efficiently and economically transport the increased quantity of containers. On the other hand, ports have had to deal with the challenge of accommodating not only more boxes (which impacted storage capacity, yard and quay equipment), but also the larger vessels (which impacted the accessibility criteria, quay equipment, labour requirement etc) and at the same time improve their productivity and efficiency in order not to lose their competitive edge to the advantage of better performing ports. These impacts, together with others, will be discussed in the following sections. It is possible to anticipate here that all these factors have significantly augmented the exposure of ports to competition.

2.3 How Big is Beautiful

At the origins of containerisation, containers were carried in general cargo ships or multipurpose ships. It was not until 1965 that the first order was placed for the first purpose built cellular container ship (Pillay and Wang, 2003). Nowadays, mammoth ships like Emma Maersk or MSC Daniela are able to carry over 12,000 TEU on board. The evolution of size in container ships is illustrated in figure 7:

Figure 7: Six Generations of Container Vessels



Source: Rodrigue, 2009

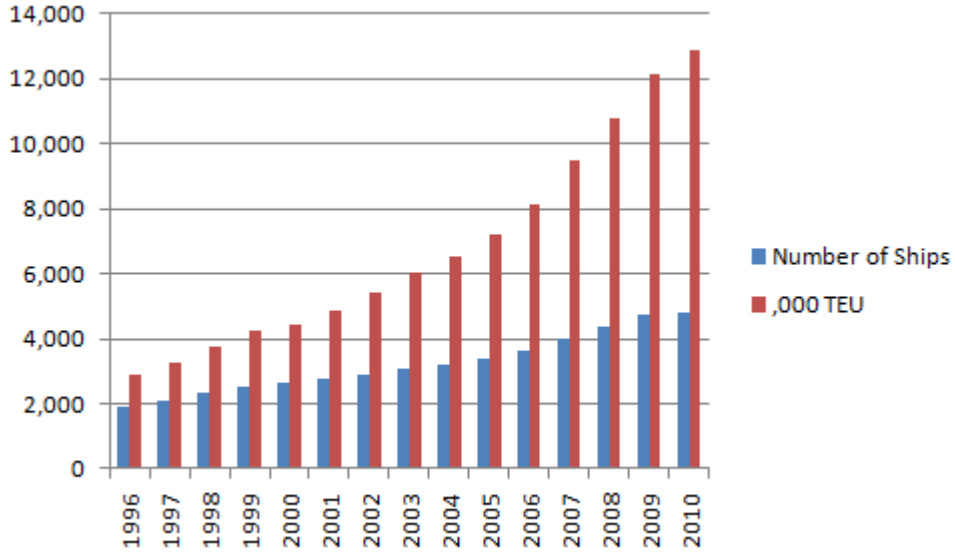
As already mentioned above, the increase in size of the vessels affected port accessibility significantly; indeed, the bigger the ship, the deeper the draught required at ports. Only few ports around the world are able to accommodate the newest generation of container vessels, and in some cases such as for Rotterdam, this can constitute a competitive advantage: the mega vessels will call at one port with the deep draft, and from there cargo will be shipped by land or sea to other ports that cannot be accessed by such big vessels. This concept also relates to the hub and spoke system, which will be mentioned later on in this discussion.

The trends towards ever-larger vessels can be explained through the quest of liner shipping companies to exploit economies of scale. Samsung reported that a 12000 TEU vessel employed on the Europe- Far East Route would result in an 11% cost saving per container slot compared to a 8000 TEU ship, and as much as 23% compared to a 4,000 TEU ship (Notteboom, 2004).
Despite this astonishing scale of growth, academics such as Cullinane and Khanna (2000) argue that the optimal ship size is in the range of 8,000 TEU, beyond which flexibility and operational problems appear; it is also worth notice that cost savings can only be realised if the vessels are filled to a capacity of about 80%, otherwise economies of scale are lost (Rodrigue, 2009). Evergreen provides an example of a company that has not believed in the mega ships concept for many years, while the other top 5 companies were ordering many new vessels of this size. This debate is, however, beyond the scope of this study.

2.3.1 The Growth of the Container Vessel Fleet

Together with a growth in vessel size, the container ship fleet also witnessed a growth in scale (Figure 8):

Figure 8: Growth of the Containership Fleet



Source: elaboration of the author based on Clarkson, 2010a

As it can be seen from the graph, there were about 2000 container vessels in 1996, whereas in 2009 this figure had reached about 5000.
The evolution of TEU capacity of the fleet is also impressive: from 3 million TEU in 1996 to almost 13 million TEU in 2010 (Clarkson, 2010a).

The reason behind such a growth is certainly the growth of trade and thus the increased need to transport finished and semi-finished goods; in this, a prominent role has been played by the rising Chinese economy. With globalisation and the creation of a global, rather than a local, regional or national market place, manufacturing firms have been encouraged to move their production sites even far away from the markets of consumption, in order to exploit economies of scale and scope in production, as well as reduced labour costs such as those that can be found in China, indeed. This creation of new geographies of production and consumption has affected the link between the two, i.e. transportation, and in particular maritime transportation (Zondag *et al.,* 2010). The growth of trade in this context has indeed caused shipping companies to modify their routes, frequency of services and their network designs in order to adapt to a changing context, in which the aim is to provide customers and final consumers with the highest and most reliable service possible.

2.4 Horizontal Integration: the Phenomenon of Global Shipping Alliances

With the world becoming global, consumer tastes converging, and world trade growing, liners needed to provide a global coverage, and thus sought economies of scale and scope by enlarging the fleet and using larger vessels.

However, as mentioned above, these economies can only be fully exploited if capacity utilisation reaches a good percentage of the available capacity. This can be traced as one of the main reasons for the coming together of shipping companies in Global Alliances, a trend that started roughly in 1994 (Alix *et al.,* 1999) and that brought about a great deal of consolidation in the liner shipping industry.
Other reasons have been identified by a number of academics: reduction of costs, capital risk sharing, increased flexibility (Song and Panayides, 2002), access to new markets and greater geographical coverage, increased sailing frequency and customer satisfaction (Lu *et al.,* 2006; Cariou, 2000).

Nowadays, almost all global liner carriers are involved in global alliances (with the notable exception of MSC), which entails the sharing of terminals, vessels, joint use of equipment, joint purchasing and procurement and shared inland transport and logistics (Midoro and Pitto, 2000).

The great level of consolidation achieved through horizontal integration has had undefined effects on the competitive position of ports, and on how they have responded to this change. What is certain, as agreed by Heaver *et al*. (2000) and Heaver *et al*. (2001) is that shipping companies have acquired a much greater market power and bargaining position vis-à-vis port authorities, stevedores, etc. Port Authorities around the world have had several different reactions to this trend, but it is yet to be cleared what the ultimate effect of it in port competition will be.

2.4.1 The Development of the Hub and Spoke Networks

Together, globalisation, containerisation, growth of world trade and the increasing scale size of vessels contributed to profoundly modify the way liner shipping networks are organised.
Rimmer (2004) suggests that at the outset, the main carriers exploited their resources on the major East-West Routes, so as to connect the poles of the global economy; when the need to extend their coverage to a global scale became pressing, they started serving the North-South markets too (Hoffmann, 1998).
Then, with the introduction of larger vessels, there was a cascade effect and these new vessels went to serve the East-West Routes, while the smaller vessels were deployed to cover the North-South Routes. The extension of the coverage to a global level was undoubtedly facilitated by the creation of the above mentioned global alliances (Slack *et al.,* 2002).
As ports more and more assumed the role of nodes in the transport chain (Robinson, 2002) hub and spoke networks were created, linking East-West routes with North-South ones : the global coverage was thus achieved.

As of today, most shipping companies utilise this type of network, which consists of hub ports, lateral ports, main lines and branches (Rodrigue *et al*., 2009); larger vessels stop just at a few hubs on the main trade lanes, such as Algeciras, Gioia Tauro, Marsaxlokk, and Miami. Subsequently, cargo is transhipped via smaller vessels, feeders or land transport to either other ports or to final destination.

The impact of this on container port competition is that not all ports can classify as hubs, because of the service and infrastructure facilities that these entail. Because of the tendency of the main shipping lines to operate through the hub and spoke network, a great concentration of traffic was created and thus some ports have lost

their share of traffic and competitive hedge to the advantage of hub ports, converting in mere peripheral points of entry. Moreover, the loyalty of shipping lines can never be taken for granted: with these complex networks in place, it is very easy that a port will lose traffic not because of its efficiency and infrastructure or superstructure, but just because networks have been reconfigured to the advantage of the shippers or shipping lines.
As noticed by Notteboom (2004), this is just one of the aspects that make the liner shipping industry instable, with obvious consequences on the port industry.

2.4.2 The Development of Global Terminal Operators

Global shipping alliances are just an instance of the broader wave of horizontal integration that has hit the port and shipping industries in the past decades.
Another form of horizontal integration is to be found in the container handling and container terminal businesses. Over the past few years, many ports have handed over the operation of their container terminals to global terminal operators.

These companies have evolved from their traditional local areas of operations to control berths and terminals all over the world; thanks to their financial strength (required for intensive capital investments in container terminal infrastructure and superstructure) and to their expertise (De Souza *et al.,* 2003), this type of terminal management structure has been highly successful in recent years, especially in Europe (Slack and Fremont, 2005) and these companies have realised much higher profits than other sectors of the maritime industry (Brennan, 2002).
Typical examples of global terminal operators include HPH (Hutchinson Port Holding), PSA (Port Authority of Singapore), DP World, and APM Terminals.
They operate on the basis of multi-users criteria and have progressively grown over the years, causing the virtual disappearance of local terminal management companies.

Certainly, a consequence of the existence of global terminal operators is the decline of the local participation in the port community. Evangelista *et al.* (2001), Heaver *et al.* (2000), Heaver *et al.* (2001) and Slack and Fremont (2005) all agree on the consequence on the port industry: port authorities, having ceded the management of terminals to international companies, are left with little or no control over them. They become merely “pawns in a global system” (Slack, 1993) and the effect that this has on competition is uncertain: global terminal operators may have conflicting interests and objectives with the port authorities with regard to competition, market shares, and growth.

2.5 Vertical Integration

While the search for exploiting economies of scale, a factor encouraging global shipping alliances, is something that belongs to a Fordist economy, the quest for economies of scope and the resulting co-operation in economic networks is typical of the Post-Ford era (Notteboom and Winkelmans, 2001).
It is in the latter context that we see the liner shipping industry more and more integrated, not only horizontally, but also vertically.
Horizontal and vertical integration are phenomena that concern the port industry, both directly and indirectly: directly because there has been a great deal of terminal operators expanding in logistics service provision, the emergence of global terminal

operators, the cooperation with inland terminals etc. Indirectly because the effects of horizontal and vertical integration in the liner shipping industry intrinsically influence the way port position themselves in the market and the way they compete.

2.5.1 The Emergence of Dedicated Terminals

In an effort to provide a better service to customers with increased, changing needs, caused by the globalisation of the world economies, shipping lines are striving to provide a service that is more and more complete, in adhesion to the philosophy of "door-to-door" service (as opposed to the port-to-port one) (Christopher, 2005). Moreover, they are trying to gain a greater control over the transport chain; one way of achieving these goals is to establish an exclusive berthing space at a port/terminal, the so-called dedicated terminals, and a phenomenon that started in the U.S. and then expanded into Europe. Examples of these are the MSC dedicated terminals in Valencia, in Hamburg, or the Maersk Terminal in Rotterdam.

Academics like Slack and Fremont (2004), Musso *et al.* (2001), Cariou (2003) and Haralambides *et al*. (2002) discuss in details the issue of dedicated terminals; Avery (2000) points out the reason for such a move, such as cost savings, increased productivity due to the tailored satisfaction of customer needs (as opposed to common users facilities) and the reduced number of links in the distribution chain.

Having acknowledged the reasons and the context in which dedicated terminals came into existence, it is important here to mention the effect that this had on port competition.
First, like for horizontal integration, vertical integration increases the market power of shipping lines vis-à-vis port authorities and stevedores. Second, like discussed by Heaver *et al*. (2000), situations of potential monopolisation of port infrastructure by certain shipping companies may arise; moreover, shipping lines may be unwilling to have their vessels handled at terminals controlled by competitors, and the port will therefore lose clients. In addition to this, there is the risk that earlier investments by cargo handlers will be negatively affected, for example through a regrouping of activities at the dedicated facility. Hence, while a port authority may concede to the dedicated terminal initiative in order to achieve competitiveness, the results they may obtain is reduction of total container volumes or even running the risk of over (unutilised) capacity.

2.5.2 Other Forms of Vertical Integration

As well as having access to dedicated container terminals, shipping lines have vertically expanded into such activities as inland distribution and provision of logistics services, and terminal operators have expanded in much the same business. The rationale behind this is still to control to the greater extent possible the transport and distribution chains, as well as to offer customers a "one-stop-shop" kind of service.

2.6 A Note on Port Governance

After having discussed the forms of horizontal and vertical integration that affect the port and shipping industries, a note on port governance cannot be omitted because of the effects that new models of port governance have had on port competition. In a

nutshell, the devolution of port management function has resulted in a more commercial and customer-oriented approach to port competition, with the ultimate result of intensification of competition (Brooks and Cullinane, 2007).
The revolution of the traditional system of port governance is identified with the phenomenon of privatisation, which started in the 1980s and 1990s in Europe.
The World Bank (2007) identifies three main reasons for the change in port governance.
By the 1980s, ports had become bottlenecks in the efficient and fast flow of goods and information through them. This was due to restrictive labour practices, which had not fully embraced the labour reduction threat posed by automation and containerisation; to the centralised form of government control of ports, which was unable to capture and provide for the changes in the shipping and port environments; and finally to the inability and, in some cases, the unwillingness of port authorities to invest in the port infrastructure and superstructure, exactly when such investments were required in order for ports to keep up with new technologies and processes of change and stay competitive.
For all of the above reasons, the port reform started: the public sector started seeking the involvement of private parties in port and terminal management and operations. It should be noted here for the sake of the discussion that privatisation was not introduced for the purpose of increasing competition, as discussed below; rather, port reform started as a response to the changes taking place in the industry, with latter obvious effect on port competition.
The level of involvement of private parties varies with the type of port reform used, such as corporatisation, management contracts, leasing, B-O-T type of agreements, to the extreme of full privatisation (of which UK is an excellent example).
The four broad types of management and governance systems in use are illustrated in table 1:

Table 1: Basic Port Management Structures

Type	Infrastructure	Superstructure	Port labor	Other functions
Public service port	Public	Public	Public	Majority public
Tool port	Public	Public	Private	Public/private
Landlord port	Public	Private	Private	Public/private
Private service port	Private	Private	Private	Majority public

Source: the World Bank (2007)

Although a debate exists on weather privatisation has to do with operational efficiency (Liu, 1995; Trujillo and Numbela, 1999; Tongzon and Heng, 2005), surely it had an impact on port competition: new players came into existence in the port competitive arena, such as global terminal operators, private stevedores and handling companies, shipping lines themselves. Intra-port competition was created (De Langen and Pallis, 2006) and as competition increased, only the most efficient and competitive service providers would survive. In this sense, it can be asserted that privatisation, indeed, increased the level of port efficiency.

2.7 Ports as Nodes in the Supply Chain: the "Old Paradigms"

In the context of growing horizontal and vertical integration and of continuous change affecting the shipping and port industries, it is little wonder that new paradigms for the study of ports have been proposed over the years.

In the past, seaports were recognised for their importance for national economies, for their role in raising the productivity of factors of production and for producing higher levels of output, income and employment (Walter, 1975; Talley, 1988). The importance of seaports was deemed to be even higher if these were involved in international trade. Ports were thus recognised as crucial elements for the economic development of the hinterlands they used to serve.
On the basis of this paradigm, most academic research and literature used to focus mainly on the physical, infrastructural abilities of ports to provide accommodation for ships and to load/unload them (Song and Panayides, 2008). However, when taking into account the changes taking place in the port industry, the need for a new paradigm for the study of ports became impellent.

In his paper, Robinsons (2002) analyses the evolution of the port paradigms from being mere interfaces between sea and land, to the point where ports become an element in "value-driven chain systems or in value-chain constellations".
He states that (pp.252):

> "*(Ports) deliver value to shippers and other third party service providers in the value-driven chain; they will segment their customers in terms of a value proposition; and will capture value for themselves and for the chain in which they are embedded in so doing"*.

Bichou and Gray (2004) add to this view by stating that ports are the point in which logistics channels, trade channels and supply channels converge. Moreover, they acknowledge that in such a context, ports become not only an important element of the transport system, but also they become a major subsystem of the broader production and logistics systems: ports are not only nodes, but also *links* in global supply chains.
This latter view is shared by Carbone and De Martino (2003): for them, the port is a cluster of organisations in which several parties belonging to the logistics and transport industries are involved in bringing value to the final customers. They define value creation as the process whereby a transport or logistics service provider not only offer mere transport of merchandise, but a comprehensive package of logistics services tailored on the basis of customer requirements. For them, a value adding activity is thus one that adds value to the product or service and for which the customers are willing to pay. By fulfilling this role of value addition, ports become important entities supporting the procurement, manufacturing and distribution functions of finished and semi-finished goods.

In this context, it is evident that not only new paradigms for the study of ports have emerged, but also that this logistics revolution has had profound effects on the way port compete.
The above mentioned authors all convene on a new framework and context within which seaport competition takes place.
The competitive position of ports is no longer confined and dependent upon its physical characteristics, connectivity and efficiency, but also, and perhaps more importantly, upon its links with a given supply chain. Therefore, competitiveness is increasingly determined by external co-ordination and control of the whole supply chain (Carbone and De Martino, 2003).

Robinson (2002) even goes as far as to assert that port competition does not take place between ports, but between chains: in his view ports compete not on the basis of their operational efficiency or location, but on the criteria of whether they are embedded in supply chains that can provide shippers with greater value.
Song and Panayides (2008) are not so extreme in this respect: they recognise that certainly the integration of seaports in supply or value chains has a bearing on the competitive position of ports. They suggest that port authorities focus on certain parameters (such as use of technology for data sharing, provision of value added services, relationship with shipping lines and inland transport providers, transportation modes integration) to measure and improve their level of integration in a given supply chain; through this tool, they will be able to improve their competitive standing.

2.7.1 The Importance of Inland Connectivity and Inland Terminals

Given their role as nodes and links in global supply chains, ports need to be as efficient on the land side as they are on the sea side (Miyashita, 2005). Inland connections and hinterlands are essential elements to link different nodes in the supply chains that ports serve.
Moreover, as pointed out by Notteboom (2004) the percentage of inland costs in the total cost of door-to-door container transport can be estimated to range between 40% and 80%; this is due to the fact that while economies of scale and scope at sea pose a limit to ocean freight rates, inland pricing is much more cost-driven. The bottom line is that in some cases the economies gained at sea may be lost on the land side. Therefore, achieving cost and general efficiencies with respect to port-hinterland connections will provide ports with a competitive edge from the stand point of carriers.
Furthermore, ports that manage to establish network relations with inland terminals and logistics centre are able to provide value adding port hinterland linkages (Iannone *et al*., 2007). Whenever these centres facilitate the efficient and productive operations of the ports and reduce congestion, the relationship can also become beneficial in terms of competitive advantage.

The integration of ports and inland connections and terminals is one of the main points of the concept brought about by Notteboom and Rodrigue (2005), called “Port Regionalisation”. This new phase of port development has its foundations in the creation of a relationship between inland terminals and the seaports, through a connection of road, rail, or barges where feasible. These inland terminals should function as points of cargo consolidation and deconsolidation, and where value is added in response to customers’ requirements. These operations do not necessarily need to be carried out in the seaport area, and thus problems of lack of space, congestion and conflicts for land usage can be reduced (Iannone *et.al*, 2007).

The concept of inland terminals is not new; earlier on, Slack (1999) had proposed the use of “satellite terminals” as an alternative to traditional port expansion, such as the building of green filed sites.
Woxenius *et al.* (2004), Parola and Schiomachen (2005) and especially Roso (2007; 2008; 2009a ;2009b) go in great details to analyse the so called “dry port concept”, its benefits and consequences for port networks, whereas studies from Rutten (1998) and Macharis and Verbeke (1999) analyse their location problems and questions of efficiencies.

What is important to stress for the purpose of this discussion is that these dry ports have to be seen as extensions of the seaports themselves, and not as stand-alone units. They are placed in the global networks of seaports and help to improve the productivity and efficiency of seaports in themselves; as such, they constitute an important source of competitive and sustainable advantage (Van Klink, 2000).

2.7.2 Inland Terminal Networks: is it only about Benefits?

Vandervoort and Morgan (1999) notice that the dry port concept should be consciously fitted into an organised system, because it makes little economic and strategic sense if positioned as a standalone unit. This is agreed upon by Van Klink (2000) and Roso in her works, as explained above. Therefore, it is possible to picture networks that include seaports, dry ports, inland terminals, inland distribution centres.

The reasons why ports seek collaboration with these dry ports, and thus doing form a network inland, are discussed by Roso, as mentioned above. In particular, she argues that one of the benefits of the seaport – dry port relationship is the reduction of congestion, both in the port and at its access gates, and in the surroundings of the port. Since in theory the dry port should be connected to the seaport mainly by rail, and also by road, the environmental impacts of the port are reduced, as it is widely acknowledged that rail is much more environmentally friendly than road. Moreover, congestion is reduced in the surroundings, thereby reducing the risk of accidents and the level of CO2 emissions: congested traffic is more polluting that smooth traffic flows, and produces more CO2 and noise pollution (Salomon and Mokhtarian, 1997). Furthermore, because in theory the short-term storage function of the port is moved to the dry port, and thus this becomes in actual fact an extension of the seaport gates, the port does not need to expand on site. Since many European ports are surrounded by cities, and their expansion often cause land usage conflicts, these are solved with the dry port solution (Roso 2008; 2009a).

