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Load Centres In The Mediterranean Port Range. Ports Hub And Ports Gateway

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LOAD CENTRES IN THE MEDITERRANEAN PORT RANGE. PORTS HUB AND PORTS GATEWAY

40TH CONGRESS OF THE EUROPEAN REGIONAL SCIENCE ASSOCIATION

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ABSTRACT: The growing progression in the use of containers as standardized charge unity in maritim transport and the tecnological revolution associated to this has involved deep changes in the nature of interport competition. At first, the concept of Hinterland is becoming obsolete because the use of containers provide the intermodality and so remove monopolistic position of ports in his next influence area. Adjoint to this, interport competition is not focused, however, exclusively in enlarging the next influence area and more and more it has to do with his function of transshipment, that is, attracting the throughput with origin or destination to another port. Shippers organize container througput by means of Round-The-World services which reasoning lie in using huge ships paying of call in a few strategic ports where transhipments are done from/to ports of origin or destination ports through feeder ships(with a moderate size). The upshot of all that is growing concentration of container througput in a few intermodal launches and the configuration of a very competitive environment in the regional port systems. The purpose of this paper is analysing the impact of tecnological, economic and spatial changes associated to the introduction of containers in maritime transport in the Mediterrean Port Range. In particular, competition among main Mediterranean ports for becoming the dominant port of the system, called Load centers, is analysed. For this, the concept of Load Center is specified distinguishing between the Hub or Gateway strategy, and a concentration and competitive position analysis of main Mediterranean ports in the period 1990-1998 is done. The concentration analysis is undertaken trough the use of Gini and Hirshman-Herfindahl indexs and the Lorenz Curve, whereas the study of competitive position is done from the Shift-Share analysis.

I. FOREWORD

The increasing use of container as standardised cargo unit in maritime transport, which has involved an important technological shift, is the most outstanding phenomenon that has taken place in this sector last thirty years. The world container throughput has changed from thirty seven millions of TEUS¹ in 1980 to one hundred seventy five millions in 1998²(World Bank, 1999), which involves an annual average increase about nine per cent. In 1994, the containerisation average extent of general cargo³ in main European ports was, with regard to weight, about 64 per cent (T.E. Noteboom 1997). We can point out dates as that only one shipping line has a fleet of 360.820 TEUS, which placed in a straight line would cover a distance of 2200 kilometres.

Above all, there is a point to focus on container throughput because of being the kind of cargo that contributes to major extent in generating added value. So this is the conclusion of several empirical studies undertaken in this field⁴. We must not undervalue the provision of raw material to heavy industries that is concerned with dry and liquid bulk throughput but their handling make less economic activities, employment and rents in ports and its cities than most part of general cargo components.

The high growth showed by container world trade is consequence of its advantages. The most important are these:

- Packing and handling savings to the merchandise.
- Container carriers are faster than general cargo conventional carriers and its stay in ports is more reduced(12 per cent of its time compared to 50 per cent of general cargo carrier time).
- The easier surface access encourages just in time practice.
- The high growth of elaborated and half-elaborated merchandise trade which is consequence of the economic globalisation. We have to keep in mind container is the best system in maritime transport at moving this kind of cargo and is almost exclusive in overseas movements.

The increasing weight managed by general cargo (and specially containers) is involving a change in ports secondary function(commercial and industrial function⁵) although the primary function(transport function) remains the same. The Logistic

Activity Areas(LAA) specialised in maritime transport are replacing to the industrial states⁶ whose main demand is raw materials (petrol, ores, and so on). The LAA are shaped as platforms with specialised facilities in storage, handling and freight distribution, where are located services operators and firms related to transport sector. In these platforms there are transport and logistic activities such as the next: maintenance, cargo load an unload, modal interchange, grupage, storage and stock management on behalf of clients, package, labelled, consignment preparing and so on. This process is a specific outcome of the more general trend referred to the increasing weight of services in the world economy.

The broadening of container use has involved deep changes in the maritime transport, especially with regard to port competition.

Firstly, the hinterland concept⁷ is getting obsolete, at least in the sense of influence area where a port has a monopolistic position. Containers as transport cargo unit improves the intermodality(the sea-surface transshipment) so that it becomes common that different ports shares the same hinterland(Hoare 1986), whose borders now will depend on the development of intermodal transport corridors⁸ and not on exclusive market areas of each port. So it takes places a direct competition between ports far away one of each other.