Although the theory makes perfect sense, reality is quite different. With reference to the transport modes that should be used to connect ports with inland nodes, road is still the prevailing alternative in Europe. Indeed, road has the biggest market share in the modal split, i.e. 76%, whereas the share of rail transport is not only small but also decreasing (European Union Road Federation, 2008).
The reasons for this reluctance in using rail transport are several. First, a proper rail infrastructure has to be in place for the efficient distribution of cargo; besides, a legislative framework has to be in place that ensures that public authorities and private interests involved take care of the correct functioning and usage of the infrastructure (Vandevoort and Morgan, 1997). Second, Van De Horst and De Langen (2007) highlight that problems of coordination arise in hinterland transport because of the existence of various stakeholders, often with different interests and way of conducting business. Specifically, with the relatively recent liberalisation of the European rail cargo market there are problems of coordination between those who provide the infrastructure and those who provide the transport service. Furthermore, Engstrom (2007) emphasizes the reluctance of users to choose rail transport because of higher risks of cargo damage and lack of flexibility.

This discussion about environmental benefits and modal split is relevant in this study because of the belief, found in recent literature on port competition, that those ports

that embark in environmentally friendly and sustainable initiatives gain a competitive edge in relation to those that do not (Nijkamp, 1999).
Measures of environmental impacts of port and port related activity has been carried out by Haezendonck (2001) and has more recently been applied empirically in the context of inland ports (Haezendonck and Dooms, 2004).
In the latter, the authors find that there is no relation between the economic performance of a port and the application of environmentally friendly initiatives. This is explained, to a certain extent, by the fact that the users of transport services are not directly harmed by the environmental and related externalities generated through port activities. Moreover, the authors conclude that, in terms of environmental management and performance, a competitive advantage of one port may have reverse and negative effect on some other ports in the same network.
Therefore, it is possible to infer that the structuring of the transport network as it is today, and as explained in this chapter, has negative repercussions on the environment, and therefore for as much as it is beneficial for the efficient transportation of cargo flows, it has an undeniable negative "green downsides".

2.8 Seaport Clusters: the "New Paradigm"

In the context of an ever-changing framework within which ports operate, the paradigm of ports as nodes in the transport, supply and value chains has been recently extended with a complementary view: the cluster perspective (De Langen and Haezendonck, 2011).
Cluster theories, discussed in details by academics such as Baptista (2003), Enright (2003), Gordan *et al*. (2005) and Porter (2000), have only been applied to the study of seaports in recent years. The first two significant academic contributions in this respect have been made by Haezendonck (2001) and De Langen (2004). Broadly speaking, Haezendonck applies the concept of clusters as the appropriate unit of analysis to examine port competitiveness. De Langen, instead, applies the concept of clusters to ports with particular interest for the impacts of such concept on the issue of port governance.
Most recently, Brett and Roe (2010), analyse the potential for clustering in maritime transport, through a case study of the Greater Dublin Region. They notice that describing clusters is maybe more attainable than trying to define them, and that there is no unified cluster theory or model to analyse clusters, but rather many contributions to the topic from different perspectives and case studies, which hints to a difficulty in encompassing all aspects of such a complex and multi-faceted issue into one comprehensive piece of work.

For as complex entities as clusters can be, the application of the cluster perspective to the seaport industry provides not only a new paradigm for the study and understanding of ports, but also a useful tool to provide insights in determinants of port competitiveness, port performance indicators and port governance (De Langen and Haezendonck, 2011).
Four reasons are provided by the above mentioned authors as a justification of this view. First, the cluster perspective is a useful aid in the investigation of the determinants of port competitiveness: intra-port competition can be studied in the context of intra-cluster competition. Second, while in the transport node perspective the competitiveness of a port is measured in throughput volumes, in the cluster perspective a significant dimension is added, through the consideration of the

concept of "value-added tons". This last notion is explained in details and applied in the research conducted by Haezendonck (2001).
Third, through the cluster perspective the importance of the relations between inter-dependent firms and their contribution to the success of the cluster can be taken into consideration; this is relevant for seaports, in which several inter-dependent firms can contribute to the overall competitiveness, productivity and efficiency of a given port.
Fourth and last, the role of the port authorities may be once more put into discussion, for its role as a "dominant firm" in the port cluster. The port cluster view provides an additional dimension to it. This type of analysis can be considered as a follow up of the quest started by Heaver *et al.* (2000) and Notteboom and Winkelmans (2001) with respect to the role of port authorities in the port changing environment.
The table below shows the characteristics of the transport node view and of the cluster view.

Table 2: Transport Node View and Cluster View.

	Port as transport node	Port as economic cluster
Definition	A gateway through which goods are transferred between ships and the shore.	An economic complex consisting of all firms related to the arrival of ships and cargo *and* located in one region.
Performance indicator	Throughput volume	Value added in the port (cluster)
Analytical models for analysing the role of the government	Classification landlord, toolport and service port	Port authority as central organization in cluster governance.
Frequently mentioned performance variables	• Maritime accessibility • Geographic location • Hinterland connections	• Intra-port competition • Knowledge spill-overs • A qualified labour pool
Research issues	• Development of liner network structures • Hinterland accessibility as determinant of port competitiveness • Factors influencing terminal efficiency	• The effect of institutional arrangements on port competitiveness • Ports as logistics, trade and production centers. • Clusters of ports in proximity • Green port and port's social responsibility
Geographical focus	Specific terminals	Geographical and institutional proximity of actors in ports.

Source: De Langen and Haezendonck (2011)

2.8.1 Port Clusters in Practice

Although the framework within which to analyse port clusters is something that has been evolving over the past ten years or so, there are few areas that are, *de facto*, recognised as maritime or port clusters.
These are London, for its financial clustering services (Fisher Associates, 2004), Hong Kong (Maunsell Consultants, 2003), Singapore (Smith, 2004), and Dubai

(Dubai Maritime City, 2006), as well as the Dutch maritime cluster (De Langen, 2002).

Most recently, the port of Valencia has been awarded the "Best in Class Award" for best practices in port cluster performance by the Global Institute of Logistics.
The GIL (2009, pp.7) recognises the importance of seaport clusters; they are defined as "*firms engaged in the transfer of goods in the port and their onward distribution;.. it also includes logistics activities as well as processing firms and administrative bodies".* They identify port clusters as a critical element to shape competition and provide a description of some of the advantages derived from belonging to a cluster. They define the performance of a seaport cluster on the basis of the value added or generated by the cluster. It is exactly in the effort to define uniform, recognised performance measurement benchmarking practices that the Institute started an investigation of seaport clusters all over the world.
At the end of a two years research process, the Valencia Port cluster was identified as the one with the greatest level of maturity, and characterised by the highest level of involvement and engagement in the collaborative process that is typical of clusters.
It is from this research and award that the author generated the idea to carry out an investigation on the determinants of port competitiveness in the Port of Valencia.
This will contribute to the existing knowledge base with a view of how much, in practice, the cluster perspective is embraced and understood by the actual industry practitioners.

2.9 Chapter Conclusion

The aim of this chapter was to describe the various trends and forces that shaped the way ports are operated, governed, financed, managed and the way ports compete. This has been achieved by an extensive review of the existing literature on such topics as globalisation, containerisation, the increase of container vessel size and of the containership fleet, horizontal and vertical integration, the reconfiguration of container transport network, port privatisation, and finally different paradigms for the study of ports.

The conclusion that can be drawn at the end of this chapter is that as a result of the different trends affecting the port and shipping industries, ports are exposed to an increased level of competition, in an environment in which they strive for increasing efficiency and productivity. All of this happens in the context of rising degrees of integration between different stages of the supply chain, so that ports have lost their market power vis-à-vis terminal operators and shipping lines. The role of the port authorities in this scenario has been changing significantly and has been redefined as a consequence of the presence of private actors in the port scenario. Therefore, it is possible to anticipate that the issue of port competition is a complex one, influenced by different aspects and in which various stakeholders are involved.
In the context of this research, an introduction to the forces shaping port competition has been deemed necessary in order to understand the scenario in which competition actually takes place. It is through this understanding that one can proceed to the analysis of port competition, and ways to measure competitiveness.

At the end of this review, a complete picture of the port industry in the last 50 years or so, shaped by the most important trends, has been drawn. The purpose of the

research has been reminded here as well; it is against this background that the foundations are set for the next chapter, in which a review of the literature on port competition and competitiveness will complete the theoretical part of this thesis.

3. Port Competition

After having analysed the forces and trends shaping port competition (Chapter 2) the discussion will now focus on the issue of port competition itself.
This chapter has the objective of defining port competition, according to the existing available literature. Different levels of port competition are explained, and a distinction between competition and competitiveness is made. Furthermore, the rationale behind the study of port competitiveness is pointed out, followed by a listing of the methodologies available to measure competitiveness and competition used in the past years. In the last section of this chapter, the author attempts to provide a comprehensive overview of the determinants of port competitiveness.

3.1 Defining Port Competition

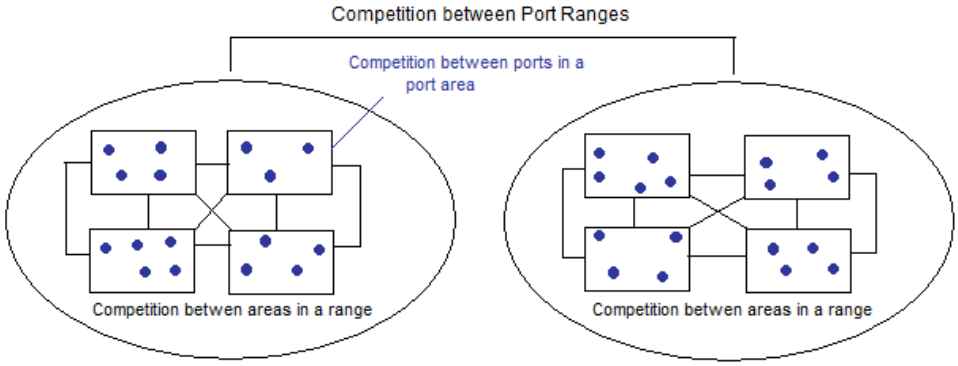
It is widely acknowledged in the literature that no consensus exists on a single definition of port competition, because of its multifaceted, complex nature. This is why Van de Voorde and Winkelmas (2002) noticed that the concept can be approached from different angles.

Perhaps the first academic who looked into the issue of seaport competition in a structured manner is Verhoeff (1981). Even though his study dates back to the 1980s, he recognised the complex nature of seaport competition too. He states that (pp.49):

> "*Seaport competition is very much talked about, but seldom it is thought about deeply.(...) It is usually referred to in rather general terms such as "the" competitive position of port X, "the" competition between port X and Y and "the" competition in port Y. (...) Seaport competition has a complex nature and (..) because of its complexity it is inappropriate to speak of "the" competition. Great care and clarity are necessary to identify and classify this competition".*

He goes on into details about explaining why the issue in itself is complex: he asserts that complexity is due to the geographical levels on which competition takes place, to the economic structures of different port ranges, areas etc., and to the market features of port service.
Although his contribution influenced the study of seaport competition, the author himself does not attempt to provide a precise definition; by contrast on the basis of his conceptualisation he places seaport competition in a framework where competition takes place on 3 geographical levels: among port ranges, among ports areas in a certain port range, and among ports in a certain port area. This can be conceptualised as follows:

Figure 9: Simplified Seaport Competition in Verhoeff's View



Source: elaboration of the author based on Verhoeff, 1981.

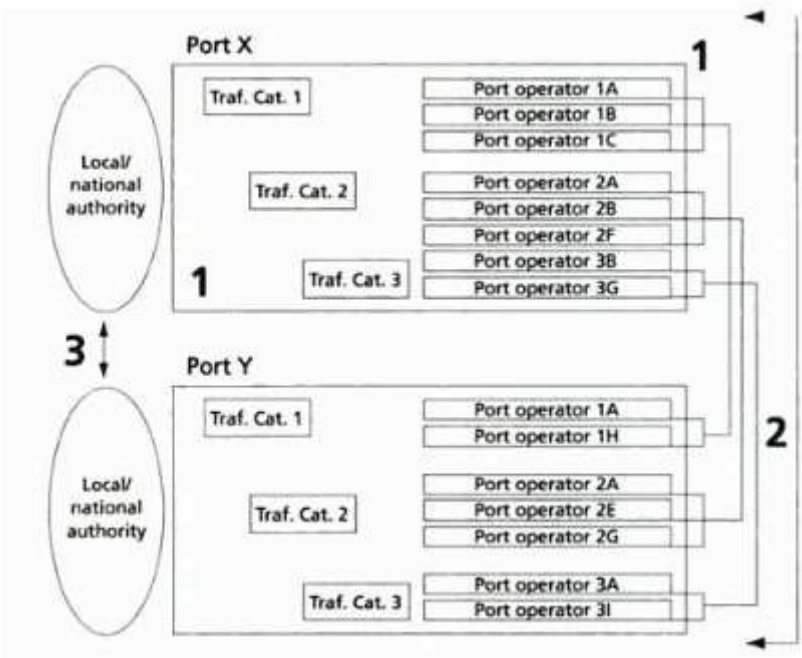
In a broad sense, seaport competition is commonly recognised to be "competition between and within ports"; however, it is just as commonly agreed that this definition not only has become inappropriate (Haezendonck, 2001), but it is in many ways incomplete (Van de Voorde and Winkelmans, 2002).

Van de Voorde and Winkelmans (2002) argue that the definition should encompass all the factors that, in actual facts, compose port competition; these are, for instance: the traffic structure of ports and port undertakings; the management structure in place; the port authority expertise; the degree of application of communication and other technologies; the presence of government intervention; the generation of added value etc.
In the light of these considerations, they provide the following definition of seaport competition (pp. 11).

> "*Seaport competition refers to the competition between port undertakings, or as a case may be terminal operators (...) in relation to specific transactions (the object, taking into account the origin and destination of the traffic flows concerned). Each operator is driven by the objective to achieve maximum growth in relation to goods handling, in terms of value added or otherwise. Port competition is influenced by (1) specific demand from customers, (2) specific factors of production, (3) supporting industries connected with each operator, and (4) the specific competencies of each operator and rivals. Finally, port competition is also affected by port authorities and other public bodies".*

According to this definition of seaport competition, the authors identified three levels of competition taking place, as illustrated in figure 10:

Figure 10: Three Levels of Port Competition



Source: Van De Voorde and Winkelmans, 2002

The first level of competition (1) is between port operators in the same port for each of the traffic category that composes the traffic structure of any given port. This level of competition is known as **Intra-Port Competition at the operator level.**
At a second level (2), there is competition between operators from different ports, in the same traffic category. This type of competition takes place in ports that are located in the same range and that serve an overlapping hinterland. It is defined as **Inter-Port Competition at the operator level.**
Finally, the third level of competition (3) is the **Inter-Port Competition at the port authority level**. Here, port authorities compete with each other.
At the end of the description of the different types of port competition, Van de Voorde and Winkelmans stress that in no ways competition takes place between entire ports: it is competition between terminal operators or port undertakings, relative to specific, individual traffic flaws, which is significant.

Haezendonck (2001) adopts a similar approach in order to define port competition, but the outcome of her analysis differs from the one previously illustrated in that she highlights the existence of four levels of competition.

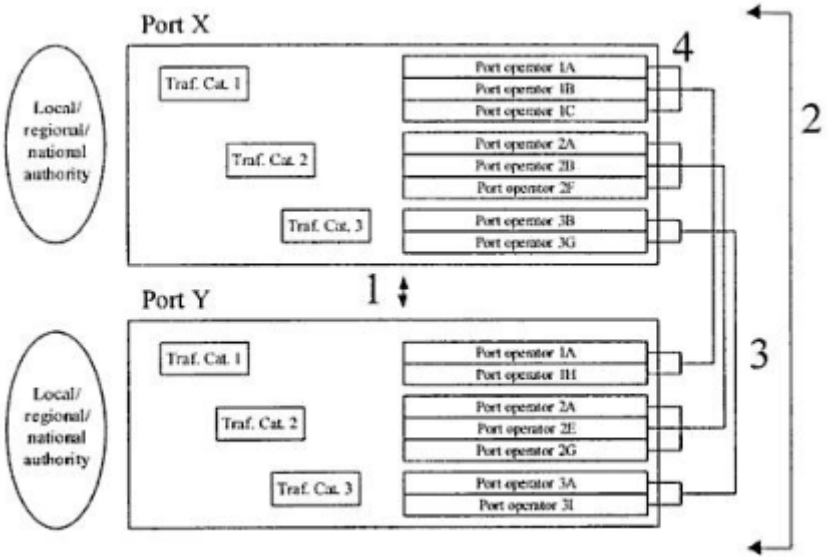
In her research, she points out that when analysing port competition, the commodity structure of the port is of significant relevance, as already noted by Goss (1990). Moreover, if commodities are considered, then it is important to make a distinction between competition between port authorities (aimed at improving overall port performance as well as competition between port operators to avoid monopolistic – inefficient- situation) and competition among port operators (aimed at acquiring traffic in specific traffic categories or commodities).
Furthermore, applying Porter's theory of the "Comparative advantage of Nations" to the port industry, it is possible to assert that no port can be successful in all traffic categories; on the contrary, most ports are strongly competitive only in one or two traffic categories, as already demonstrated through previous studies.

On the basis of these observations, Haezendonck (2001) agrees with Van de Voorde and Winkelmans (2002) that competition takes place within specific traffic categories between port undertakings, and not between entire ports.
She provides a slightly different definition of seaport competition (pp. 14):

> *"Port competition aims at acquiring trade in specific traffic categories, with port operators (and their terminals) as the main actors engaged in this competition and with port authorities as supporting actors providing opportunities for – and imposing constraints on – the port operators directly and on the broader port cluster indirectly."*

In the light of this modified definition, she identifies four levels of competition, as illustrated in figure 11:

Figure 11: Four levels of Port Competition



Source: Haezendonck, 2001, pp.15.

At first sight, this graph looks very much like the previous one, but there are some important differences. First and foremost, Haezendonck (2001) identifies a further level of port competition; second, her analysis is somewhat more complete that the one conducted by Van de Voorde and Winkelmans (2002).

As a first level of port competition, she points out to **Inter-Port competition on a port authority level** (1) where port authorities aim at increasing the competitiveness of seaports by providing necessary infrastructure (or channelling public investment towards it), optimal working conditions, prevention of monopolies etc.
The second level of competition is recognised to be **Inter-Port competition on a commodity level** (2), where the players compete to gain market share or to position better in a specific traffic category. This is the dimension not specified in the model previously illustrated.
The third level of competition consists of **Inter-Port competition on an operator level** (3), once again confined to specific traffic categories.

Last, competition as **Intra-Port cluster competition** (4), i.e. competition among operators within one port.

Both illustrations of the levels of competition contemplate intra-port competition as well as inter-port competition. The World Bank (2000) in addition, provides an explanation of "intra-terminal competition", where companies involved in the same business (such as stevedoring company) compete against each other to provide their service within the same terminal.

3.1.1 A note on Inter-Port Competition: a Matter of Hinterlands

Whether it is among port authorities or between port operators, there is one condition that needs to exist for inter-port competition to take place, i.e. the hinterlands the ports in question serve need to overlap.

McCalla (1999) defines hinterlands as those *"areas behind the port to which the port sends imports and from which it draws exports"*; in this definition, it is possible to notice the captive nature of the hinterland. As explained by De Langen (2007), a captive hinterland consists of the region behind one port where the port has a significant competitive advantage because of lower generalised transport costs. Because of this cost advantage, the port is not so exposed to competitive forces, as it will concentrate of serving its own, more or less captive, hinterland. Such a situation existed in the context of the presence of trade barriers, old-fashioned transport infrastructure, the absence of technological innovations, of intermodality (Haralambides, 2002).

However, with recent changes and trends as those explained in Chapter 2, the notion of captive hinterlands has become somewhat obsolete.
The port industry has witnessed the evolution of hinterlands from being captive to be contestable: contestable hinterlands are "*those regions where no single ports has a clear cost advantage over competing ports (...)* and as a consequence *(...) various ports will have a share of the market"* (De Langen, 2007). Such contestable hinterlands are those where the competition is fiercest, and this is due not only to cost advantages, but also to quality of the infrastructure, frequency of services offered by the port, and the political influences on the port operating environment (Vigarie, 2004).
The issue of contestable hinterlands is relevant not only for the existence of port competition, but especially for inter-port competition in relation to containerised cargo, which is the focus of this study. Indeed, as recognised by Zondag *et al.* (2010) containers are the least captive cargo of all traffic categories.

3.2 Why Studying Port Competition?

The study of port competition, as defined in the sections above, it is not conducted for the sake of expanding the existing academic knowledge, or for the pleasure of investigating academic concepts and applying quantitative models. The reasons for analysing the competitive position of ports are grounded in the needs of port operators to understand the changes that have taken place in the port industry in recent years and react accordingly. This is particularly so in the case of container ports and terminals, since competition affecting them has particularly strengthened over recent years.

Thanks to an analysis of port competition and competitiveness, ports and port operators can understand their present competitive standing and formulate strategies and policies that will determine their future competitive position.

With no doubt, the changes highlighted in Chapter 2 and the issue of overlapping hinterlands discussed above have contributed to the strengthening of port competition; as already discussed, port competition is played more and more on the logistics and qualitative level, rather than on physical and infrastructural characteristics. More and more, the focus of studies of port competitiveness has shifted away from the elements such as costs and physical infrastructure, which are measurable quantitatively, to elements that are qualitative in nature and are not so easy to measure and quantify.
For these reasons, a thorough evaluation of the determinants of port competitiveness now plays an essential role in formulating port strategy and port policy. The identification of the major strengths and weaknesses of a given port will contribute to the determination of its level of competitiveness (Basta and Morchio, 2008).

At this point, it is useful to define what is meant by port competitiveness and to distinguish it from the concept of port competition.
As defined by CNEL (2004) port competitiveness is:

> "*The ability of producing and selling, of coping with competition, of reacting to the competitors' strategies, and of successfully competing within the market and/or entering new ones".*

It is evident from the above definition that while port competition is, *de facto*, a state of the market, competitiveness relates to how agents of competition move within competitive scenarios.
Competitiveness is related to the performance of a given port in providing value added goods and services to its customers; in so doing, ports not only pursue economic values, such as profit maximisation, but also non-economic values, such as increasing the quality of services offered to secure customer loyalty. Competitiveness does not equal productivity, just as much as productivity does not equal competitiveness. Competitiveness, instead, includes a variety of economic and non-economic variables, some of which are quantifiable and some of which are not (Yeng *et al.*, 2004).

As already stated above, in assessing the determinants of port competitiveness, it is found that those are more and more related to quality rather than quantity. Because of the complexity of the issue, the importance of identifying which factors can improve the competitive position of the port cannot be overstressed.

Moreover, another reason for the study of port competitiveness and competition lies in the importance of ports' decisions on firms' localisation decisions, with the consequent potential economic effects on a regional level. This is especially true since the logistics revolution took place, in particular because shippers and lines tend to combine the sea leg of transport, where cargo passes through the port, with distribution services and inland logistics, in which ports nowadays play an important role (Basta and Morchio, 2008).

For the reasons discussed above, studies on port competitiveness have their rationale in guiding port authorities and port operators in understanding their competitive standing and in determining strategies to keep it or improve it.
Next, the methodologies used in previous studies on port competition and competitiveness are discussed.

3.3 How to Measure Port Competitiveness? Overview of Methodologies

In order to measure port competitiveness, many different methodologies can be used.
The fact that there are so many methods available that have been used in the past to measure competitiveness and analyse competition reflects the complex nature of the port sector, a fact that has been mentioned at the outset of this chapter.
The ultimate choice of the method(s) to use will rest upon the type of data available, *in primis*, and also and mainly on the final purpose of the analysis conducted, as well as the context within which the analysis is carried out. More precisely, the method(s) used will depend on whether the aim of the analysis is quantitative or qualitative, and on the scope of the research (one port/many ports; a port range; terminal(s) etc.) (Basta and Morchio, 2008).

A comprehensive and systematic overview of different methods to measure competitiveness and analyse competition seems to lack in the literature. Here, an effort is made to provide such an overview.
After an extensive review of the literature regarding methodologies to measure port competition and competitiveness, some 17 different methods and applications have been traced. An attempt to somehow categorise them has been made by the author in this chapter, which is intended to be neither exhaustive, nor comprehensive.

3.3.1 Methods Commonly Employed

1. Market Share Analysis (MSA): it is identified by Michalopoulos *et al.* (2007) as the traditional way to estimate port competition. The port(s) analysed are deemed to have a competition degree that is equivalent to their share of the market under analysis. In other words, the market share of a given port is equal to its competitiveness degree in the market of consideration.
   The main advantage of this method is that it is very straightforward; however, it lacks of basically all the other competition factors, which instead needs to be included.

2. SWOT Analysis: it stands for Strengths, Weaknesses, Opportunities and Threats. It has been applied by Ircha (2001) and Chou *et al*. (2003), among others. In particular, Ircha (2001) deems this methodology appropriate in her analysis of Canadian Ports; she identifies, on a qualitative level, the external opportunities and threats and the internal strengths and weaknesses of port. The aim of her study is to provide a full understanding of the port's role and reactions to internal and external changes. Her analysis allows the definition and prioritisation of key issues that affect competition, as well as the development of goals, objectives and strategies.

3. Linear Regression techniques: these have been applied to a series of studies, among which is worth mentioning the work by Tongzon and Heng

(2005) and Tongzon (2002). In the former study, the authors first extract eight determinants of port competitiveness from the literature; subsequently they develop a PCI (port composite index), and apply to it principal component analysis to assign weights in a non-subjective manner to the different indicators. Finally, they run a linear regression model. The main aim of their study is not just to identify the determinants of port competitiveness and their effects, but also to establish whether or not private sector participation in the port industry could, at least to some extent, improve port efficiency and performance, and thus competitiveness.

4. Data Envelopment Analysis (DEA): a broadly applied methodology, for example by Tongzon (2001) and Barros (2006). It generally aims at studying economic efficiency of ports by evaluating "decision units". It compares the relative levels of efficiency of different ports and terminals with regard to the relationship between the resources employed and the output produced (Basta and Morchio, 2008).

3.3.2 Methods related to Benchmarking Practices

5. Principal Component Analysis: this method was applied by Tongzon (1995) in an effort to provide a framework for uniform comparison of ports. He used various variables for container ports on a worldwide level, and reached a conclusion that resulted in a classification with emphasis on similarity (Pardali and Michalopoulos, 2008). These two authors argue that PCA as applied by Tongzon set the foundations for Benchmarking.

6. Benchmarking Analysis: it refers to a relatively new method proposed and applied by Michalopoulos *et al*. (2007) for the study of Mediterranean ports, and by Pardali and Michalopoulos (2008) in a study of the port of Piraeus. It is based on the benchmarking technique, which has the objective of improving processes through best practices. The use of this technique is focused on the continuous application of optimal practices and results.
   The main advantage of this method is that a flexible number of variables, both qualitative and quantitative, can be included at the discretion of the analyst. Thus, it is possible to capture some of the complexity affecting port and terminal operations. Moreover, this approach is highly applicable and easily understandable, which is attractive for stakeholders such as port authorities and port operators.
   The model based on this analysis aims at establishing a leader port in the market of consideration through measurement of best performances; it also aims at identifying differences between a given port and the average port in the market, as well as differences with the leader port in the market. A more comprehensive explanation of this model will be provided in Chapter 4, section 4.2.

3.3.3 Methods related to Port Selection Criteria

7. Discrete Choice Models: these methods focus on the port selection criteria, on which most studies of port competitiveness are based (Yeo *et al*., 2008). They have been applied by academics such as Malchow and Kanafani (2004) and Tiwari *et al*. (2003) in order to model transport choice. The results of their research provided some important considerations, such as the importance of location, goods characteristics and the number of ship calls at a given port as most important port selection criteria. De Langen (2007) notices that this method does not take into account behavioural factors in port choice, and through his study on port competition and selection in the context of contestable hinterlands, for the case of Austria, he tries to amend to this lack.

8. Factor Analysis: this methodology is still very much related to the concept of port selection criteria. It is employed by Yeo *et al*. (2008) in their study of port competitiveness in Korea and China. In particular, they use exploratory factor analysis, as opposed to confirmatory factor analysis. The former has the objective of exploring purposes to establish trends and variable structures, whereas the latter can be employed for evaluation and analysis purposes. First, they conduct a survey in the area of interest of shipping companies, and then they apply the exploratory factor analysis to reveal the determinants of port competitiveness.
   The method is composed of a first step, where a varimax rotation is used to transform sets of interrelated variables into sets of unrelated linear combinations of the same variables. The second step consists of a reliability test used to test the consistency of the survey responses.

9. Simulation: still in the context of port selection criteria, Van Asperen and Dekker (2010) quantify the routing flexibility of a port with the aim of providing a valuable tool to assist decision makers in the port selection process. They do this through a simulation model that is implemented in Java programming language. The configuration of a given experiment may include transport networks, inventory locations, and costing parameters among other things. Furthermore, they carry out a sensitivity analysis as a validity test of the outcomes achieved. The overall result of their research is that they provide a quantified interpretation of important selection criteria such as location, shipping frequency, charges and flexibility.

3.3.4 Multi-Criteria Decision Methods

10. Grey Relational Analysis (GRA): this methodology belongs to a group of methods, applied recently in the study of port competitiveness, called multi-criteria decision methods (MCDM), which has been used extensively in the context, although recently (Castillo-Manzano *et al*., 2009). Teng *et al.* (2004) use GRA to establish the determinants of competitiveness in eight East Asian container ports. They apply GRA to statistics and survey data in order to rank competitive criteria, so as to cope with the voiced insufficiency of data and with some uncertainty problems which are due to difficulties in tracking port performance data. In their analysis they apply sensitivity

analysis, with the overall result of their research being the identification of factors and criteria that are relevant for the competitive position of the eight ports analysed, ranked according to their efficiency and effectiveness categorisation.

11. Analytic Hierarchy Process (AHP): it is another technique belonging to the MCDM group. It was used by Huang *et al*. (1999: 2001) and by Song and Yeo (2004) in their respective studies on port competitiveness. Song and Yeo (2004) state that the rationale behind their choice of this method consists of its ability to capture the complexity of the port environment, characteristics of the MCDMs. The main advantage of this analysis, which is made up of three consecutive steps, is that it is able to measure intangible as well as tangible criteria, to provide the analysis with validity and comprehensiveness. The three steps, as reported by the authors, consist of first, structuring a hierarchy of decision making choices; second, making comparisons, pair-wise, so as to define which are the priorities, and third to synthesise priorities into measures of the various decision alternatives. Obviously the empirical part of the analysis consists of defining specific variables that can act as proxies for the theoretical variables.

12. Promethee Analysis: A further method belonging to the MCDM family, it has recently been used by Castillo-Manzano *et al.* (2009) in the Spanish port context. They argue that a limitation of the AHP method is that the level of the analysis is aggregate, and therefore significant information can be lost in the analysis. To compensate for this, they use the Promethee Analysis; like in AHP, it provides a ranking of alternatives (through the use of proxy variables) but it also organises the rankings, and enables the identification of possible incompatibilities between decision alternatives. The main advantages of this method rest upon its transparency, the combination of different aspects of competitiveness into a single value, and overcoming subjective judgements.

13. Fuzzy Multi-Criteria Grade Classification Model (FMGC): it basically consists of an extended, more complex application of the APH model, amending to some of the latter method deficiencies. It has been applied by Huang *et al.* (2003), among others, for port competitiveness evaluation.

3.3.5 Methods Encompassed in Port Forecasting Models.

14. Logit models: these models are not used for the mere estimation and measurement of port competitiveness: instead, they are part of port forecasting models that also include, more or less explicitly, the competition elements. Such method has been used by Veldman and Buckmann (2003) for an economic analysis of the Maasvlakte 2 project. They use it in order to explain market shares, and more specifically to quantify the routing choice and to derive from that the demand function to be used in port forecasting.

15. Multinomial Logit Models: are similar, in purpose, to the logit models. The port competition models they built are port forecasting models. An application is found in Zondag *et al*. (2010) who build a three parts model

able to calculate port freight flows under different maritime-sector-specific scenario and macro-economic scenario, as well as to calculate the impacts of several policy measures.

3.3.6 Methods used in Strategic Analysis

16. Strategic Positioning Analysis (SPA): SPA has been used by Haezendonck (2001) in her study of the competitive positioning of the Port of Antwerp in the Hamburg-Le Havre Range. Its main purpose is to describe quantitatively the performance of ports in terms of market share, growth rates and diversification. Apart from this, it can also be useful in providing information on the evolution of the competitive position of ports and define options and alternative in the area of strategic decision making.
    SPA consists of three techniques, namely Port Portfolio Analysis (PPA), Shift-Share Analysis (SSA) and Product Diversification Analysis (PDA).
    PPA will be explained in details in the next chapter.
    As recognised by Basta and Morchio, the main advantages of this method are the ease of data collection, as well as the trustworthiness of the sources; indeed, this method employs traffic data, which can be found in such databases as those of ESPO, Containerisation International, or are directly provided by port authorities on the ports' websites.

17. The Porter's Extended Diamond Framework: this method has been applied, among others by Haezendonck (2001) and Acosta *et al*. (2007). It is aimed at not only identifying, but also quantifying the determinants of port competitiveness. This extended version of Porter's model, which originally included four attributes affecting the competitive standing of a port – namely, factor conditions, demand conditions, structure and rivalry, related and supporting industry - also includes one dimension that allows its application to the port industry, i.e. government intervention. Acosta *et al.* (2007) also add another dimension, i.e. chance events or risk factors. The application of this model to the port industry has been first carried out by Rugman and Verbeke (1993). This method is applied in a competitiveness matrix to be included in a survey to submit to industry specialists, and then the results are analysed through L1 regression.

3.4 The Determinants of Port Competitiveness: a Review of the Literature

At this point, the only element left to complete this discussion of port competition and competitiveness is the clarification of what the determinants of port competitiveness are. Numerous studies have previously embarked in this task.
On the basis of the literature reviewed above, with the addition of the works conducted by Van der Sluijs (2007) and Cullinane and Wang (2009), the determinants of port competitiveness have been identified and grouped in categories, as illustrated in Table 3:

Table 3: The Determinants of Port Competitiveness

Maritime (Infrastructure and Superstructure)	Geographical Location; Accessibility; Depth at Berth/Navigation Channel; Entrance/Departure Navigation Aids; Transit Time on Route; Number of Container Terminals; Length of Container Quays; Number/Productivity of Quay Cranes. Storage Capacity; Number of Reefer Plugs;
Service	Vessels Turnaround Time; Vessel Waiting Time; Speed of Cargo Handling; Frequency of Sailings; Quality Management/Policies; Reputation for cargo damage/loss/theft/pilferage; Delays in Cargo Handling/Customs Inspections; Port/Terminal Congestion; Transhipment Capabilities; Bunkering-Fresh Water-Ship's Product Services; Waste Management; Terminal Productivity; Provision of 24/7 Service.
Hinterland	Hinterland Economic Size; Contiguous Cities Economic Size; Land Distance Connectivity; Intermodal Links; Inland Transport Network; Quality of Road/Rail/Barges Connections; Accessibility (inland congestion, reliability); Inland Distribution Networks; Inland Terminals/Logistics Depots; Connectivity with Inland Terminals/Logistics Depots; Provision of Value Added Logistics Services
Costs	Towage, Pilotage, Mooring Dues; Cargo Handling Charges; Dwell Time Fee; Storage Costs; Terminal Charges and Fees; Bunkering Prices; Waste Processing Dues; Cold Ironing Costs; Inland Distribution Costs.
Labour	Labour Quantity/Productivity; Annual/Daily Operation; Flexibility of Working Hours; Power of Trade Unions; Skills and Professionalism of Labour; Provision of 24/7 Service.
ICT	EDI, Integrated Communication Technologies, Online Documentation/Tracking; Port Users Intranet.
Environment	Environmental Responsibilities; Environmental Standards Implementation; Relationship Port-City; Environmental Compensation Provisions.
Authorities	Government Policies; Government - Local/Regional/National-Intervention; Port Authority Intervention; Management Structure; Private Sector Involvement;
Other	Reputation; Reliability; Preferences of Lines/Shippers; Promotion and Marketing; Customer Relationships; Fast and Efficient Problem Solving; Reporting;

Source: elaboration of the author based on research

There are two comments to make after having illustrated the determinants of port competitiveness.

First, there has been a shift in perceptions from giving more weight to those criteria that are related to infrastructure and superstructure (hardware components) to instead estimating software components (quality of service, reliability, flexibility) as more important (De Martino and Morvillo, 2008). In this context, it has been widely recognised that cost elements, though relevant, are not a priority in the choice of a port/terminal: the demand for port services can therefore be affirmed to be relatively

inelastic. What port users prioritise are the aforementioned software elements (De Langen, 2008); there is of course a trade off between the quality of the service offered and the price to pay for it.

Secondly, not all the determinants above are applicable to any port; each port is a situation *per se*, although similarities may exist among ports. Therefore, the responsibility to identify which elements are relevant in the context of a given port analysis rests on the analyst's judgement.

3.5 Chapter Conclusion

This chapter focused on the issue of port competition. The first section was dedicated to define port competition; it has been highlighted that no homogenous definition of port competition exists, possibly due to the complexity that characterises the port industry. Following the definitions of port competition, the different existing levels on which competition takes place have been illustrated.
A rationale for the study of port competitiveness and competition has then been provided, followed by a review of the several methodologies used in the analysis of port competition. The chapter is concluded with another review, this time related to the actual determinants of port competitiveness.

This chapter concludes the theoretical part of this thesis. In this, the forces and trends influencing port competition in the past decades have been explained (Chapter 2), and the issue of port competition has been discussed in details (Chapter 3).
It is based upon these theoretical findings that the remained of this study is built. The methodology used is discussed next.

4. Methodology

After the review of the literature (Chapters 2 and 3), this chapter is going to present the methods and methodology used to build up the study and to answer the research questions.
As pointed out by Saunders *et al.* (2007) the terms methods and methodology have two different meanings: while "methodology" means the theory according to which research should be carried out, "methods" refer to all the procedures and techniques that have been employed to collect and analyse data. It is the task of this chapter to explain both the methodologies and the methods used in this study, whereas the following chapter will present the results of the research conducted.
First, the two quantitative models built will be presented and explained, i.e. Port Portfolio Analysis and Benchmarking. Second, the questionnaire administered to various experts will be explained. Whereas the first two models contribute to answer the first three research questions, the questionnaire, which is the qualitative part of this study, will contribute to answer the fourth and fifth research questions.

4.1 Port Portfolio Analysis

As already hinted at in Chapter 3, PPA is a technique which, in the context of ports, is encompassed in Strategic Positioning Analysis, of which it is the first of three steps. The SPA technique is discussed in details in Haezendonck and Winkelmans (2002).
Port portfolio analysis is an application to the port industry of the widely renowned "growth-share matrix" first developed by the Boston Consulting Group in 1968 for strategic planning in a broad business dimension. The matrix enables the analyst to study the positioning of business units, in this case ports or traffic categories within them, according to two variables, which are the market share and the average growth rate. The objective of the analysis is to determine the standing of a business unit (port or traffic category) in comparison to its rivals (competitor ports or other traffic categories in ports). The application of the above described framework is found in Haezendonck (2001).
She explains that the technique is very much applicable to the port industry (Haezendonck and Winkelmans, 2002): for instance, they state that the traffic categories of various ports become Strategic Traffic Units, a concept that is parallel and equivalent to the strategic business units elaborated by the BCG. The original matrix identifies four different market positions, as described by the figure below:

Figure 12: Boston Consulting Group Matrix

Growth Rate	High	Question Marks	Stars
	Low	Dogs	Cash Cows
		Low	High
		Relative Market Share	

Source: elaborated from the author on the basis of Dibb, Simkin, Pride and Ferrell (1991), in Haezendonck (2001).

Question marks are those units with high growth rate and low market share: they have good potential and require investments to grow their market share.
Stars are characterised by high market share and high growth rates: units in this category are recognised to be those that are indeed successful in a business.
Dogs, instead, are the opposite, they have low market share and low growth rate and are therefore those units of which a business should consider getting rid.
Finally, there are Cash Cows: they have large market share but they have low growth rates. They are important for the business as they generate financial resources, but their position in the market is established.

On this basis, Haezendonck (2001) notices that when applied to the port industry, these four categorisations are not satisfactory enough; therefore she proposes a new terminology in her study, which is applied in this thesis too. It is described by the figure below:

Figure 13: BCG Matrix adapted to the Port Industry

Growth Rate			
	High	High Potential	Star Performer
	Low	Minor Performer	Mature Leader
		Low	High
		Relative Market Share	

Source: elaboration of the author on the basis of Haezendonck (2001)

High Potential Units are those that have low market share but high growth rates; if the growth rates are a phenomenon observable during time, it may well be that the market share will grow too, and these units could turn into Star Performers.
Star Performer units have high market share and high growth rates: Haezendonck (2001) highlights that the long term sustainability of this position is not guaranteed.
Minor Performer units are those with low market share and low growth rates; simply they do not perform as good as other units. Finally, Mature Leaders are those that have high market share but a low growth rate.
In the empirical part of this research, we will be able to position the traffic categories for each port analysed according to this matrix. Moreover, ports will be positioned according to this matrix in relation to their total traffic, for the category of containerised traffic, and lastly according to the proportion of containerised traffic in total traffic for each port.

4.1.1 Data

In order to conduct PPA for the Port of Valencia, a range of ports needed to be identified. The focus of this study is on containerised traffic, and therefore research to identify its main competitors in this traffic category was undertaken.
There are a few criteria that have been considered to choose the ports to include in the range:

1) The Port should be in the Mediterranean: this is because Valencia aims to be the access gateway to the Iberian Peninsula in the Mediterranean region. Therefore, it is the Mediterranean the relevant geographical area of focus.

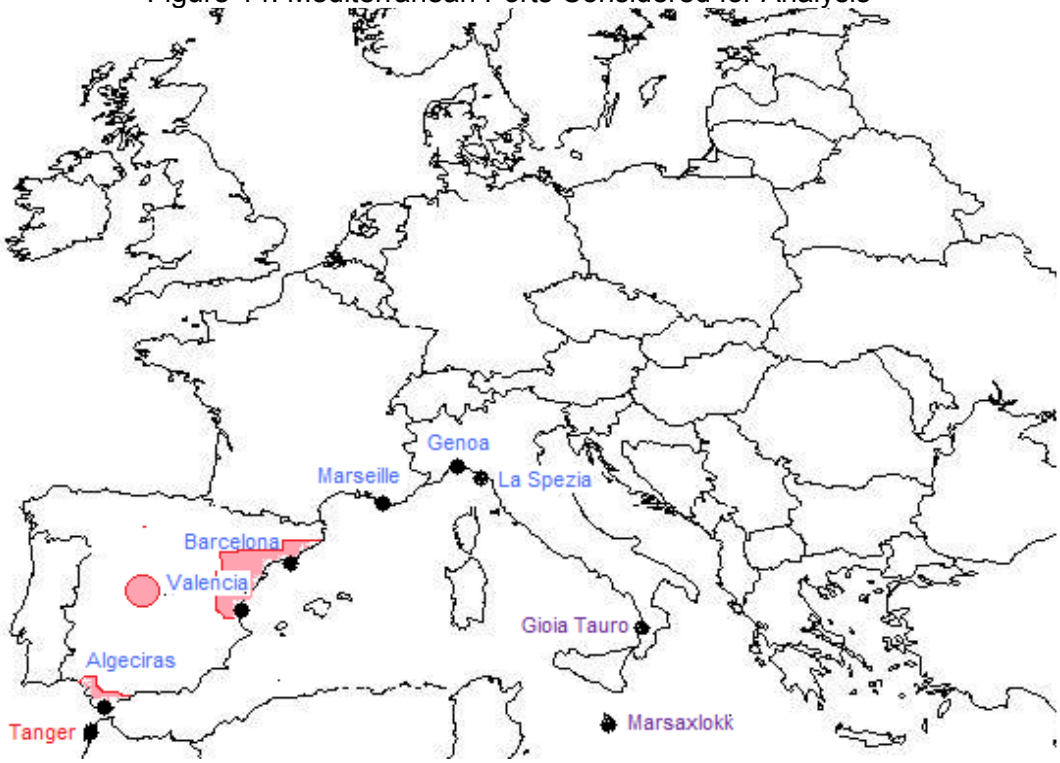
2) The Port should be able to serve the Iberian Peninsula either directly, or through transhipment, or through inland transport.