Secondly and associated to that, port competition is now not only referred to widen the neighbouring influence area but as well to its transshipment function, that is, attracting those throughput whose origin or destination is not the own port. Shippers manages container throughput in regular lines, that is, those involves fixed routes and regular calls, with the objective of covering commercial areas⁹ Round-the world-services(RTW)¹⁰ are replacing traditional system routes. The underlying logic to these services is to be using ships of great size to call in quite a few ports strategically placed and since them by means of feeders ships(whose size is medium) undertake transshipments since/to his origin/destination ports. This allows to take advantage of scale economies¹¹ to the maximum extent related with the use of overseas ships(which has a capacity from four thousand to six thousand TEUS) reducing the number of its less productive hours.

Lastly, the throughput concentration around huge intermodal platforms by main shipping lines is taking to a few ports concentrate more and more major share of world maritime trade of containers. So top ten ports in container throughput moved the thirty one per cent of total throughput in 1980 while in 1998 was forty eight per cent.

Moreover, the container maritime transshipment is twenty per cent of total container throughput and goes on increasing (World Bank 1999).

All that shapes a competitive environment and so a very vulnerable position of main ports in front of shipping lines strategies which, in turn, have shown a intense concentration process last years¹²

The goal of this communication is analyse the impact of technological, economical and social transformations associated to the introduction of container in maritime transport in the Mediterranean Port Range. In fact, we analyse competition between main Mediterranean ports for becoming load centres¹³.

This communication is organised in this way. In section II we precise the concept of load centre, posing the differences between the concept of hubs and gateways. In section III, we undertake an analysis of concentration, trough the most common tools in any analysis on concentration, that is, Gini and Hirshman-Herfindahl indexes and the Lorenz curve. Then, we undertake a competitive position analysis of these ports, trough the Boston-Consulting Group Matrix and the Shift-Share Analysis. Finally, in section IV we point out some conclusions derived of our analysis.

II. THE DIFFERENT LOAD CENTRES CONCEPT: GATEWAY AND HUBS.

The transshipment concept has been traditionally referred to cargo movements through a intermediate port in the route from origin port to destination port. Nowadays, the origin-destination route of cargo will optimise, as economically as in time, the total transport cost, which includes the sum of the different used transport modes costs. To be integrated in this route will be the competitive strategy of a port, although it does not belong to origin or destination country. So transshipment function has a new dimension because it is possible to undertake it by maritime and land ways.

In this context, it is necessary to make a distinction between the terms that it could be used to define a dominant port, that is, the called load centres:

- Maritime hubs. Ports where takes place the concentration/distribution of great volumes of cargo. Part of this cargo has its origin and/or destination out of port hinterland. The hub port concentrates its resources basically in transshipments ship to ship, being the relevance of local cargo very small.

- Gateways. Ports with transshipment functions whose hinterland makes high volumes of commercial cargo, are located next to important consumption areas and endowed of good intermodal transport connections, which allow the cargo concentration and distribution by means of all kind of transport modes(land, maritime, river and even air ways).

This distinction allows a better approach to the study of competition between main Mediterranean ports.

The growing presence of “megacarriers”(due to strategic alliances between main container shippers)in the Mediterranean and the fast establishment of container terminals specialised in transshipments through the Suez-Gibraltar corridor has increased almost two times Hub port capacity supply last years.

Nevertheless, the megacarriers are able to take advantage to the Gateway ports located in(or next) the great metropolitan areas. These areas make an important volume of exports and imports with a high added value which requires to shippers a direct call to these ports. If these ports have a container terminal with enough capacity, advanced technology an modern information systems, they will have many opportunities to be used by shippers in order to undertake transshipment load/unload operations, reducing the feeder services dependence.

The throughput points out call ports, that is, maritime hubs and can overestimated the economic significance of these ports that in reality is almost non-existent because of the limited regional impact of operations such as storage. Investments to these ports, whose location is geographic nor economic and so can takes places in developing areas, is not acceptable as development funds. In any case, its status is relatively occasional because it depends on strategies of a reduced number of great shippers whose interests obviously have not to do with the economic regional growth¹⁴

The Gateway strategy not only supposes a greater making of economic added valour but it has strategic valour as well, due to the fact of becoming one of the land and logistic chain nodes, which interlinking the main metropolitan areas of Western Europe. In spite of that, we must not forget Gateway ports have to catch maritime transshipment in order to address the enquiries of biggest shippers and making enough throughput to take advantage to scale economies that allows a port to be competitive.