3) The Port should be renowned for its container traffic capabilities and past traffic records; only major ports are considered, so for example the Port of Cartagena, Spain, was not considered since containers represent only a small percentage of the total traffic structure, and this port does not have a true potential to compete with Valencia for containerised cargo.

4) The traffic data for the Port should be available for at least the past 10 years; this criterion had to be modified during research; for most of the ports, it was not possible to get such data for earlier than the year 2003. Therefore, the period analysed in the PPA carried out is 2003-2009 (7 years). This is a limitation of the research, which could also constitute a possibility for further research.

According to these criteria, the Ports selected were, in the end, six.
These are Barcelona, Algeciras (both Spanish Ports) Marseille (France), La Spezia, Genoa (Italy) and obviously Valencia (Spain), as illustrated in figure 14:

Figure 14: Mediterranean Ports Considered for Analysis



Source: adapted for this study from Notteboom, 2010

The ports in light blue are those that have been selected for application of the PPA technique. Gioia Tauro would have had to be included too, but this was not possible due to impossibility of tracing traffic data for the period observed.
As for Marsaxlokk, the same is valid. Therefore, it was not possible to include it in this analysis; however, both Gioia Tauro and Marsaxlokk (in purple) are included in the Benchmarking analysis, which will be presented later on in this chapter.
As for Tangier (in red), this port was considered for analysis too, but of the two container terminals there, only one was willing to provide traffic data, therefore the analysis was not possible. Moreover, the two terminal operators responsible for operations at the moment have just recently taken over from others, and hence traceability of data was reduced.
The areas in pink represent the core logistics areas of the Iberian Peninsula that can be served from Med Ports (Notteboom, 2010).

For the six selected ports, traffic data was found through the ESPO (European Seaport Organisation) database, and crosschecked through CI (Containerisation International) database online.

4.1.2 A note on Traffic Data: "nominal tons" and "value tons"

The traffic data used in this analysis is nominal, i.e. nominal tons.
As acknowledged by Haezendonck (2001), traditional portfolio analysis is indeed carried out in "nominal tons", which does not take into account the importance of the value added by various traffic categories. This is why she introduces the concept of "Value Tons", explaining that a port operator or port authority is more interested in attracting those cargoes that generate high economic value. She thus explains that nominal tons should be "weighted" according to a weighting rule that considers the value added by the traffic categories that compose a port's traffic structure.

There are various weighting rules available, such as the "Bremen Rule", the "Rotterdam Rule" and the "Antwerp Rule", the latter developed by Haezendonck herself. She does this by gathering information directly from cargo handling companies.
Because each ton of cargo does not add the same value for any port, these rules are not applicable to all ports, but rather they are specific to the port for which such rules are developed. However, in order to develop a port-specific weighting rule, some obstacles are commonly found such as (Haezendonck, 2001):

- Confidentiality and lack of availability of data
- Non homogenous methods to aggregate information
- Limited transparency of the data collection and interpretation process

Given these obstacles, it was impossible for the author of this study to develop a weighting rule for the port of Valencia, and hence analysis is carried out using nominal tons. The author, though, recognises the importance of such a concept, and also that this constitutes an important limitation of the research undertaken. At the same time, it could constitute a possibility for further research of the topic.

4.1.3 PPA Level 1

The first level of PPA has the aim of positioning the ports analysed according to their total traffic; in this phase, the portfolio is constituted by the "range" of ports analysed, i.e. Barcelona, Algeciras, Valencia, La Spezia, Genoa and Marseille.
In line with the traditional building up of the BCG matrix, the horizontal axis shows the market shares, and the vertical axis shows the growth rate. The graph surface is divided by two lines, one horizontal and one vertical. These two lines divide the surface into the four quadrants that allows the visualisation of the ports positioning. The vertical line represents the average market share of the ports in the range, whereas the horizontal line represents the average growth rate registered by the ports in the range.

4.1.4 PPA Level 2

The second level of the analysis is conducted separately for each port. On this level, each port is a portfolio of traffic categories. For the purpose of this study, four traffic categories are chosen, i.e. dry bulk, liquid bulk, general cargo (excluding containers) and containerised cargo.
The four traffic categories are positioned in the matrix according to their average growth rate in the traffic structure, as well as their share in the total traffic structure. This level of analysis allows to identify which categories are stronger or weaker for each port.

4.1.5 PPA Level 3

For the third level of analysis, one of the traffic categories is chosen, i.e. containerised cargo, because of the overall purpose of the study. The portfolio in question is therefore again constituted by the whole range of ports, but only with respect to this kind of traffic. The aim is to obtain a classification of the ports in consideration according to their market share in the range and to their average growth rate only with respect to containerised traffic.

4.1.6 PPA Level 4

This level, which is argued to be the most significant of the analysis, is similar to the previous one, but with the important addition of another dimension of analysis.
In the matrix created for this level, the x axis shows the share of containerised traffic within the traffic structure of each of the ports in the range. The y axis still shows the growth rate. The additional dimension added is that each port is represented by a sphere, whose area is proportional to the total traffic (in tons) of that port. In the middle of the sphere, a percentage shows the proportion of containerised traffic of the total. As recognised by Haezendonck (2001), the main advantage of this dimension is that three things can be shown at the same time, i.e. 1) the position of container traffic for each port in the range; 2) the size of containerised cargo in a port in comparison to the size of the same in the other ports; 3) the growth rate for this traffic in all the ports.

The results of the PPA are presented in Chapter 5, section 5.1.

4.2 Benchmarking Analysis

The benchmarking technique, as stated in Chapter 3, is a relatively new method to estimate port competition. In this, it is possible to integrate quantitative variables as well as qualitative variables, on the basis of the literature reviewed such as that in Chapter 2 and 3.
Quantitative variables are named “Features” (FE), whereas qualitative variables are named Quality Criteria (QC).
With the aid of the benchmarking methods, it is possible to evaluate and measure the performance of ports through some calculations (Pardalis and Michalopoulos, 2008):

- Benchmarking scores for each of the variables analysed (FE and QC) for each port
- Benchmarking score of the average Mediterranean port for each variable (FE and QC)
- The Best Scores of the ports in the range under study
- The Competition Degree of each port, according to which ports can be classified.

At the end of the analysis, the leader port in the range is identified as that which has the highest number of best scores in the variable of reference (FE and QC); a correlation is run between the number of best scores and the competitiveness degree of all ports in order to test the validity of the model.

4.2.1 Data

The ports subject of the benchmarking analysis are Barcelona, Valencia, Algeciras (Spain), Genoa, La Spezia, Gioia Tauro (Italy), Marsaxlokk (Malta), and finally Marseille (France). The time period refers to 2009.
Data for the analysis is once again secondary data; traffic data has been obtained through Containerisation International or ESPO. For the qualitative data, the sources used are the websites of the Port Authorities or the websites of the several container terminals in the ports. Moreover, what was lacking was found through the online database of Containerisation International.
Only in the case of the Port of Valencia, a difficulty was found in tracking down the aggregate storage capacity of the container terminals; through a telephone call at MSC Terminals in Valencia, this capacity was estimated to amount to a certain figure, which has been used for the analysis.

4.2.2 The Variables

The total number of variables, i.e. 30, is divided into two categories: Feature Criteria and Quality Criteria. Both categories are further subdivided into other categories: FE criteria are divided into “supply”, “demand” and “labour”. QC criteria are divided into “others”, “information systems”, “application to ships”, “application to cargo” and “miscellaneous”.
A note has to be made here with reference to how the two main categories have been subdivided; originally, as according to Michalopoulos *et al*. (2007) the subcategory “others” belonged to the FE criteria. However, while other variables related to supply, demand and labour, where quantitative variables, those related to

"others" were qualitative values quantified by means of a standard number. For this reason, in this study the line between feature criteria and quality criteria was drawn after supply demand and labour.
Each subcategory is illustrated by a number of variables, as shown in Table 4:

Table 4: The Variables of the Analysis

Category	Sub-Category	Variables	Kind	Measure Unit
FE	Supply	N. of Container Terminals	Quantitative	Number
FE	Supply	N. of Berths	Quantitative	Number
FE	Supply	Total Length of Berths	Quantitative	Meters
FE	Supply	N. of Cranes	Quantitative	Number
FE	Supply	Surface of Cont. Terminals	Quantitative	1000 m2
FE	Supply	Storage Capacity	Quantitative	TEU
FE	Supply	Reefer Points	Quantitative	Number
FE	Supply	Depth	Quantitative	Meters
FE	Demand	Total Cont. Traffic	Quantitative	1000 TEU
FE	Labour	Annual Operation	Quantitative	Days
FE	Labour	Daily Operation	Quantitative	Hours
QC	Others	Rail Facilities	Qualitative	Yes/No
QC	Others	Logistics Centre	Qualitative	Yes/No
QC	Others	Environmental Management	Qualitative	Yes/No
QC	Others	Expansion Project	Qualitative	Yes/No
QC	Info Systems	EDI Operation	Qualitative	Yes/No
QC	Info Systems	Integrated Info Management	Qualitative	Yes/No
QC	Appl.to ships	Ship Handling	Qualitative	Yes/No
QC	Appl.to ships	Vessel Planning	Qualitative	Yes/No
QC	Appl.to ships	Yard System	Qualitative	Yes/No
QC	Appl. to cargo	Cargo Manifests	Qualitative	Yes/No
QC	Appl. to cargo	Loading/Discharge	Qualitative	Yes/No
QC	Appl. to cargo	Container Control	Qualitative	Yes/No
QC	Appl. to cargo	Cargo Control	Qualitative	Yes/No
QC	Appl. to cargo	Gate Control	Qualitative	Yes/No
QC	Appl. to cargo	Stacking	Qualitative	Yes/No
QC	Appl. to cargo	Tracking	Qualitative	Yes/No
QC	Miscellaneous	Advertisement	Qualitative	Yes/No
QC	Miscellaneous	Statistics	Qualitative	Yes/No
QC	Miscellaneous	Reporting	Qualitative	Yes/No

Source: elaborated by the author on the basis of Michalopoulos *et al.*, 2010

Quantitative variables are traced and reported; qualitative variables, instead, are quantified through the constant value method: when a port fulfils the criteria (i.e. offers the service, or is engaged in an activity) it takes the standard value 1, whereas if it does not, it is assigned the value 0.
A further note should be made about the qualitative variables; with respect to the original variables proposed by Michalopoulos *et al.* (2001), the variables of this study have been adapted to the purpose of the research: the QC criteria "Logistics Centre", "Environmental Management" and "Expansion Project" have been deemed to be necessary to include.
As for the FE criteria, subcategory demand, the original model included also the number of empty and full containers in the traffic structure. Because these two were not traceable for all ports in 2009, they have been eliminated, and as such this constitutes a limitation of the research.
The original model included 35 variables, whereas here 30 are taken into account, of which the above mentioned have been added, and some related to application to cargo, to ship and miscellaneous have been deleted.

4.2.3 The Statistics

On the basis of the methodology presented above, some statistics were created and computed to identify the leader port in the range analysed. These are presented below.

- Benchmarking Score of Feature FE ($BSCORE_{(FE)}$) and Benchmarking Score of Quality Criteria QC ($BSCORE_{(QC)}$):

$$BSCORE_{(FEp)} = AVERAGE\ (var_1, var_2, ...var_n)$$
$$BSCORE_{(QCp)} = AVERAGE\ (var_1, var_2, ...var_m)$$

where *n* is the total number of features FE (11), *m* is the total number of quality criteria QC (19), and *p* is the number of ports (9). We also calculate:

$$BSCORE_{(FEp+QCp)} = BSCORE_{(FEp)} + BSCORE_{(QCp)}$$

- Benchmarking Score (BSCORE), that is used to compute the score for the "average Mediterranean port":

$$BSCORE = Average(\Pr ice_i)_{P=1}^{P=l}$$

where P= 1, 2,...,*n* is the number of ports, *Price* is the value of each variable, and *i*= 1, 2, ...k is the number of variables considered (30).

- Best Score (BestSCORE), according to which it is possible to verify, for each port, the best scores registered:

$$BestSCORE = Max(\Pr ice_i)_{P=1}^{P=l}$$

where P= 1, 2...,n is the number of ports, Price is the value of each variable, and *i*= 1,2,...,k is the total number of variables considered.

- BENCHp, which is needed to compute the Port competitiveness degree (PCD):

$$BENCHp = AVERAGE\ (BSCORE_{(FEp),}\ BSCORE_{(QCp)})$$

where BENCHp is the average of the benchmarking scores of features and quality criteria for each of the eight ports under consideration.

- The Competitiveness degree (CD) for each port is :

$$CDp = \frac{100BENCHp}{\sum_{p=1}^{n} BENCHp}$$

These statistics are computed and are used to make the graphs that will illustrate the results obtained, in Chapter 5. The model is tested for its validity with a correlation that is run in Excel. The model has resulted valid, and therefore in the analysis it is possible to proceed to the comparison of the leader port with the average Mediterranean port and with the other competitors, i.e. those that have the second and third best numbers of Best Scores.
The results of the benchmarking analysis, coupled with the positioning study (PPA) and the literature reviewed, form the basis to construct the questionnaire, which has been sent out to industry practitioners and experts to gauge which are, in fact, the determinants of port competitiveness in the Port of Valencia.

4.3 The Survey

Although the quantitative models provide a valuable insights about the strategic positioning of the port of Valencia with respect to its range of competitors, and a first insight of what kind of factors determine its competitive advantage, it has been necessary to deepen the research to find out what are the actual determinants of competitiveness according to the perceptions of the users and main actors in the port of Valencia.

In this study we use the definition of survey and questionnaire indistinctively, provided by De Vaus (2005), i.e. a list of questions that are presented in a certain order to the respondents, and this list is the same for all the respondents.
Because the respondents of the survey are all located in Spain, the most practical way to have them answer it was judged to be over the internet; therefore, the type of questionnaire sent out was self-administered, internet based (Saunders *et al.*, 2007). An introductory email was sent to all respondents, containing the web link at which they could find the survey to complete. This reduced the burden of respondents to download the file, for example in Word format, fill it in and send it back.
Moreover, because of the geographical location of the respondents, the questionnaire was administered in Spanish.

4.3.1 The Questions

For the purpose of the research, it was decided to divide the survey into three parts.

The first part consists of five questions in which the respondents are asked for their personal details.
The second part is a multiple choice section in which the determinants of port competitiveness are determined. The 25 factors influencing the competitiveness of the port of Valencia have been chosen on the basis of the research carried out. The factors are presented in the table below:

Table 5: Determinants chosen for Analysis and Rationale

Determinants	**Rationale**
1.Geographical Position	Port's capacity to be the access gate of Spain
2.Foreland Connections	
3.Physical Infrastructure (Accessibility)	
4.Physical Infrastructure (Storage Capacity)	Quality of Service (Performance)
5.Physical Infrastructure (Warehousing)	
6.Range of Services Offered	
7.Quality of Services Offered	
8.Customs Procedures	
9.Hinterland Connections	Land Connectivity (Cluster Aspect + Gate Potential)
10.Rail Connectivity	
11.Road Connectivity	
12.Delays in Cargo Inspections	Quality of Service (Performance)
13."Marca de Guarantia"	Cluster aspect + Performance
14.Quality of Logistics Services	
15.Logistics Centre Zone	
16.Information Platform	Cluster aspect
17.Environmental Policy Management	Performance
18.Port Prices	Price Factors
19Port Tariffs	
20.Basic Services Price	
21.Container Terminal Dues	
22.City-Port Relationship	Cluster aspect
23.Local Government Intervention	Impact of public bodies (Cluster Aspect)
24.Regional Government Intervention	
25.National Government Intervention	

Source: elaboration of the author

Respondents are asked to say how much, on a scale from -2 (strong negative effect) to +2 (strong positive effect) each factor influence the competitive position of Valencia vis-à-vis its rivals.

Finally in the third part of the survey, there are two open questions. In the first one, the respondent are asked to say whether they believe Valencia can be the main access gateway to the Iberian peninsula; in the second one, they are asked to indicate the factors that are more important in order to improve the competitive position of the port of Valencia.
The English version of the survey can be found in Appendix 3.

4.3.2 The Respondents

The survey was sent by email to some 75 potential respondents, which were divided into categories: Port Authority and Research Bodies for the Port of Valencia; Ship Agents; Ship Owners, Stevedores, Container Terminal Operators, Freight Forwarders, and Maritime Cargo Consolidators.
The emails were obtained mainly through the 2009 Valencia Port Yearbook, edited by Men Car. This is a source of email addresses, telephone and addresses for the community involved in port operations in Valencia. In the case of main shipping lines, it was possible to trace personal emails on the websites of the Spanish branches.
Due to the time of the year in writing, most people were out of the office; some of them expressed the unwillingness to participate in the research, some others stated they would complete the survey and never did. The response rate was rather low, possibly also because of the way the survey was administered. This is a common problem of internet based surveys, and as such it constitutes also a limitation of the present research.

4.3.3 Analysis

Once the responses were collected, it was not possible to perform any kind of advanced or inferential statistics due to the low response rate to the survey, which resulted in a small sample size. The sample, although useful to delineate some conclusions, was deemed to be too small to fully represent the interests and opinions of the many stakeholders involved in the operations of the Port of Valencia. Therefore, first the median was computed for each of the 25 determinants of competitiveness chosen; however, due to the fact that many answers scored 0 (no opinion), the neutral scores were eliminated and the answers divided in competitive disadvantages (scores -2 and -1) and advantages (score +1 and +2). Thus doing it was possible to identify factors determining the competitiveness of Valenciaport, as well as factors undermining the competitive standing. Finally, the answers to the third part of the survey, i.e. the open questions, are presented.

4.4 Chapter Conclusion

This chapter has presented the methodologies and methods used to conduct the research and to answer the research questions. The PPA and the Benchmarking analysis were presented, together with the data used to apply them and some of the limitations encountered during the research. Finally, the survey has been explained and illustrated, with the type of questions administered and the type of respondents to which the survey was sent. Once again, some limitations of the research were mentioned.
It is on the basis of the methods used that results of analysis could be obtained. These are presented in Chapter 5.

5 Results and Analysis

Based on the methodology discussed in Chapter 4, the goal of this chapter is to present the results of the quantitative and qualitative models used and to analyse them. This will be done through the presentation of graphs, obtained by elaboration of information based on port statistics. Any figure or table that is not felt to be relevant to the discussion, but has nonetheless been used to achieve the results presented, can be found Appendix 1 and 2.
First the results for the PPA are presented, and Valenciaport is positioned with respect to its competitors. After this, the benchmarking technique results are presented. Although relatively limited, this technique allows to preliminary investigate on the sources of the competitive position of a given port, on the basis of pre-determined criteria. Finally, the determinants of Valenciaport's competitiveness are identified through the results of the survey, based on the perceptions of port stakeholders.

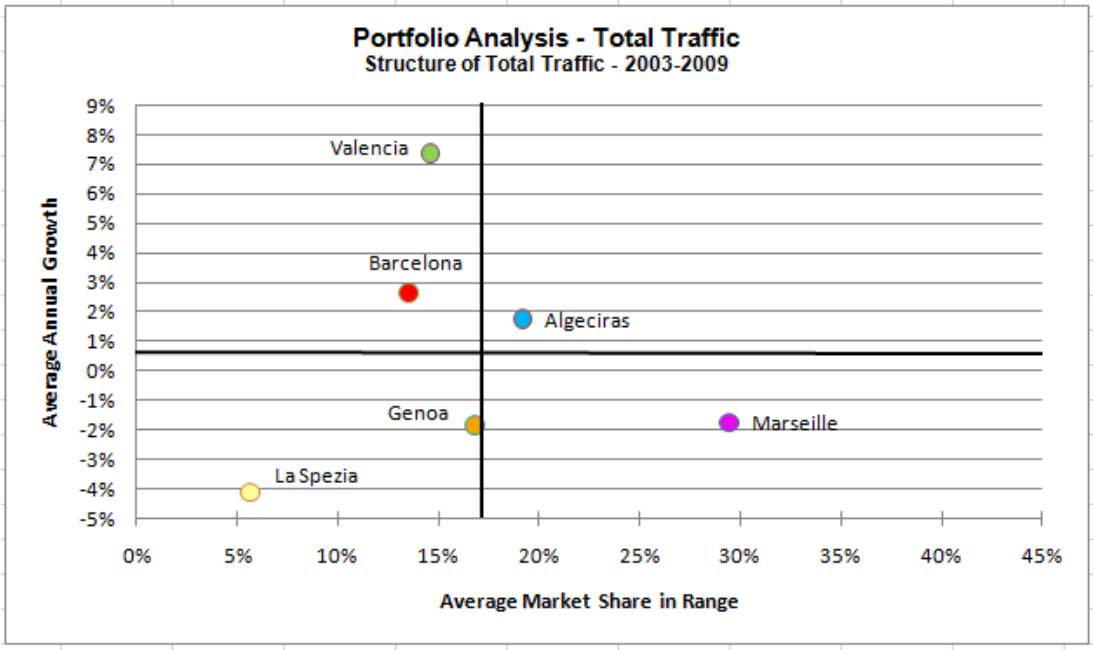
5.1 Port Portfolio Analysis

Port portfolio analysis has been conducted on four levels, for six ports (Marseille, Algeciras, Barcelona, Valencia, Genoa and La Spezia). This first quantitative technique, although descriptive, will allow to show the position of the ports considered first in relation to total traffic, then to analyse the traffic structure of each seaport in order to indentify strong units of traffic; to continue, the container traffic category will be chosen to assess how ports are positioned in relation to this traffic, and finally the last level of analysis will allow the positioning of ports by relating container traffic with total traffic.

5.1.1 PPA Level 1

For the first level of port portfolio analysis, the results obtained are illustrated in Figure 15.

Figure 15: Portfolio of ports – total traffic



Source: elaboration of the author based on port statistics.

The figure above shows how the six ports analysed are positioned with respect to their average annual growth (y-axis) and their average market share in the range considered (x-axis), according to the total traffic they realised in the period 2003-2009.
The bold vertical line represents the average market share of the ports for this period, whereas the bold horizontal line represents the average annual growth in total traffic for the ports in the same period. In 2003-2009, the average annual growth rate in the six ports amounts to -0.62%, whereas the average market share in the range amounts to 16.67%.

These two lines divide the graph surface into the four quadrants which allow the competitive positioning of the seaports analysed.

Marseille is the only port that is positioned as a “Mature Leader”: it has the highest market share in the range for total traffic (29.43%), but a growth of -1.75%. It is worth mentioning that this negative figure for growth is adversely influenced by the growth registered in the year 2008-2009 (-13.3%), which is due to the global economic crisis that undoubtedly affected trade and hence port traffic.

La Spezia and Genoa clearly belong to the category of “Minor Performers”. La Spezia registered an average growth of -4.12% with a corresponding market share of 5.65%. Genoa performed relatively better: although the average growth is negative and below the range average (-2%), its market share corresponds to the average market share in the range. The average growth rates for the two ports have been negatively affected by the growth rates for the year 2008-2009, which are respectively -23% and -12.4%. La Spezia has been the port in the range analysed that suffered the crisis the most in terms of growth, while maintaining a fairly stable market share. Genoa, in comparison, has seen its growth rate not so badly affected and has maintained its market share stable, too.

Algeciras is the only port that emerges as a "Star Performer", with the second highest market share (19.20%) and an above average growth of 1.77%. Over the period considered, it has been able to maintain its market share stable, although like the other ports, its average growth rate has been adversely affected by the growth rate of 2008-2009 (-7-7%).

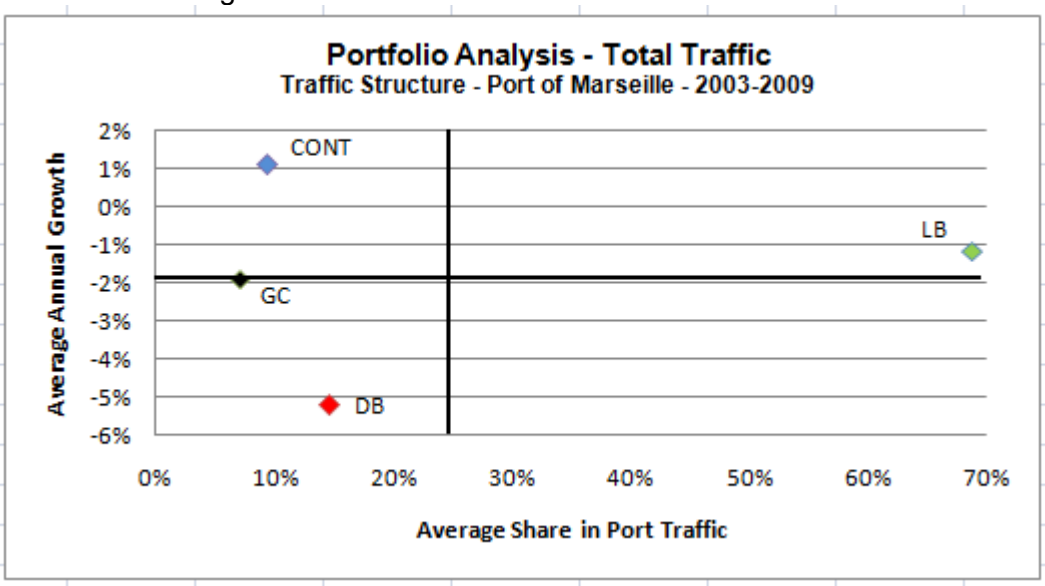
Barcelona and Valencia are both positioned as "High Potential" ports; however, there is a distinction to be made between the two seaports. Barcelona has a drastically smaller growth rate in relation to Valencia (1.77% and 7.37% respectively), as well as a smaller, but not significantly so, market share (13.52% versus 14.61% of Valencia).
In addition to the above, it is worth mentioning that Valencia, notwithstanding the economic crisis, has the highest average annual growth rate of all the ports analysed.

5.1.2 PPA Level 2

The second level of the port portfolio analysis consists of considering the traffic structure of each seaport. Four traffic categories (liquid bulk, dry bulk, general cargo, and containerised cargo) have been identified that constitute a portfolio for each of the six ports analysed. The relative share of each category in the total traffic of the individual ports is displayed on the x-axis, whereas their respective growth rate is shown on the y-axis. This level of analysis has the aim of positioning the traffic categories within each seaport in order to understand their relative importance.
The results of this level of analysis are displayed below.

5.1.2.1 Port of Marseille

Figure 16: Traffic Structure of the Port of Marseille



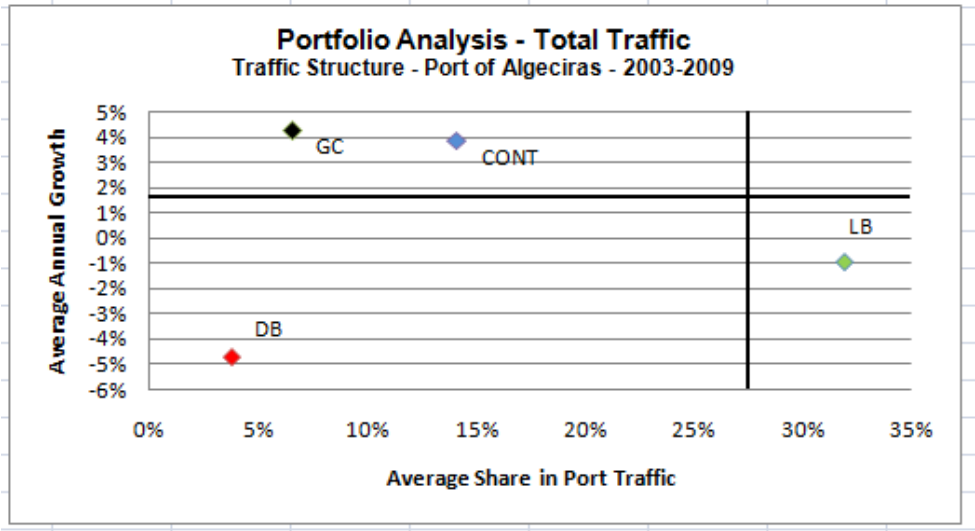
Source: elaboration of the author based on port statistics.

The "Star Performer" in this seaport is liquid bulk, with almost 70% average share in total port traffic and a growth above average.

Containers are positioned as “High Potential”, being the only traffic category with positive average annual growth rate, although the share of this traffic category is below average.
Dry bulk is definitely a “Minor Performer”, whereas general cargo has a growth that equals the average, but a low share in the total traffic; it is possible to assert that if this category gains market share, it could turn into a “High Potential” unit.

5.1.2.2. Port of Algeciras

Figure 17: Traffic Structure of the Port of Algeciras



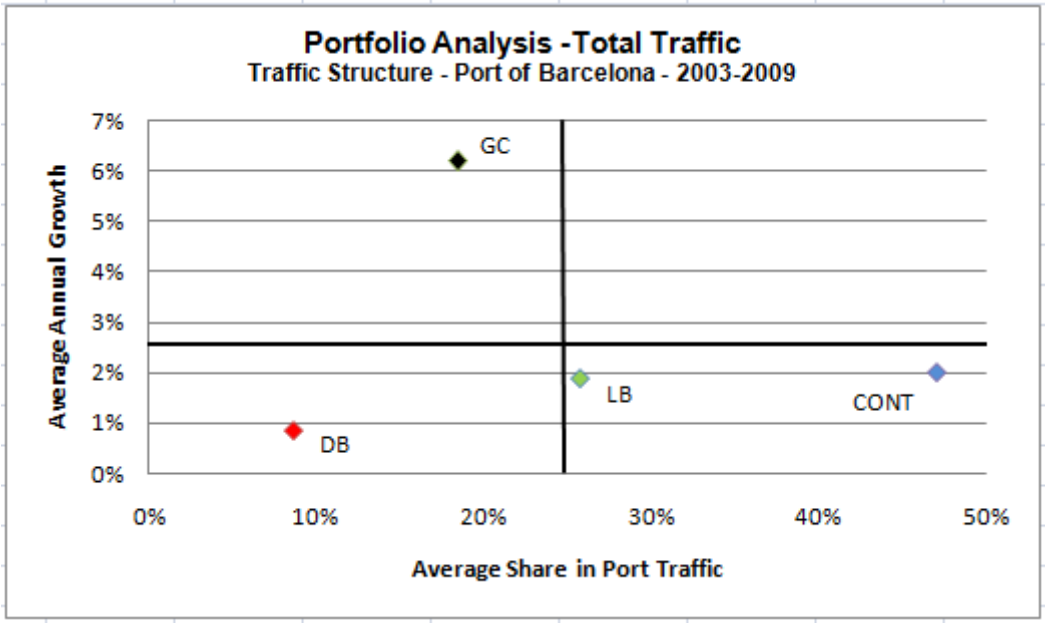
Source: elaboration of the author based on port statistics.

The traffic structure of the Port of Algeciras is displayed in Figure 17.

None of the traffic categories is identified as a “Star Performer”; however, general cargo and containerised cargo are positioned as “High Potential”, and are the only two categories that registered positive growth over the period analysed. Containers are more important in terms of share in the total traffic (14.10%) with respect to the share of general cargo (6.56%)
Dry bulk is clearly a “Minor Performer”, with both average annual growth and share in port traffic well below average. Liquid bulk, on the other hand, is a “Mature Leader” unit, with a significant share of total traffic but a lower than average annual growth.

5.1.2.3 Port of Barcelona

Figure 18: Traffic Structure of the Port of Barcelona

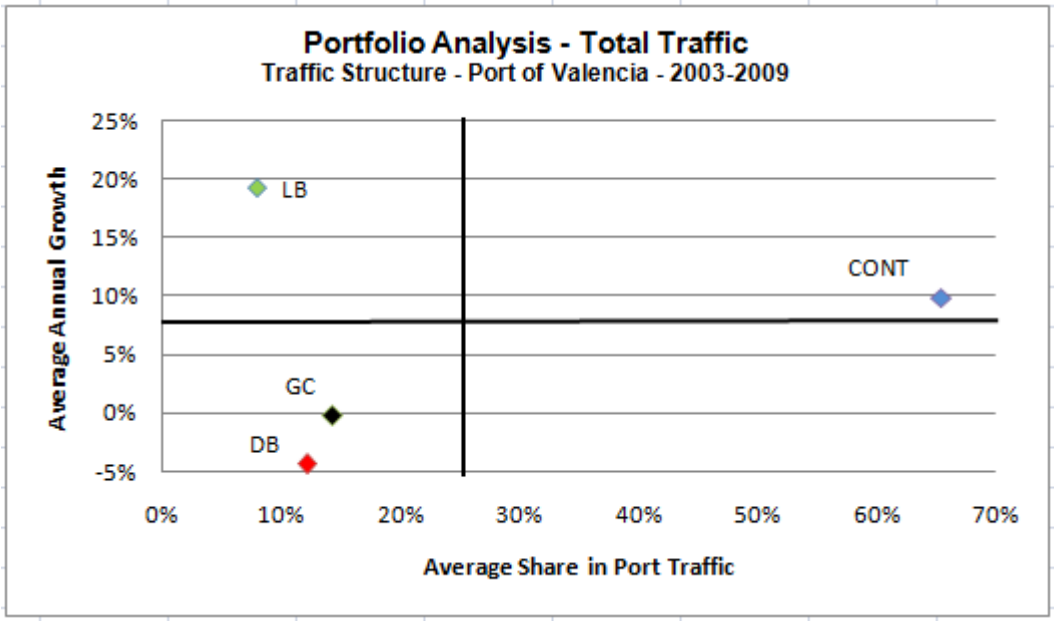


Source: elaboration of the author based on port statistics.

Within the Port of Barcelona, again no traffic category positioned itself as a "Star Performer"; however, particular attention is to be paid to containers. Over the years, this unit has registered good annual growth rate (still inferior to general cargo, though), but in 2008-2009 Barcelona has lost container traffic to the advantage of Valencia and has recorded a negative growth of -17.3%. This, combined with an average share in the port traffic of 16.27% over the whole period analysed, makes container traffic a "Mature Leader", together with liquid bulk. Liquid Bulk is the traffic category that has been affected by the 2008-2009 crisis the least.
Dry Bulk is identified as a "Minor Performer" in the port, whereas general cargo is a "High Potential" unit, with the highest average annual growth of the four traffic categories.

5.1.2.4. Port of Valencia

Figure 19: Traffic Structure of the Port of Valencia

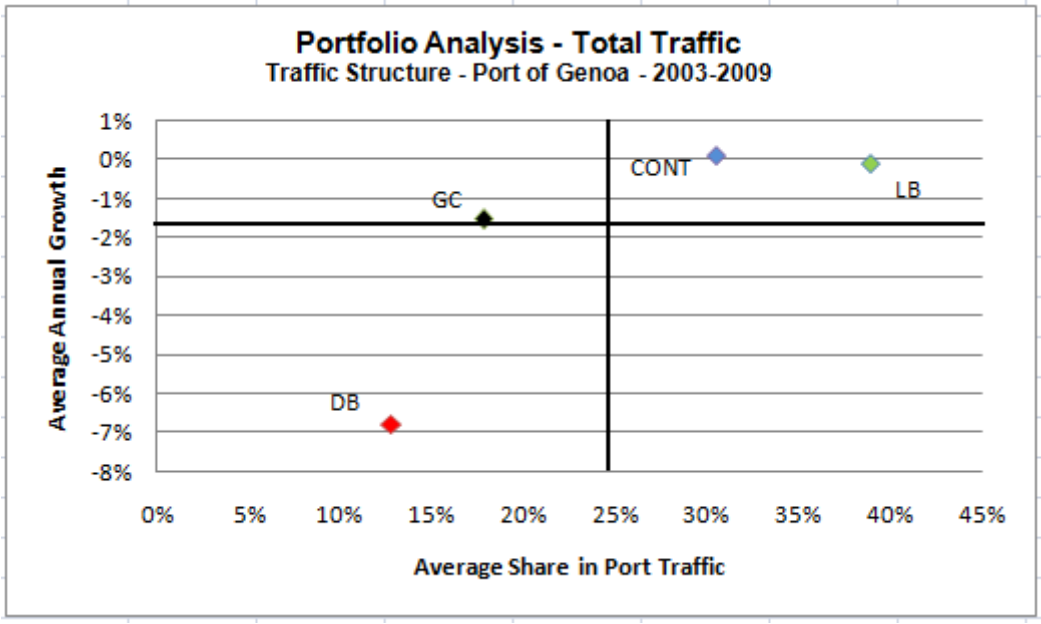


Source: elaboration of the author based on port statistics.

Containers are indeed a "Star Performer" in the Port of Valencia. Notwithstanding the economic crisis of last year, this unit has registered an above-average annual growth, and a well above-average share in the port total traffic. Containers, therefore, are proved to be the most important traffic category in Valencia, just as the Port Authority has declared in multiple instances.
Liquid bulk is the traffic category with the highest average annual growth rate (19.20%), and it is positioned as a "High Potential" unit, although its relative share is the lowest of all the categories (7.96%).
General cargo and dry bulk are "Minor Performers", with similar share in port traffic, although general cargo performs better in terms of average annual growth.

5.1.2.5 Port of Genoa

Figure 20: Traffic Structure of the Port of Genoa

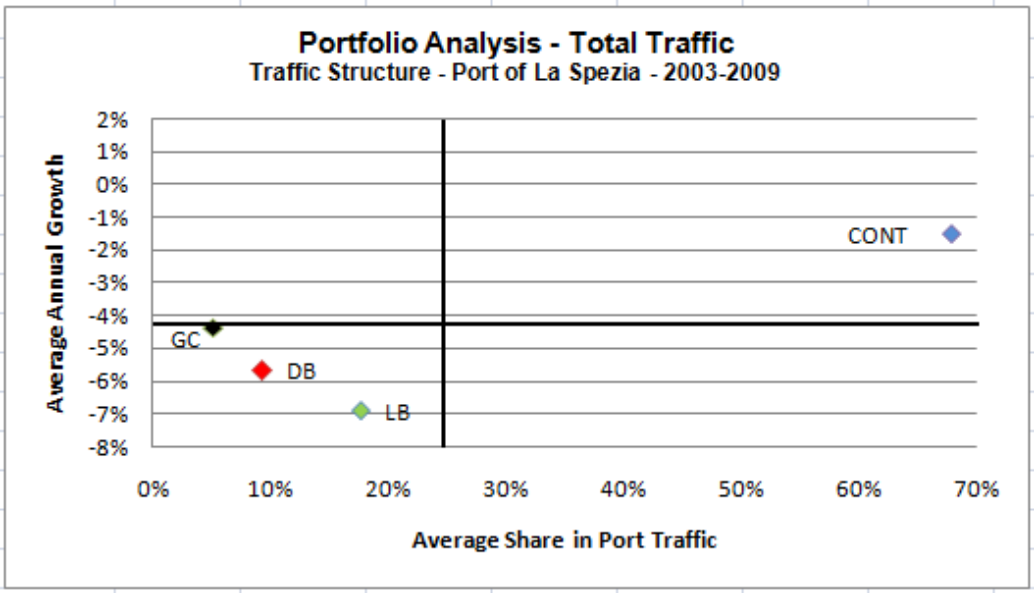


Source: elaboration of the author based on port statistics.

Figure 20 shows that, in the Port of Genoa, both containers and liquid bulk are positioned as “Star Performers”. Containers have a relative better growth, whereas liquid bulk has a higher share in total port traffic.
General cargo is categorised as a “High Potential” unit, although it is worth mentioning that the average annual growth of this category is just above the average annual growth of the total traffic. At the same time, one should bear in mind that the total figures are affected by strong negative growth registered in all categories in 2008-2009, in particular with reference to general cargo indeed.
Dry bulk is a “Minor Performer”: the well below-average annual growth of -6.78% has been dramatically influenced by the figure registered for 2008-2009, i.e. -33%. On the other hand, dry bulk has progressively lost its share in the range, to the favour of other categories.

5.1.2.6 Port of La Spezia

Figure 21: Traffic Structure of the Port of La Spezia



Source: elaboration of the author based on port statistics.

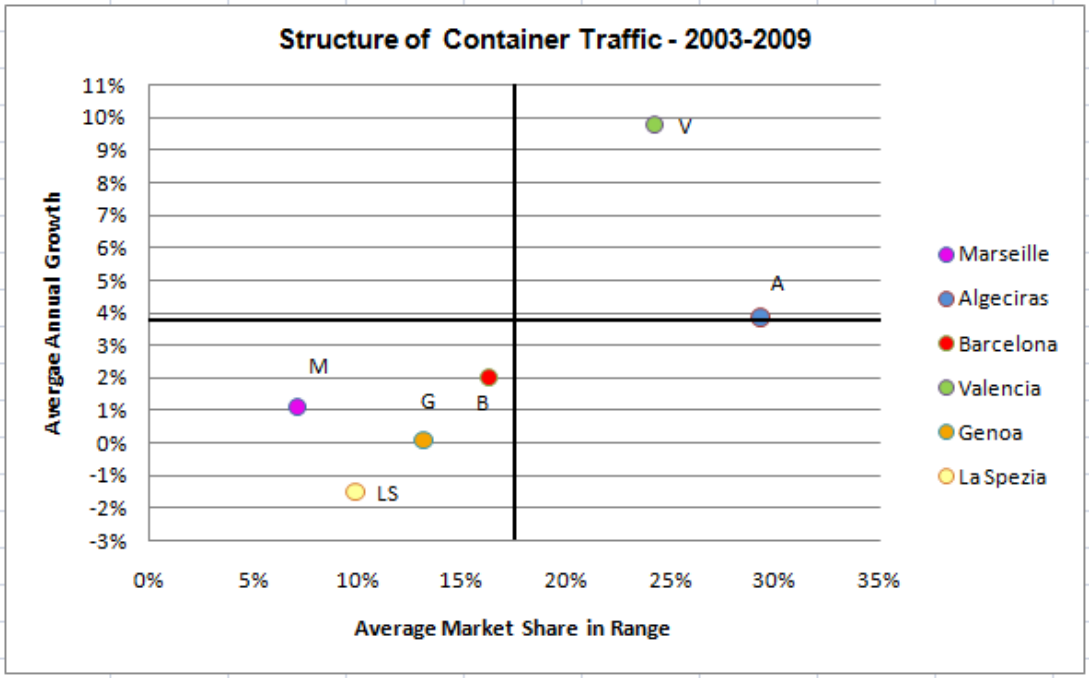
From Figure 21, it is possible to position containers as the "Star Performer" unit of the port of La Spezia. This traffic category amounts to almost 70% of all traffic dealt with, and has registered an average annual growth (-1.51%) which is, although negative due to the economic crisis, still well above the average of the total (-4.12%). All traffic categories have actually suffered considerably from the crisis. General cargo is a "Minor Performer", with the lowest share in port traffic, and its growth has been hit the strongest in 2008-2009 (-44%). Dry bulk and liquid bulk are also classified as "Minor Performers".

5.1.3 PPA Level 3

In this third level of analysis, the six ports analysed are considered as a portfolio of ports for a specific commodity group, which in this case is containers.
From the second level of analysis, this category of traffic has emerged to be either positioned as a "High Potential" unit (for two out of six ports) or as a "Star Performer" (for three out of six ports). Moreover, because this study is focused on containerised traffic, this is the commodity group chosen to be the subject of this level of analysis.

The average annual growth of containerised traffic in the six ports analysed is displayed on the y-axis, whereas the average market share of each port in the range is displayed on the x-axis. The aim of this level of analysis is to position the seaports under consideration with respect to the containerised traffic, in order to identify the relative importance and competitive position. Figure 22 shows the results obtained.

Figure 22: Structure of Container Traffic in the six ports analysed



Source: elaboration of the author based on port statistics.

The horizontal bold line represents the average annual growth of containerised traffic for all the six ports analysed, i.e. 3.86%. The vertical bold line represents the average market share of each seaport in the range, which is equal to 16.67%.