III. LOAD CENTRES CONCENTRATION AND DEVELOPMENT IN THE MEDITERRANEAN PORT CONTAINER SYSTEM

III.1 LOAD CENTRES IN WEST MEDITERRANEAN SEA

The strategic location of Mediterranean sea in the route between Far East and Europe has not been managed in the past by ports located in this area. This is a consequence of the next two reasons.

Firstly, North Europe ports development (such as Rotterdam, Amberes, Hamburg and so on), which are the extremes of a very heavy transport and communications infrastructure network crossing different regions and countries along the great human and industrial concentration of the European centre, especially the called Ruhr and Rhin axis.

And secondly, labour conflicts, low productivity, bad working of railways and custom and control services in the Mediterranean ports, and consequently its high costs and lack of reliability, in addition to the excessive state dependence that limits its commercial and management ability.

In this context, it was a logical behaviour by shipping lines not operate in Mediterranean ports, provided that they were not able to take advantage to the less sailing days in the origin/destination route of the cargo compared to North Europe ports¹⁵

During this decade, the panorama has changed notably; Mediterranean ports have reached a major independence from state organisations, which has allowed a more efficient management and a more aggressive commercial policy¹⁶

The ports, which are study object, are top container throughput ports in the interval 1990-1998¹⁷ and so those that can become load centres. In particular, we consider the Spanish ports Algeciras, Valencia and Barcelona, the Italian ports of Genova, La Spezia, Livorno, Trieste, Venezia and Gioia Tauro and Marsella (France), El Piero (Greece) and Marsaxlokk (Malta).

III.2 CONCENTRATION ANALYSIS

In this section, we assess the hypothesis that new conditions required by the containerisation will have as a result the throughput concentration in some few load

centres from every regional port system, either as a maritime hub or as an intermodal gateway. For that, we undertake a revision of theoretical literature that enters in this question and after that we realize an empirical study through the use of Hirshman and Gini Indexes and the Lorenz curve, the three tools most used in concentration analysis (Noteboom 1997).

In specialised literature, we only can find a limited number of models referred to the concentration and deconcentration process in port systems. The most used is the Taafe et al. model (1963), in which there is a first stage with ports weakly connected along the maritime coast and a last stage in which is established a main network composed of corridors between gateway ports and the major urban centres.

Recently, Slack (1990) added a new stage in the Taafe et al model, in which takes place an additional concentration of traffic flows as a result of the new intermodal corridors. In this way, redundant nodes located out of the main routes will get declining.

The model developed by M. Barke (1986) is quite similar to the model of Taafe et al. Nevertheless, he introduces in the last stage of his model a deconcentration process. This happens when major port areas begin to have congestion problems, encouraging some port activities leave from the urban centre in order to set up in peripheral areas less congested. In a less extreme way, this deconcentration stage points to the port infrastructure widening (for instance, new specialised terminals) far away from its historical centres to port areas less urbanised. In a way more extreme, this tendency to the deconcentration involves an activity change of the major ports to new next ports less congested.

A more radical process of spatial deconcentration can be found in the Hayuth model (1981). Hayuth poses five stages, every one with different features with regard to the concentration models, port-hinterland relationship and technological innovations. In the first stage of containerisation, when its possibilities have not been identified yet as a mean of broadening the port market area, there are few changes in the port-hinterland relationship. But when containerisation becomes a dominant technique in the general cargo trade, it takes place a container throughput concentration in a limited number of major ports. The trend to concentration is a result of forces in three fields of container transport system: scale economies in oceanic trips (decrease in port calls), transshipment through the port and scale economies in the intermodal transport (channeling container throughput through few major corridors).

In last stage, Hayuth introduces a trend to deconcentration in port container system¹⁸ with the aim to model empirical evidence from USA port container system in the interval 1970-1985 since a theoretical perspective. When port system develops, it appears some scale diseconomies in the load centers such as lack of room for enlargement that limits foreland or accessibility to hinterland(port congestion due to infrastructure or superstructure bottle necks). These restrictions to load centres encourages some carriers to prefer to call at smaller ports.

Once we have revised specialised theoretical literature, we undertake an empirical study about concentration evolution of containers cargo between major Mediterranean ports in this field for the 1990-1998 interval.