Valencia emerges as a clear "Star Performer", with both annual growth (9.78%) and market share in the range (24.24%) that are above the average. Once again, it is confirmed that the main strength of the port of Valencia is indeed containerised traffic, and it also appears here that it positioned itself much better in relation to the other competitors. Furthermore, it is remarkable that notwithstanding the economic crisis, which resulted in negative results for all other ports analysed, Valencia has been able to position itself so much better than the others.

Algeciras has an annual growth over the period 2003-2009 which corresponds to the market average, but its share in the range is far superior to any other of the seaports considered. Thus, it is possible to infer that its average growth is the result of the economic crisis: containerised traffic has had, in the year 2008-2009 a negative growth of -11.5%, and has indeed been the traffic category most hardly hit by the crisis within the port. It is thus confirmed that Algeciras, together with Barcelona, lost their edge in containerised cargo to the benefit of Valencia.

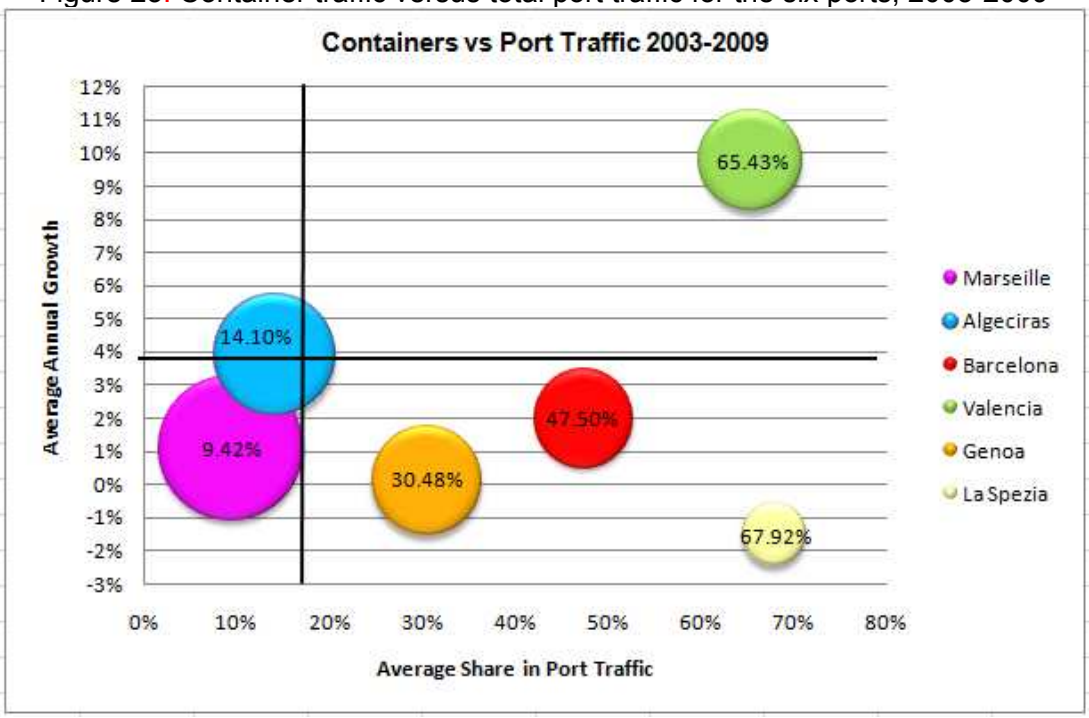
All the other seaports taken into consideration are positioned as "Minor Performers" in containerised traffic. Of them, Barcelona is the one that is positioned higher, both in terms of average annual growth rate, and in terms of average share in the range considered. As already mentioned above, this situation can be attributed to the

effects of the crisis, which affected Barcelona badly, in particular with reference to container cargo.

5.1.4 PPA Level 4

The fourth and last level of port portfolio analysis has been argued to be the most important of all of them (Haezendonck, 2001). This level completes the analysis by adding a third dimension: the total traffic of the seaports analysed.
The difference with the third level, presented above, is that here the x-axis displays the average share of container traffic in total port traffic, for each of the six ports. The y-axis still displays the annual average growth rate of containerised cargo for the range considered.
The dimension added is a circular shape whose area is proportional to the total traffic volume of the port considered; inside, the share of container traffic in this total is presented.
The main advantage of this last level of analysis is that three things can be displayed at the same time: first, the position of containerised traffic in the commodity structure of each seaport (level 2); second, the size of containerised cargo in relation to the size of the same in the other ports analysed (level 3) and third the growth rate of container cargo for the ports analysed.
The results obtained by the fourth level of analysis are presented below.

Figure 23: Container traffic versus total port traffic for the six ports, 2003-2009



Source: elaboration of the author based on port statistics.

The "Star Performer" is undoubtedly Valencia. As it could already be seen in level 1, this port is not a star performer in terms of total traffic. However, it is the best performer in terms of the relative importance of container traffic both as a percentage of total traffic, and in relation to the other seaports (level 3).

La Spezia also shows the importance of containers within its cargo structure (level 2), but is negatively affected by lower than average growth rate in this
category, as well as in relation to the importance of containers for the other ports (level 3). Thus, it is classified as a "Mature Leader".

For Barcelona, containers are important (almost half of the total traffic), but growth is below average, for reasons already explained above. Hence, Barcelona is a "Mature Leader", too, together with Genoa.

Marseille is a definite "Minor Performer" in containerised cargo, which only constitutes 9.42% of total traffic. It should be borne in mind, though, that the results of level 2 highlighted that this category classified as "High Potential", and therefore future evolutions of the world economy and of the port strategy could alter this positioning.

As for Algeciras, it is the only port classified as "High Potential". This result comes to no surprise: Algeciras has been for years the leader container port of the Iberian Peninsula, and this positioning of high potential container port is probably attributable to the effects of the economic crisis.

5.1.5 Partial Conclusions

The results of the port portfolio analysis conducted show that the port of Valencia is a clear "Star Performer" in containerised traffic with respect to the range analysed.
Not only it has a high potential for the evolution of total traffic (level 1), but also containerised cargo is the most important traffic category within its cargo structure (level 2). Moreover, it is also a "Star Performer" in this category in comparison to its other five competitors (level 3), as well as a "Star Performer" in this commodity in relation to its total traffic, when compared to the other seaports considered (level 4).

Algeciras emerged, from level 3 and 4, to be a fierce competitor of Valencia. Barcelona, too, is a potential competitor.
The other ports, namely Marseille, Genoa and La Spezia, are still considered competitors of Valencia, but they are not so strong: Marseille because containers are not so important in its traffic structure (although a "High Potential" unit), Genoa because although containers are relevant in the traffic structure, its annual growth is below average; finally, La Spezia, because although containers constitute almost 70% of its total traffic, total traffic is minor than in other ports, and the growth rate is the smallest of all.

5.2 Benchmarking Analysis

The aim of the port portfolio analysis was to determine the position of the six ports in consideration, mainly with respect to containerised cargo.
With benchmarking, it is possible to gain insights on what kind of factors determine this competitive position. Through this technique it is possible to identify the leader port for containerised cargo for the year 2009. According to the model, the leader port will be the one with the maximum number of best scores; there will be a strong correlation between the maximum number of best scores and the PCD (Port Competitiveness Degree).

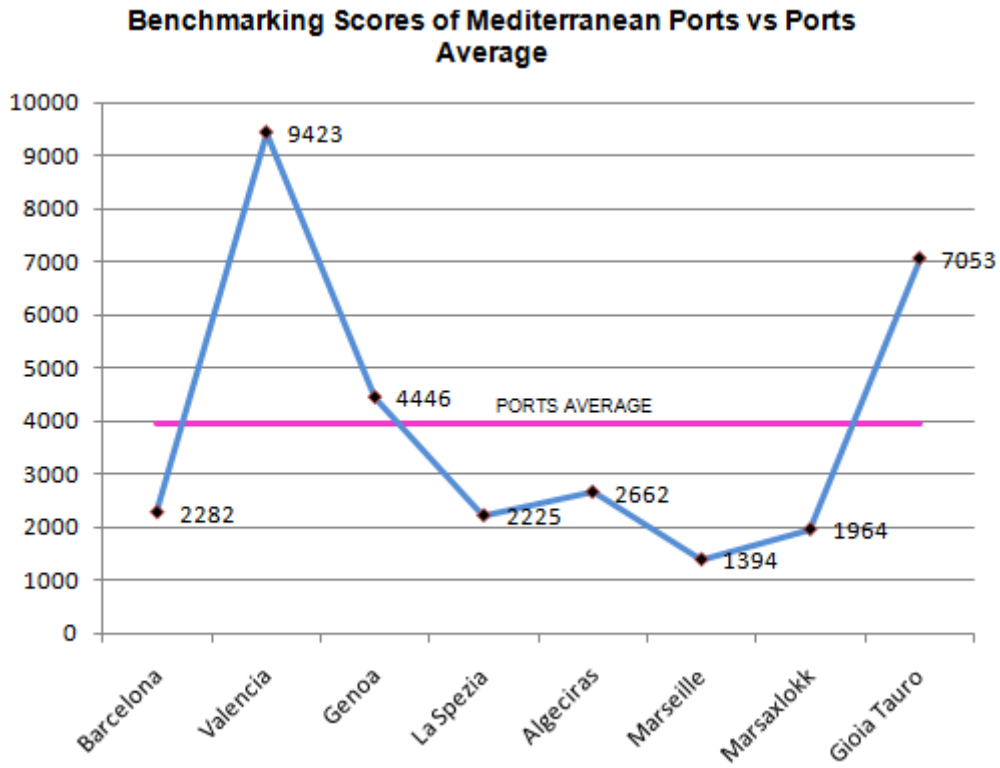
As for the ports under consideration, all of the six above have been considered, but two more have been added, i.e. Gioia Tauro and Marsaxlokk. Therefore, the analysis now takes into account eight ports, which are all important entry points for the Iberian Peninsula: Barcelona, Valencia and Algeciras for obvious geographic position; Marseille through intermodal land transport; Genoa and La Spezia through land transport/feedering; and finally Gioia Tauro and Marsaxlokk which are renowned transhipment ports.

The results of the analysis are hereby presented with the aid of graphs and tables, which have been elaborated by the author on the basis of port statistics.

5.2.1 Benchmarking of Ports against the Average Port

The first step of benchmarking analysis is to compare the eight seaports under consideration with the average Mediterranean port. The benchmarking is based on the benchmarking scores (features and quality) obtained for each of the ports, against the benchmarking score of the average Mediterranean port (features and quality).
The aim of this step is to determine the port(s) that score higher than average, and thus identify a potential leader. The results are as follows:

Figure 24: Benchmarking of ports against the average port



Source: elaboration of the author based on research

The benchmarking score of the average Mediterranean port has been obtained by averaging the benchmarking scores of all ports under consideration – features and

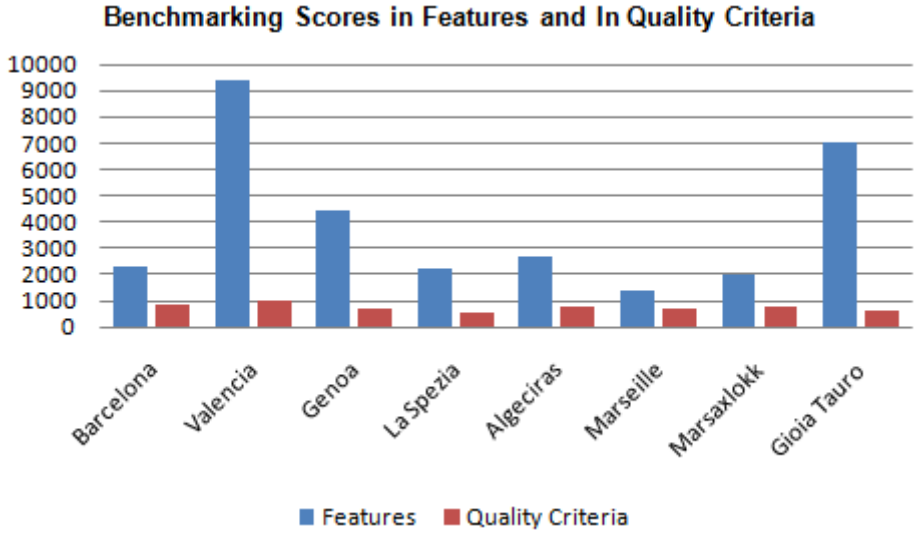
criteria -; it amounts to 3931 and it is represented by the pink horizontal line in the graph above.
Valencia is the port that performs better, having registered the highest benchmarking scores (9423). It is followed by Gioia Tauro (7053) and Genoa (4446), which are positioned above the average too.
On the contrary, the ports of Algeciras, Barcelona, La Spezia, Marsaxlokk and Marseille (here listed in descending order of scores) are positioned below average.

The first step of the benchmarking analysis has thus identified the three ports that perform above average, among which we can trace Valencia as the best performer; it has also identified those five that perform below average, with respect to the benchmarking scores of features and quality.

5.2.2 Benchmarking: Features and Quality Criteria

The mere positioning of ports according to their total benchmarking scores would not add much value to this analysis. It is for this reason that a step further needs to be taken, which consists of identifying which ports perform better in feature criteria and in quality criteria. Results are shown in figure 25.

Figure 25:



Source: elaboration of the author based on research

It is worth reminding here that feature criteria have to do with supply, demand and labour, whereas quality criteria have to do with information systems, services to ships, services to cargo, and miscellaneous.

Valencia performs best in terms of features criteria, followed by Gioia Tauro. Genoa, Algeciras, Barcelona, La Spezia, Marsaxlokk and Marseille follow, although the scores are much lower.
It is therefore possible to assert that Valencia and Gioia Tauro are better than the others with regard to Infrastructure, Container Traffic and Labour.
As for the quality criteria, Valencia registered the best score possible (equal to one), and this highlights a wide variety of services offered.
Barcelona has the second best score (0.84), followed by Algeciras (0.79).

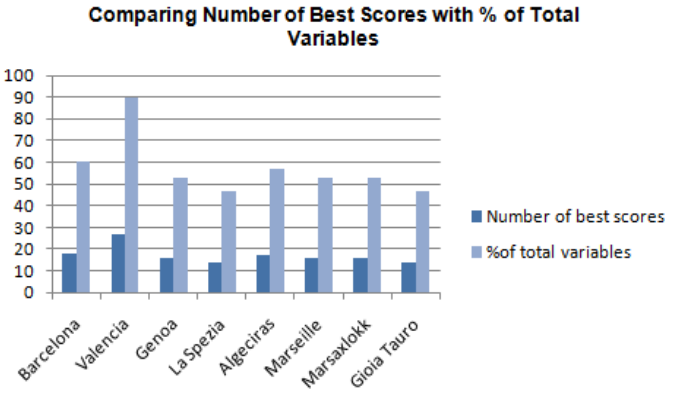
The other ports scored below this figure, indicating a minor number of services offered.

5.2.3 Best Scores

A third step towards the identification of the leader port consists of registering the number of best scores achieved by each port for the total of the variables, and then comparing it with the percentage of total variables. The results of this process are displayed in figure 26:

Figure 26: Best Scores vs. Percentage of total Variables

Ports	Number of Best Scores	% of Total Variables
Barcelona	18	60
Valencia	27	90
Genoa	16	53
La Spezia	14	47
Algeciras	17	57
Marseille	16	53
Marsaxlokk	16	53
Gioia Tauro	14	47



Source: elaboration of the author based on research

Valencia is the port that achieves the highest number of best scores (27; 90% of the total). What this means is that it is the port that scores better than the others either in the provision of the services analysed, or in the infrastructure provided (such as storage capacity, reefer plugs, number and length of berths) as well as in container traffic registered for the year 2009. In other words, out of the 30 variables analysed, Valencia performed best in 27 of them. Since it has the highest number of best scores, this port is indentified as the leader port in the market of consideration.

Second best is Barcelona (18; 60% of the total); this port owes this high number of best scores mainly to the provision of the service offered, rather than to variables related to supply, demand, and labour. This is the reason why it scored better in this step of the analysis rather than in the benchmarking scores.
Algeciras comes as a third best (17; 57% of the total) and it is very close to Barcelona, for exactly the same reasons.

Genoa, Marseille and Marsaxlokk scored the same (16; 53% of the total); these ports on the other hand, tend to perform better than Barcelona for the labour, demand and supply variables, but are inferior in terms of the number of services offered.

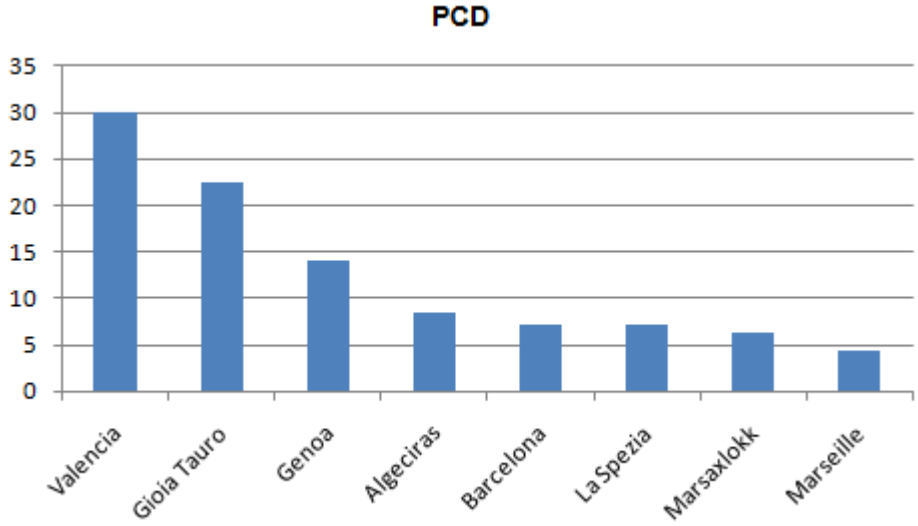
Finally, we have Gioia Tauro and La Spezia (14; 47% of the total). This comes a little as a surprise, especially given the high position of Gioia Tauro for the benchmarking scores in the first step of the analysis. The reason behind this score is that, although it is a big port, with good infrastructure and high containerised

traffic, it lacks in the provision of some services such as advertisement, statistics, reporting, environmental management etc.

5.2.4 The Port Competitiveness Degree Index

Next, with the aid of the statistics BENCHp, explained in the methodology, it is possible to compute the Port Competitiveness Degree Index.

Figure 27: Port Competitiveness Degree Index



Source: elaboration of the author based on research

Valencia, once again, is the port with the highest competitiveness degree (30%), followed by Gioia Tauro (22%) and Genoa (14%). Algeciras is the one, of the rest of the port, that scores better, with an 8.4%, which is however still far lower than its antecedents.

In terms of best scored and competitiveness degree, Valencia is identified as the leader port. However, the model would not be complete without a test of validity.

5.2.5 Correlation between Number of Best Scores and PCD

In order to test the validity of the model, correlation is run between the number of best scores for the ports and their degree of competitiveness, as presented above.
This is done with the aim of testing whether there is a relationship between the two elements.

The result of the correlation, performed in Excel, is **0.633**.
Thus, we conclude that the model is valid, and there is correlation between the number of best scores registered by the ports and their competitiveness degree.
We can infer from this that, according to the benchmarking analysis carried out, Valencia is indeed the leader port in the market of consideration, in relation to containerised traffic.

5.2.6 Comparison of Feature Criteria

After having assessed the validity of the model, we find that the number of best scores is correlated to the competitiveness degree of the ports, and that the model is valid. Therefore, it is possible to analyse what determines the advantage of Valencia on the basis of the study carried out. For this purpose, the scores registered for Valencia are compared to the average Mediterranean port, as well as the two others that register the second and third highest scores, i.e. Barcelona and Algeciras (Table 6)

Table 6: Benchmarking Scores of Features (by variable)

	Valencia Benchmarking Score	Average Score	Barcelona Benchmarking Score	Algeciras Benchmarking Score
Supply				
N. of Container Terminals	4	3.5	6	2
N. of Berths	12	8.4	10	7
Total Length of Berths	5133	3196	3000	3834
N. of Cranes	30	19.8	17	21
Surface of Cont. Terminals	1815	1059.3	1285	786
Storage Capacity	90000	34842.9	15918	18302
Reefer Points	2596	1578	2655	2876
Depth	16	16.1	16	18
Demand				
Total Cont. Traffic	3654	2126.7	1800	3043
Labour				
Annual Operation	360	359	360	360
Daily Operation	24	24	24	24

Source: elaboration of the author based on research and calculations

It can be seen that Valencia scores much better than the average in most of the variables analysed; in the number of container terminals, however, it is very close to the average and inferior to Barcelona. Moreover, for the depth at berth, it is less than average, although the difference is irrelevant. Barcelona has the same maximum depth, whereas Algeciras has the highest. The depth at berth is very important in relation to accessibility, especially of the new mega ships; Algeciras requires such a depth because of its transhipment nature. Nonetheless, Valencia is able to accommodate the latest generation of such vessels; for example MSC Daniela, with a carrying capacity of 14,000 TEUs, calls at Valencia MSC Terminal (Levante, 2009).
Remarkably high scores are registered for the storage capacity, due mainly to the capacity of the Public container terminal; also the length of the berth is noticeable, where Valencia scores better than Barcelona although it has less container terminals.

In terms of demand, Valencia is the port that has registered the highest level of throughput. This is remarkable given the economic conditions that affected Spain in particular during the economic crisis.
As for the labour category, the results show that there is very little difference in the hours/days of operation; in fact, only Marseille was the port with a significant reduced number of operating days.

5.2.7 Comparison of Quality Criteria

In order to complete the benchmarking analysis, a comparison of the benchmarking criteria (quality) is carried out of the port Valencia with the average Mediterranean port and Barcelona and Algeciras. The results are illustrated in table 7.

Table 7: Benchmarking Scores of Quality (by variable)

	Valencia Benchmarking Score	Average Score	Barcelona Benchmarking Score	Algeciras Benchmarking Score
Others				
Rail Facilities	1	0.875	1	1
Logistics Centre	1	0.875	1	1
Environmental Management	1	0.875	1	1
Expansion Project	1	0.750	1	1
Info Systems				
EDI Operation	1	0.625	1	1
Integrated Info management	1	0.5	0	0
Application To ships				
Ship Handling	1	1	1	1
Vessel Planning	1	0.75	1	1
Yard System	1	1	1	1
Application to Cargo				
Cargo Manifests	1	0.875	1	1
Loading/Discharge	1	1	1	1
Container Control	1	0.75	1	1
Cargo Control	1	0.375	0	1
Gate Control	1	0.875	1	0
Stacking	1	0.875	1	0
Tracking	1	0.375	0	0
Miscellaneous				
Advertisement	1	0.75	1	1
Statistics	1	0.625	1	1
Reporting	1	0.375	1	1
Total Quality	**19**	**14.13**	**16**	**15**

As inferred from the table above, out of the 19 services analysed, Valencia offers them all; this is higher than the average (14.13) and than Barcelona and Algeciras, although we can notice that there is not much difference between these last two.
As for the category "others" all three ports score the same, which is higher than the average registered. The scores for the averages are due to the minor level of performance in quality criteria of the other ports analysed.
As for information technologies, all ports implement EDI, but only Valencia has a more modern, integrated ICT system, i.e. Valenciaportpcs.net, which allows the sharing of information in an efficient and accurate manner between the users of the port.
All ports score the same in the application to ships category, and all three are superior to the average Mediterranean Port.
As for the application to cargo, Valencia outperforms the average in all categories, except in loading and discharge, which is the same of the average.
Last, for the miscellaneous category, all ports perform much better than the average, which is low particularly in reporting services.

5.3 Conclusions on the Quantitative models

The aim of the Port Portfolio Analysis was to position the six ports analysed; this has been done with particular attention to container traffic.
The final results of this analysis showed that Valencia is positioned as a "Star Performer" and therefore confirmed what is read in the press that this port has the ambition of becoming the leader in containerised traffic in the Mediterranean and in Spain.

In order to deepen the quantitative research and to establish the reason for this positioning of the basis of pre-determined criteria, a Benchmarking Analysis was carried out. This method allowed the determination of the market leader in terms of containerised traffic, and to ascertain on which kind of variables this leading position is based.
Results showed that Valencia is indeed the absolute leader: in terms of benchmarking scores, in terms of number of best scores achieved, and in terms of the degree of competitiveness. Moreover, results also show that Valencia outperforms the average Mediterranean ports both in terms of feature and quality criteria.

The next step of the research is to investigate what the most important determinants of the competitiveness of Valencia are, according to the perceptions of important stakeholders involved in port operations; this will be done through the aid of a questionnaire.

5.4 The survey

5.4.1 Part One: the Respondents

Of the 75 potential respondents to which the survey was proposed, only 16 answered, which constitutes a 21.3% of the total. However, of these 16 responses, only eleven were completed, i.e. a 14.7% actual response rate.
Some of the potential participants explicitly refused to take part in the survey as part of company policies, some others started it but never completed it, and some did not

respond to the invitation in the research. Eleven results, although representing a small part of the total potential stakeholders involved in the Port's operations and management, will be used for analysis here. It should be mentioned that because of the size of the sample analysed, no advanced or inferential statistics could be performed, because eleven respondents were not deemed to be representative of the variety and number of the stakeholders involved in the Port of Valencia. Therefore, only simple descriptive statistics is performed, and the analysis is mainly qualitative in nature.

Of the eleven responses, one was provided from the Port Authority of Valencia, four from ship agents for liner companies, four from freight forwarders and logistics companies, and two did not declare their business activity or name of the company. All the respondents have expressed the wish to stay anonymous.

5.4.2. Part Two: the Determinants of Port Competitiveness

The results of the survey are displayed in table 8.

Table 8: Results of the Survey

	R1	R2	R3	R4	R5	R6	R7	R8	R9	R10	R11	Mode
Q1	2	1	2	2	2	1	2	2	1	1	2	2
Q2	1	0	1	2	2	1	1	2	1	1	1	1
Q3	1	1	2	1	1	1	1	1	2	1	2	1
Q4	0	1	1	-1	1	1	0	1	1	1	1	1
Q5	1	0	1	-1	1	1	0	1	1	1	1	1
Q6	2	0	2	1	2	1	1	1	1	1	1	1
Q7	1	0	1	1	1	1	1	0	-1	1	1	1
Q8	1	-1	2	1	-1	0	1	1	0	1	1	1
Q9	1	0	1	-2	1	0	1	1	0	1	1	1
Q10	-1	0	1	-2	-1	0	1	1	0	1	1	1
Q11	1	1	2	-1	2	2	2	1	1	1	2	1
Q12	0	-1	0	-2	-1	1	-1	0	1	1	0	0
Q13	1	1	1	2	1	1	0	0	1	1	2	1
Q14	1	1	1	1	1	1	1	1	0	1	1	1
Q15	0	-2	0	0	0	-1	0	-1	0	0	1	0
Q16	2	1	2	2	1	1	1	1	0	1	2	1
Q17	0	0	1	0	0	1	0	0	1	1	0	0
Q18	0	0	1	1	0	1	-1	-2	0	0	-1	0
Q19	-1	0	-1	1	-1	1	1	-1	-1	0	0	-1
Q20	0	0	-1	0	-1	1	1	1	0	1	-1	0
Q21	-1	0	-1	-1	1	1	-1	-1	0	0	-1	-1
Q22	1	-1	0	-1	0	1	0	1	2	2	1	1
Q23	2	-1	1	0	0	0	0	2	-1	1	0	0
Q24	1	-1	1	1	0	0	0	2	1	1	1	1
Q25	0	0	0	-1	0	0	0	-1	-1	0	-1	0

Source: elaboration of the author based on survey results

Each question (Q*n)* corresponds to the determinants of competitiveness chosen for the analysis, for which the reader should refer to Table 5.

R*n* stands for each respondent. The ones in light yellow (R1 and R11) are those that stayed anonymous, the green ones (R8;R9;R10) are freight forwarder and logistics companies, the ones in blue (R3;R4;R6;R7) are ship agents and the purple one R5 is the Port Authority.

Because calculating the mean of the responses would have little meaning and no significance, the median was calculated, which gives the most frequent of the answers provided. On this basis, it is possible to assert that 18 of the 25 factors chosen are perceived from respondents to be determinants of competitiveness, of which one gives a strong positive competitive advantage, i.e. the geographical position of Valencia. Two of the factors are perceived to be having a negative effect on competitiveness, i.e. port tariffs and container terminal prices, both related to the cost element. For seven elements, the most frequent answer provided was "no opinion", therefore the analysis need to be further deepened to break down the answers of the other respondents.

For further analysis of the results, the neutral answers (score 0, "no opinion") are not taken into account. The answers that have received scores of -1 and -2 are classified as disadvantages and those that have scored +1 or +2 are classified as competitive advantages. The results of this step are illustrated in table 9.

Table 9: Disadvantages and Advantages

	Disadvantage	Advantage
Q1	0	11
Q2	0	10
Q3	0	11
Q4	1	8
Q5	1	8
Q6	0	10
Q7	1	8
Q8	2	7
Q9	1	7
Q10	3	5
Q11	1	10
Q12	4	3
Q13	0	9
Q14	0	10
Q15	3	1
Q16	0	10
Q17	0	4
Q18	3	3
Q19	5	3
Q20	3	4
Q21	6	2
Q22	2	6
Q23	2	4
Q24	1	7
Q25	4	0

Source: elaboration of the author based on survey results.

With reference to table 9, there are eight factors which are clear determinants of port competitiveness for Valencia, i.e. its geographical position, the foreland connections offered, the accessibility, the range of service offered, the "Marca de Guarantia", the

quality of the logistics services, the information platform Valenciaportpcs.net, and the environmental policy management.
The factors above did not receive any negative score. However, with reference to the environmental policies, it can be noticed that only four respondents were willing to provide an answer, which is a far smaller number that the consensus expressed in identifying the other clear factors of main advantage. This reflects what was found in the theory about environmental management, i.e. that the port users are not always fully aware of the environmental consequences of their business activities. The sample is too small to draw a generalised conclusion, and this statement is just based on the results of this analysis.
Of the eight factors listed above, three belong to the elements for which Valencia excelled in cluster performance, i.e. the "Marca of Guarantia", the quality of logistics services, and the information platform. The first two are strongly interrelated, and reflect the effort of Valencia of achieving excellence in the service provided and customer orientation, whereas the third one reflects its willingness to promote integrative and collaborative practices among all the port stakeholder. The fact that these factors are perceived as clear advantages by port users mirrors the success of Valencia in promoting such a culture. Of the three remaining factors, three relate to the potential of Valencia to be the access gateway of Spain, with respect to its geographical position, foreland connectivity and accessibility, whereas the ranges of services offered relates again to the quality of the services that this port is able to provide.

Another six factors can be considered as determinants of port competitiveness, since they only scored once as disadvantages (by a ship agent – Q4;Q5;Q9;Q11 and freight forwarders – Q7;Q24); these are storage capacity, warehousing, quality of services offered, hinterland connections, road connectivity and the regional government intervention.
As for the first two, the fourth and the fifth, these results confirm what had already been hinted at in the benchmarking analysis, i.e. that Valencia possesses indeed a superior infrastructure and a good connectivity. In particular, road connectivity is considered to be a competitive determinant by ten of the eleven respondents.
The decision of Valencia to make infrastructure one of the three competitive keys in its strategic plan seems to be a reasonable one. The quality of the services offered mirrors once more the customer orientation which is part of the strategic plan, whereas the effect of the regional government intervention is a result of the philosophy of cooperation between social and economic stakeholders promoted by the Port Authority.

More divergence of opinion is found for customs procedures and the port-city relationship (Q8;Q22). For both, two respondents indicated that they are disadvantages, whereas seven and six classified them as advantages, respectively. The two negative scores come from a freight forwarder and from the port authority itself. Notwithstanding, on the basis of the analysis these two are still classified as sources of competitive advantage. In particular the port-city relationship is one aspect of cluster performance that is jointly promoted by the port authority and by the local and regional government in line with the philosophy of integration among various stakeholders.
Five factors are distinguished as disadvantages on the basis of the analysis, all of which were mostly scored with the neutral "no opinion" in the survey (Q 12;Q15;Q19;Q21;Q25). These are delays in cargo inspections, the logistics centre

zone (ZAL), the port tariffs, the container terminals prices and the national government intervention. For all of these, more respondents classified them as disadvantages rather than advantages.
In particular, the container terminals prices are considered disadvantages by six out of eleven respondents, both freight forwarders and ship agents.
Delays relate to the quality of service, which seems to be undermined in this respect.
The logistics centre zone is an aspect of cluster performance, as well as serving the purpose of Valencia to be the main distribution centre in the Iberian Peninsula, which is undermined by this disadvantage. It would be interesting to probe this answer by asking respondents the reason for this negative score, which could be done in further research.
Port tariffs and container terminal prices relate to the cost element, and obviously Valencia needs to improve this aspect in order to stay competitive.
The intervention of the national government was not perceived as an advantage by any of the respondents, and only four indicated it as a source of competitive disadvantage. This result clashes with the culture of integration and collaboration that is promoted by the Port, and therefore further probation and investigation would be needed to discover the reasons behind this judgement.

Finally, there are four factors for which is not possible to determine a clear, valid answer (Q10;Q18;Q20;Q23), i.e. rail connectivity, port prices, basic services prices, and the local government intervention.
As for the rail connectivity, three respondents consider it as a disadvantage, whereas five as an advantage. Among the negative scores, one is given by the port authority, which demonstrates that it can recognise its weaknesses. Rail connectivity is a very important aspect of competitiveness, as well as of connectivity and an element of the potential to become the main distribution and logistics hub of the West Mediterranean.
For port prices and basic service prices, the numbers of respondents that qualify them as disadvantages or advantages are equal and just slightly different, respectively. It is not possible therefore to conclude anything on these factors, however, as already mention the port of Valencia is perceived as “expensive” and should take initiatives in this area to promote its competitiveness. Last, the local government intervention is scored as a disadvantage by 2 and a disadvantage by 4. Although it appears as an advantage the diversion of opinion is too small to state something meaningful.
Despite the small sample of respondents, the port authority should consider initiatives to improve its competitive standing with respect to all of the factors stated above.

The above results can be summarised as in table 10.

Table 10: Summary of Determinants

	Significant Determinants	Determinants	Determinats (Stronger disagreement with respect to previous two)	Negative Competitive Factors	Not clear
Number (Determinants)	**8** (Q1;Q2;Q3;Q6;Q13;Q14;Q16;Q17)	**6** (Q4;Q5;Q7;Q9;Q11;Q24)	**2** (Q8;Q22)	**5** (Q12;Q15;Q19;Q21;Q25;)	**4** (Q10;Q18;20;23)

Source: elaboration of the author

5.4.3 Part Three: Open Ended Question

Of the eleven respondents, only eight provided answers, more or less complete, to the two open ended questioned that concluded the survey, among which the port authority, the four shipping agents and three freight forwarders/logistics companies.

As a response to the first question, seven out of eight respondents state that yes, the port of Valencia can become the main access gateway to the Iberian Peninsula, and some state that it actually already is especially when considering that the Port of Algeciras is a transhipment port and that it has suffered the economic crisis more than Valencia has. This potential is fully can be fully realised thanks to its strategic location and considering its proximity and connections to the capital, Madrid.
Indications in this respect have been given for improvement: for instance, the fact that to realise fully this potential Valencia needs to further develop and improve its landside connections, especially towards the North of the Iberian Peninsula. It has been pointed out that competition is strong, not just from the main competitors (such as Algeciras and Barcelona), but also from small ports such as Castellano and Alicante, which aims to enlarge their market share; for this reasons, Valencia has to be proactive in keeping and improving its competitive position.

Various suggestions to improve the competitiveness of the Port of Valencia have been given in the eight response registered. Common to all of them is a reduction in the prices, be it basic services prices, port prices, port tariffs and container terminals prices. It has even been pointed out that towage is more expensive in Valencia than in Rotterdam, which in the eyes of the respondent looked incredible especially since Rotterdam carries out many more of these operations than Valencia.
Another suggestion has been an improvement in the efficiency of the stevedore companies, but no rationale for this comment was provided.
Finally, it has been suggested that an essential point to improve the competitiveness of the port is to improve the quality of the hinterland connections, by better serving the Northern part of Spain, and especially in relation to the rail connectivity. The respondents seem fairly satisfied, instead with the quality of the road connections, a statement that is based on the answers provided.

5.4.4. Partial Conclusions

At the end of the analysis of the survey, it has been possible to identify the determinants of port competitiveness in the case of Valencia.

16 of the 25 factors analysed are deemed to provide Valenciaport with a competitive advantage, eight of which more clearly than the others.
Five factors represent, on the other hand, factors that may undermine the competitive positioning of Valenciaport, and are those that should be taken care of in order not to lose the competitive edge Valencia retains at present.
On four factors, it was not possible to produce a clear statement, and these four could be the focus for further research in this area.

Of the 16 factors that determine a competitive advantage, 3 relates to the port's potential to become the access gateway to the Iberian Peninsula. These, combined with the responses obtained in the third part of the survey, allow asserting that Valencia does have this potential and apparently is making good use of it. Moreover, all of these relate to the port infrastructure, showing that Valencia rightly identify this element as one of its three main keys to competitiveness.
Another four determinants are related to the quality of services offered, which mirrors the willingness of the port to be customer oriented, as illustrated in the strategic plan; it also mirrors the fact that another of the three key competitive factors in the strategic plan is the quality of the port logistics services.
Hinterland connectivity, important for converting Valencia in the main distribution and logistics platform of the peninsula is of essential importance, and it is deemed to be determining competitiveness, although the rail infrastructure needs to be improved.
Six of the total eight factors for cluster performances are also determinants of port competitiveness, reflecting the award for best practices awarded by the GIL. This means that Valenciaport is indeed not just promoting initiatives in this respect, but also putting them into place.
Last, regional government intervention is perceived to be a source of competitive advantage.

On the down side, five factors undermine the competitive position of Valenciaport, two of which relate to prices. This is also stressed in the open ended questions.
Others related to the logistics centre zone (ZAL) which is of relevance because important for the realisation of the potential to become a main distribution hub. Delays in cargo inspections and national government intervention are also perceived to be sources of disadvantage, although the reasons for this could not be probed.

The four factors for which it is not possible to make a statement constitute an interesting area for further research.

5.5 Chapter Conclusion

This chapter has presented and analysed the results of the study conducted.
At first, a positioning analysis was carried out to indentify the competitive position of the port of Valencia with respects to its six competitors. It has been concluded that Valencia is indeed positioned as a "Star Performer" in the category of containerised traffic, having higher than averages market share and average growth.
In order to investigate on the kind of variables that determine this competitive standing, a benchmarking analysis was carried out. It was possible to identify Valencia as the leader port of the Mediterranean in terms of containerised traffic, performing better than the average in all of the variables analysed.

Finally, the results of the survey are analysed, with the aim of gauging and detecting the actual determinants of competitiveness in the eyes of port stakeholders.
Sixteen of the 25 factors analysed are indeed determinants of competitiveness, with eight prominent ones which relates to infrastructure, quality of service and cluster aspects. This mirrors that the strategic competitive aims of the strategic plan are well achieved. Four factors undermine the competitiveness of the port, and those are the areas that constitute possibility of improvement for the competitive standing of Valenciaport.

It is through the analysis conducted in this study, which is presented and discussed in this chapter, that the research questions can be answered.
This will be done in the following chapter, which will conclude this thesis.

6. Conclusions

This chapter constitutes the final part of the study.
In the first chapter, an introduction was given about the topic of research: the impetus for research, framed in the broader shipping and port context has been explained, followed by a presentation of the characteristics and strategic plan of the port of Valencia. The aim of the study and the research questions were also presented in this chapter, together with limitations of the research. The chapter was concluded with the illustration of the structure of the thesis.

In the second chapter, the forces and trends that have been shaping the port and shipping industries in the last 40 years or so have been presented and analysed, especially with relation to the impact that these had on port competition. The importance of this chapter lies in the fact that in order to formulate strategies to improve competitiveness, it is important to understand the surrounding environment, shaped indeed by the forces analysed. Environmental scanning is a common first step in the formulation of any strategy, and the port of Valencia has applied this concept for example by conducting a SWOT analysis prior to formulating its Strategic Plan 2015.

Once the forces shaping the business operation environment are clear, it is essential to understand competition in itself. On this basis, chapter three provided definitions of port competition, and it emerged that the issue is a complex one, so much so that no wide consensus exists on a single definition of port competition. This complexity stems from the variety of port stakeholders, as well as of the different levels on which competition takes place. This chapter also illustrated the rationale behind studying port competition, and presented a list of methods used in the past 20 years or so. A review of the determinants of port competitiveness found in the literature concluded the chapter.

Chapter four was dedicated to describe in details the methodology applied for the study. Two quantitative methods were used, PPA and Benchmarking analysis, whereas on the qualitative side a survey was constructed and administered to some 75 port stakeholders, among which liner shipping agents, container terminal operators, freight forwarders and logistics company, the port authority etc. Through PPA, ports were positioned in the competitive arena. Benchmarking followed, which allowed for a preliminary investigation of factors that determine the competitive standing of Valenciaport on the basis of pre-established criteria. Finally, the survey was explained and used to find out the determinants of port competitiveness according to the perceptions of port stakeholders.

On the basis of the methodology discussed in Chapter Four results were produced and analysed in chapter five. Bearing the aim of this study in mind, the PPA has allowed the positioning of the port of Valencia with respect to its main competitors in the West Mediterranean in the past seven years. Valenciaport has turned out to be a Star Performer in the containerised traffic. In order to further investigate on the variables that determine this competitive standing, the Benchmarking analysis was been used, which allowed to identify, on the basis on pre-determined criteria, the variables that determine the competitiveness of a port compared to the average Mediterranean port and to its competitors. The leader port in the market was identified and a competitiveness degree index was built. Finally, in order to establish

the determinants of competitiveness in the case of Valenciaport, the survey was administered on line, on the basis of 25 determinants chosen after a review of the literature and adapted to this specific case. In the end, some 16 determinants of competitiveness were identified, of which eight are deemed to be most significant; on the other hand, five factors that undermines the competitive position of Valenciaport were also identified, as well as four factors for which it is not possible to make a valid or reliable statement.

At the end of the study, the aim of the concluding chapter is to answer the research questions and to summarise the main findings of this study; limitations of the research are also to be reminded here, for some may constitute opportunities and suggestions for further research.

6.1 Answering the Research Questions

In this section, the research questions are reported for ease of reference, and answered. It is important to remind here that the focus of this study has been on containerised traffic only.

1) Is Valencia really the leader port of West Mediterranean?

This first question is answered through the results of the PPA, and it is complemented by secondary source data and the results of the benchmarking analysis.
Valencia really is the leader port of the West Mediterranean in terms of containerised traffic. According to the results of the PPA, containerised traffic is the dominant traffic category in Valenciaport. Here we find the confirmation of the statement of the Port Authority that containers are the main strength of the port.
Moreover, Valenciaport is positioned as a "Star Performer" in containerised traffic with regards to its west Mediterranean competitors: it has a market share and an average annual growth that are well above the average registered for the market analysed, and because of these two elements it is the only port that has this competitive positioning.
The leadership of Valencia is also found in the press, although only on the basis of the container volumes realised: Valencia is the only port in the market considered that has seen a significant growth of volumes in the year 2008-2009, i.e. 9.78% growth, totalling almost 4 million TEUs. This level of traffic established its leadership in terms of nominal tons not only in Spain (taking the place of Algeciras) but also in the West Mediterranean (only the ports of the analysis are considered). The average annual growth rate that had been established as an aim in the Strategic Plan 2015, of around 7%, has been achieved and exceeded.
Finally, the conclusion that Valencia is indeed the leader port of the West Mediterranean for container cargo is further substantiated by the benchmarking analysis, from which Valenciaport emerged as the absolute leader.

2) Is Valencia really the most competitive port is the Mediterranean?

Benchmarking analysis was the tool used to answer this question. Through the creation of the port competitiveness degree index, it has been possible to establish that Valenciaport is indeed the most competitive of the ports analysed in the Mediterranean. This index was built on the basis of variables related to supply,

demand, labour, application to cargo and ship, miscellaneous and others. Valencia demonstrated to excel in all the categories, including infrastructure, which is one of the three keys to competitiveness identified in the strategic plan. In the literature it was found that although infrastructure is important in terms of competitiveness, the focus is more and more shifted through the quality of services, or the "software" components. Nonetheless, also in this respect Valencia has demonstrated high levels of competitiveness, outperforming the rest of the Mediterranean ports.
However, it must be reminded that benchmarking analysis has a relatively limited value of application because the variables used for the study are predetermined, and especially in relation to the services offered, or qualitative criteria, a higher score is obtained simply by assigning a standard number. The quality, efficiency and productivity of the services are not considered. Nonetheless, this analysis provides a first insight on the determinants of port competitiveness.

3) In this respect, is Valencia right in identifying the key competitive strengths in infrastructure, cargo concentration and port logistics services?

Benchmarking once again served as the tool used to answer this question, coupled with the results obtained through the survey.
It has emerged from the analysis that Valenciaport benefits from a superior infrastructure when compared to the other ports in the Mediterranean, with particular reference to elements such as length of berths, number of reefer points, storage capacity, and surface of container terminals. Moreover, from the results of the survey it is possible to infer that its accessibility, storage capacity and warehousing, as well as the physical infrastructure in general, are significant determinants of competitiveness. Therefore, the conclusion is that yes, it is correct to identify a key competitiveness strength in infrastructure.

As for cargo concentration, Valenciaport is the port in the Mediterranean with the highest volumes of container traffic registered for the year 2009, amounting to almost 4 million TEU. This has assigned Valenciaport the leadership in containerised traffic not only in the Iberian peninsula, taking over Algeciras, but also in the Mediterranean ports analysed. This growth is the result of the long term strategy that is being implemented in the port, which means indeed as promoting Valenciaport as the main access and exit gateway to the Iberian Peninsula, as well the main intermodal logistics platform and hub in the West Mediterranean. Moreover, from secondary sources, it has been possible to notice that the cargo concentration in Valencia is continuing in the beginning of 2010 (Reyes, 2010).
Therefore the conclusion is that yes, it is correct to indentify this aspect, too, as a key to competitiveness.

Finally, in relation to the port logistics services, certainly Valencia has achieved a strong competitive position because of these services.
For instance, through benchmarking it was possible to preliminary assess that it offers all of the services that corresponded to the qualitative variables.
However, as mentioned before, benchmarking analysis does not consider the quality and efficiency of those services. Therefore, the answer to this research question is complemented by the results of the survey.
Generally speaking, it has emerged that the ranges of logistics services, and their quality, are considered as determinants of port competitiveness. An important element in this respect is the "Marca de Guarantia", which is a sort of certificate of

quality aimed at ensuring that the port users are satisfied with the quality of the logistics services provided, and of the services in general. The "Marca de Guarantia" is also an important element of the culture of cooperation and integration among different port stakeholders and users, and witnesses the commitment to a customer-oriented service.
On the other hand, port logistics services are essential for a port that declares the desire to become the main distribution platform of the Iberian peninsula; in this respect, hinterland connectivity and the presence of Centres for Logistics Activities are essential, as discovered in the literature. Unfortunately, the ZAL (centre for logistics activity) of Valencia has been rated as an element undermining the competitiveness of Valencia. It has not been possible to determine the reasons for this, but it would indeed be interesting to explore this issue and take it into account for the development of strategies to improve the competitiveness of Valenciaport.
Moreover, with regard to the rail connectivity, the need to improve it has been voiced, which constitutes another aspect to take consider when redefining competitive strategies.
Therefore, it is possible to conclude that whereas infrastructure and cargo concentration are definitely keys to competitiveness, some room for improvement exists for the port logistics services.

4) What are the determinants of competitiveness, based on the perceptions of port stakeholders'?

According to the results of the survey, there are 16 determinants of competitiveness, of which eight seem to be more prominent that the others. These are the geographical, strategic position of Valenciaport, the foreland connections offered, its physical infrastructure (accessibility, warehousing, storage capacity), the ranges and quality of the services offered, hinterland connections, in particular for road, the "Marca de Guarantia", the quality of logistics services, the modern integrated information platform, the city port relationship and the regional government intervention.
On the dark side, there are also four elements that have been recognised to threaten the competitive position of the port, such as the delays in cargo inspection, the logistics centre zone, port tariffs, the prices at the container terminals, and the national government intervention.
Delays in cargo inspection are something that reduces the efficiency and quality of the service offered, and the port should really consider improving this aspect, especially since it promotes its customer orientation. The cost element, although not being the main criteria for the selection of a certain port, certainly has an impact on the preferences of the port users. Although it is true that quality comes at a price, it is important to remain competitive in terms of prices, especially since one of the respondents pointed out that towage services are more expensive in Valencia than they are in Rotterdam. Although these two ports are placed in totally different contexts and port ranges, this still looks odd, and represents an area of intervention for improvements.
Finally the fact that the intervention of the National government undermines the competitive standing of Valencia clashes with the culture of integration of economic and social stakeholder that is promoted in the strategic plan and y the community of Valencia in general. Once again, it has not been possible to gauge the reasons for this aspect, which can constitute a chance for further research.

5) Is Valencia really the main access gateway of the Iberian Peninsula?

Based on the few responses to the survey, Valencia does have this potential, and for some it already is the main access gateway.
Areas for improvements, in this respect, lay in the enhancement of the connection with the Northern part of the peninsula, as well as the upgrading and development of the rail infrastructure.
Valenciaport is considered as the natural port of the capital, Madrid, and it is in its hinterland that 55% of the Spanish GDP is produced; therefore, the above enhancements need to be in place for Valenciaport to realise fully its potential.

5a) What is the quality of the rail/road connectivity?

Respondents demonstrate to be satisfied with the hinterland connectivity of the port, and even deem this to be a determinant of competitiveness. The road connectivity in particular is recognised to be very efficient. As for the rail connectivity, the need to upgrade it and improve it has been voiced. It has to be noticed that this element is common in most of the Western Mediterranean, where the rail cargo transport is neither so advanced nor so developed and used as it is, for instance, in the ports of the Northern Range.

5b) What is the role of the logistics services offered in this respect?

The logistics services offered, in this respect, seem to aid the potential of Valenciaport to be the main access gateway to the Iberian peninsula. However, the element of the ZAL (centre for logistics activities) needs to be explored further, as it has been recognised as an element undermining competitiveness, and therefore it is potentially something with which port users are not entirely satisfied.

6.2 Limitations of the Study and Suggestions for Further Research

The limitations of the study are listed as follows:

- The unavailability of data: for some ports in the PPA it was not possible to find nominal traffic data for some ports, because unless they are published on ports' websites or provided by databases such as ESPO or Containerisation International, port authorities will not provide them, at least by email.
- The use of nominal tons in the PPA: the author recognises that a more meaningful positioning analysis would have resulted by the use of "value tons"; however, information to create a weighting rule would have required face-to-face interviews with important stakeholders in the port, and this was not possible on one hand for time constraints, and on the other hand for the geographical location of the potential interviewees.
- The inherent limitations of the Benchmarking analysis, which is based on pre-determined criteria and does not detect quality, efficiency and productivity of the services offered. Efforts have been made by the author to update the framework of analysis in this respect. Nonetheless, this technique is useful because it allows a preliminary investigation of the factors that determine the competitive position of Valenciaport, as established through the use of PPA.

- The low response rate of the survey, i.e. 14.7%: this is due to a certain extent to the fact that the survey was administered through emails and was conducted online. In addition, it is the time of the year that influenced this, because most of the potential respondents were already out of office on holidays. Furthermore, only the main stakeholders have been selected for response.
- The impossibility to probe answers given in the survey and the impossibility to apply more advanced analysis techniques, due to the low response rate.

Notwithstanding these limitations, a great effort has been put by the author in producing a reliable and valid result. The limitations of the research and the final result obtained open opportunities for further research, which are:

- Expand the time horizon of the PPA to a significant 10 or 20 years span.
- Develop a weighting rule for the Port of Valencia in order to perform the PPA with value tons, instead of nominal tons.
- Include more ports in the analysis, such as Gioia Tauro, and Marsaxlokk, as well as other smaller but relevant port in the Iberian Peninsula.
- Administer the survey to more stakeholders, and interview them in person to probe their answers and produce a more comprehensive result.
- The same analysis could be carried out focusing deeply on some port stakeholders, such as liner agents, shippers, combining and comparing the results and discover what are their priorities for the competitiveness of Valenciaport.
- A comparative analysis of port prices for West Mediterranean competitors could be conducted to discover the reasons why Valencia seems to be more expensive than others.

6.3 Final Conclusion

This thesis has positioned the Port of Valencia in its competitive setting over the period 2003-2009 in relation to its main West Mediterranean competitors. Valenciaport has emerged as a "Star Performer" in containerised traffic, demonstrating a very good growth rate despite the current economic crisis. This is the result of the long term strategic planning of Valenciaport, which is continuously seeking to improve performance and competitiveness through innovation, customer orientation and a culture of cooperation and integration among economic, social and port stakeholders.
The determinants of its competitive position have been investigated and analysed. Valenciaport is indeed the leader port of the West Mediterranean for containerised traffic thanks to a mixture of "hardware" and "software" components. Not only it excels for the quality of its infrastructure, but also it excels for the majority of the services offered; elements that represent a strong cooperation and integration among port stakeholders have been recognised as significant elements of competitiveness.
Nonetheless, there are still areas that need to be looked at carefully in order to further enhance competitiveness, especially with respect to the cost element: although price is no longer considered as a main selection criteria, in actual facts it may influence the users' choice.

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Appendices

Appendix 1

Port Portfolio Analysis: tables of data

1. Average Growth Rates and Market Shares of Seaports (Marseille, Algeciras, Barcelona, Valencia, Genoa and La Spezia), years 2003-2009

Port of Marseille					
Traffic Categories (in 1000 tons)					
	LB	DB	GC	CONT	TOT
Average Traffic	64997	13857	6758	8903	94516
% Share Traffic Category	68.77	14.66	7.15	9.42	100.00
Average Annual Growth	**-1.18%**	**-5.21%**	**-1.92%**	**1.10%**	**-1.75%**
Growth 2003-2004	-3.9%	1.1%	1.0%	11.3%	-1.5%
Growth 2004-2005	3.9%	2.7%	-3.2%	-1.8%	2.6%
Growth 2005-2006	2.7%	5.3%	6.1%	5.5%	3.6%
Growth 2006-2007	-2.3%	-18.9%	2.3%	8.1%	-3.7%
Growth 2007-2008	1.2%	7.7%	-7.0%	-16.5%	-0.4%
Growth 2008-2009	-9.7%	-40.0%	-4.0%	3.2%	-13.3%
Av. Market Share '03-'09	**52.07**	**40.16**	**18.68**	**7.13**	**29.43**
Market Share '03	52.92	39.31	21.47	7.94	32.33
Market Share '04	51.90	39.23	20.25	8.00	30.70
Market Share '05	53.13	40.26	19.01	7.49	30.64
Market Share '06	52.48	41.93	18.07	7.26	29.91
Market Share '07	52.07	37.91	17.34	7.06	27.87
Market Share '08	51.80	44.78	17.11	5.65	27.56
Market Share '09	50.21	37.72	17.51	6.54	26.97

Port of Algeciras					
Traffic Categories (in 1000 tons)					
	LB	DB	GC	CONT	TOT
Average Traffic	20492	2425	4209	9042	64145
% Share Traffic Category	31.95	3.78	6.56	14.10	100.00
Average Annual Growth	**-0.94%**	**-4.70%**	**4.25%**	**3.86%**	**1.77%**
Growth 2003-2004	1.7%	-1.8%	17.4%	12.5%	8.0%
Growth 2004-2005	-11.2%	-4.3%	4.3%	8.2%	0.4%
Growth 2005-2006	4.7%	2.1%	3.5%	10.6%	7.9%
Growth 2006-2007	-4.5%	-1.0%	11.3%	8.4%	4.3%
Growth 2007-2008	4.9%	-40.5%	0.1%	0.8%	0.3%
Growth 2008-2009	-1.7%	9.7%	-5.2%	-11.5%	-7.7%
Av. Market Share '03-'09	**16.43**	**7.05**	**11.58**	**29.31**	**19.92**
Market Share '03	17.33	7.49	10.49	28.55	19.21
Market Share '04	18.00	7.27	11.51	29.07	20.00
Market Share '05	15.76	6.95	11.65	29.99	19.54
Market Share '06	15.88	7.02	10.80	30.51	19.87
Market Share '07	15.41	7.75	11.28	29.73	20.05
Market Share '08	15.89	5.06	11.98	28.76	19.96
Market Share '09	16.77	7.79	13.36	28.56	20.80

Port of Barcelona					
Traffic Categories (in 1000 tons)					
	LB	DB	GC	CONT	TOT
Average Traffic	11286	3804	8080	20615	43811
% Share Traffic Category	25.76	8.68	18.44	47.05	100.00
Average Annual Growth	**1.88%**	**0.85%**	**6.20%**	**2.00%**	**2.66%**
Growth 2003-2004	9.0%	-6.2%	15.5%	19.6%	13.1%
Growth 2004-2005	13.4%	16.9%	13.8%	8.2%	11.4%
Growth 2005-2006	-16.1%	1.3%	25.5%	13.7%	6.0%
Growth 2006-2007	4.3%	-5.8%	6.3%	12.6%	7.8%
Growth 2007-2008	10.1%	-9.4%	0.1%	-1.0%	1.0%
Growth 2008-2009	-2.9%	11.9%	-13.2%	-29.9%	-17.3%
Av. Market Share '03-'09	**9.05**	**11.42**	**22.06**	**16.27**	**13.56**
Market Share '03	8.17	9.82	17.53	15.09	11.77
Market Share '04	9.08	9.10	18.90	16.33	12.83
Market Share '05	10.16	10.62	20.87	16.84	13.89
Market Share '06	8.20	10.65	23.45	17.62	13.88
Market Share '07	8.69	11.19	23.39	17.82	14.49
Market Share '08	9.40	11.12	24.86	16.92	14.52
Market Share '09	9.66	17.47	25.41	13.30	13.55

Port of Valencia					
Traffic Categories (in 1000 tons)					
	LB	DB	GC	CONT	TOT
Average Traffic	3760	5762	6763	30918	47255
% Share Traffic Category	7.96	12.19	14.31	65.43	100.00
Average Annual Growth	**19.20%**	**-4.35%**	**-0.24%**	**9.78%**	**7.37%**
Growth 2003-2004	3.0%	0.9%	9.6%	8.5%	7.2%
Growth 2004-2005	-17.6%	16.7%	5.1%	10.1%	9.0%
Growth 2005-2006	215.7%	12.4%	13.6%	6.6%	15.7%
Growth 2006-2007	27.2%	2.4%	3.1%	15.5%	12.6%
Growth 2007-2008	7.7%	-29.9%	-8.5%	26.4%	11.6%
Growth 2008-2009	-3.4%	-31.4%	-20.4%	3.3%	-3.2%
Av. Market Share '03-'09	**3.00**	**16.71**	**18.56**	**24.24**	**14.61**
Market Share '03	1.31	14.34	18.33	21.74	11.83
Market Share '04	1.37	14.29	18.76	21.34	12.23
Market Share '05	1.12	16.66	19.13	22.10	12.97
Market Share '06	3.39	18.53	19.46	21.97	14.14
Market Share '07	4.38	21.17	18.82	22.81	15.41
Market Share '08	4.64	16.29	18.29	27.67	17.07
Market Share '09	4.81	15.69	17.15	32.06	18.64

Port of Genoa					
Traffic Categories (in 1000 tons)					
	LB	DB	GC	CONT	TOT
Average Traffic	21054	6904	9638	16483	54072
% Share Traffic Category	38.94	12.77	17.82	30.48	100.00
Average Annual Growth	**-0.11%**	**-6.78%**	**-1.53%**	**0.10%**	**-1.85%**
Growth 2003-2004	2.8%	5.5%	2.5%	5.6%	4.0%
Growth 2004-2005	2.1%	-12.0%	-1.4%	1.0%	-1.2%
Growth 2005-2006	0.8	-17.1%	5.7%	2.9%	-0.4%
Growth 2006-2007	-0.8%	-11.8%	9.7%	13.4%	4.0%
Growth 2007-2008	-2.2%	-8.3%	-9.7%	-5.1%	-5.2%
Growth 2008-2009	-3.3%	-33.0%	-16.0%	-14.8%	-12.4%
Av. Market Share '03-'09	**16.88**	**19.74**	**26.57**	**13.16**	**16.83**
Market Share '03	16.45	23.48	29.40	14.82	18.18
Market Share '04	17.25	24.44	28.01	14.16	18.22
Market Share '05	17.36	21.49	26.92	13.64	17.51
Market Share '06	16.84	17.62	25.48	12.91	16.44
Market Share '07	16.98	17.33	26.21	13.16	16.55
Market Share '08	16.32	17.43	25.14	11.99	15.55
Market Share '09	16.94	16.40	24.84	11.46	15.39

Port of La Spezia					
Traffic Categories (in 1000 tons)					
	LB	DB	GC	CONT	TOT
Average Traffic	3205	1689	933	12323	18142
% Share Traffic Category	17.67	9.31	5.14	67.92	100.00
Average Annual Growth	**-6.90%**	**-5.67%**	**-4.37%**	**-1.51%**	**-4.12%**
Growth 2003-2004	-38.6%	3.5%	-0.9%	3.4%	-6.9%
Growth 2004-2005	4.4%	-29.3%	-3.1%	-5.9%	-6.9%
Growth 2005-2006	35.1	7.3%	25.7%	6.2%	12.4%
Growth 2006-2007	-24.3	-1.9%	15.5%	8.0%	0.6%
Growth 2007-2008	-19.7%	4.2%	-16.5%	-0.3%	-4.1%
Growth 2008-2009	-23.2%	-34.0%	-44.1%	-20.0%	-23.0%
Av. Market Share '03-'09	**2.56**	**4.91**	**2.55**	**9.88**	**5.65**
Market Share '03	3.83	5.56	2.79	11.85	6.68
Market Share '04	2.40	5.68	2.58	11.09	6.02
Market Share '05	2.47	4.01	2.42	9.95	5.45
Market Share '06	3.21	4.25	2.73	9.72	5.77
Market Share '07	2.47	4.65	2.96	9.43	5.62
Market Share '08	1.95	5.32	2.62	9.01	5.35
Market Share '09	1.61	4.93	1.73	8.09	4.64

Appendix 2

Benchmarking Analysis: statistics

1. BSCORE (FE) and BSCORE (QC)

BSCORE(FE)		BSCORE(QC)		BSCORE(FE)+BSCORE(QC)	
Barcelona	2281	Barcelona	0.850	Barcelona	2282
Valencia	9422	Valencia	1.000	Valencia	9423
Genoa	4445	Genoa	0.700	Genoa	4446
La Spezia	2224	La Spezia	0.600	La Spezia	2225
Algeciras	2661	Algeciras	1.000	Algeciras	2662
Marseille	1394	Marseille	0.700	Marseille	1394
Marsaxlokk	1963	Marsaxlokk	0.750	Marsaxlok	1964
Gioia Tauro	7052	Gioia Tauro	0.650	Gioia Taur	7053

2. BENCHp

BENCHp	
Barcelona	1140.926
Valencia	4711.581
Genoa	2223.077
La Spezia	1112.280
Algeciras	1331.094
Marseille	697.134
Marsaxlokk	981.898
Gioia Tauro	3526.416

3. PCD

PCD	
Barcelona	7.256
Valencia	29.963
Genoa	14.138
La Spezia	7.074
Algeciras	8.465
Marseille	4.433
Marsaxlokk	6.244
Gioia Tauro	22.426

Appendix 3

Survey: The Determinants of Port Competitiveness in Valencia

1. General Information

Company:
Email:
Company Activity:
Respondent:
Function:

2. Questions

On a scale from -2 to + 2, please indicate how the factors listed below affect the competitive position of Valencia with respect to its competitors, Barcelona and Algeciras (containerised traffic).

-2 = strong negative effect; -1= negative effect; 0 = no opinion; 1 =positive effect; 2 = strong positive effect

1) How much does the **geographical location** of Valencia affect its competitive position?
2) How much do the **maritime /foreland connections** offered positively affect its competitive position?
3) How much do the **physical infrastructure** positively affect its competitive position?
   - Accessibility
   - Storage capacity
   - Warehousing facility
4) How much does the **range of services offered** in the container terminals positively affect its competitive position?
5) How much the **quality of the service provided** positively affect its competitive position?
6) How much the **customs clearance** procedures positively affect its competitiveness?
7) How much the **hinterland connectivity** positively affect the quality of its competitiveness?
8) How much does the **road transport connectivity** positively affect the quality of its competitiveness
9) How much does the **rail transport connectivity** positively affect the quality of its competitiveness?
10) How much do the **delays in cargo inspections** affect positively affect the quality of its competitiveness?

11) How much the **Marca de Guarantia** positively affect port competitiveness?
12) How much does the **quality of the Logistics Services** positively affect its competitiveness?
13) How much the **presence of a ZAL** positively affect its competitiveness?
14) How much the **environmental management policy** positively affect its competitive position?
15) How much does the **information platform (valenciaportpcs.net)** positively affect its competitiveness?
16) How much:
    - Tasas portuaria
    - Tarifas portuaria
    - Tarifas de servicio básicos
    - Tarifas de terminales

    Positively affect its competitiveness?
17) How much does the **relationship port/city** positively affect its competitive position?
18) How much does the **government intervention** positively affect its competitive position?
    - National
    - Regional
    - Local

3. <u>Open Ended Questions</u>

In this sections, please provide open answers, based on your experience and area of business.

19) Do you think Valencia can become the access gateway to the Iberian Peninsula? Explain
20) Based on your perceptions, what do you think is the most important factor to improve the competitive position of Valencia?