In this sense, we can apply different methods for assessing (de)concentration in a regional port system. Firstly, Hirschman-Herfindahl index provides a good tool to assess concentration extent in a port regional system. The calculation is realized by next formula:

$$D_j = \sum TEU_{ij}^2 / (\sum TEU_{ij})^2 \text{ y } 1/n < D_j < 1 \quad (i)$$

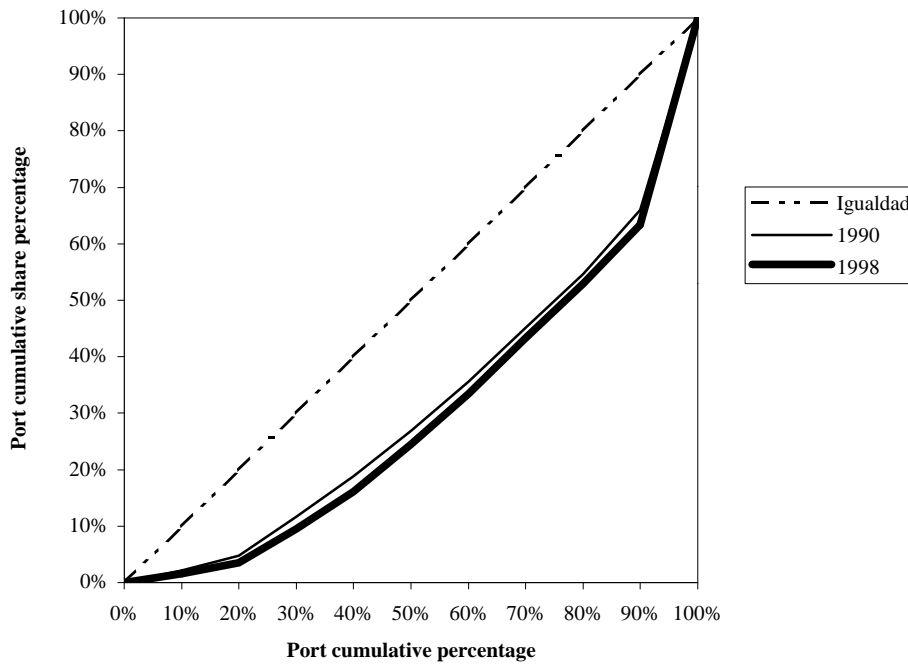
If total throughput structure is completely dominated by a particular port, index reaches valour 1(full concentration). Otherwise, if total throughput structure in the port system is equally shared between all container ports, index reaches its minimum valour 1/n.

Another method for assessing port concentration is a result of applying Gini coefficient(GC) and Lorenz Curve(LC). Gini coefficient is a very commonly used index to measure percentual diversion with regard to a distribution perfectly equal. Gini coefficient is equal to the area ratio between Lorenz curve and diagonal line joins three axis. If all ports in a port system are equals in size, GC will be 0 and LC will be equal to diagonal line. In case only one port accounts total container throughput(full concentration), CG will be 1 and LC equal to area under diagonal line. Calculation formula is next: $G_j = 0.5 \sum / X_i - Y_i / \text{ y } 0 < G_j < 1$ (ii)

Where X_i is cumulative percentage of the port number above port i and Y_i is cumulative percentage of all ports market share above port i .

By contrast to Hirshman index dependence to port number, GC allows to compare concentration extent of a port diversified number on a same base. But GC can produce wrong results when we examines a industry(in this case, port system) with a small

FIGURE 1. LORENZ CURVE



Source: Performed by own from port data supply

number of business(in this case, container ports). For that, it is suitable to use both indexes.

Results confirm Mediterranean port system tends to container throughput concentration in some few dominant centres. This trend meets with fourth stage of Hayuth model(and Barke hypothesis). Deconcentration due to increasing congestion in major ports seems not to affect to Mediterranean load centres.

On the other side, next section analysis displays this concentration is not explained for major intermodal corridors development (as Taafe et al and Slack models suggest) but for scale economies exploitation in sailing (as Hayuth model suggests) due to the use of great container ships by shippers and RTW, provided that ports with the highest throughput growth and biggest market share are maritime hubs while possible gateways performance have been more moderate.

TABLE 1. CONCENTRATION ANALYSIS (1990-1998)

	<u>1990</u>	<u>1998</u>
Hirschman-Herfindahl Index	0.11908	0.1372
Gini Index	0.36045	0.4076

III.3 COMPETITIVE POSITION ANALYSIS

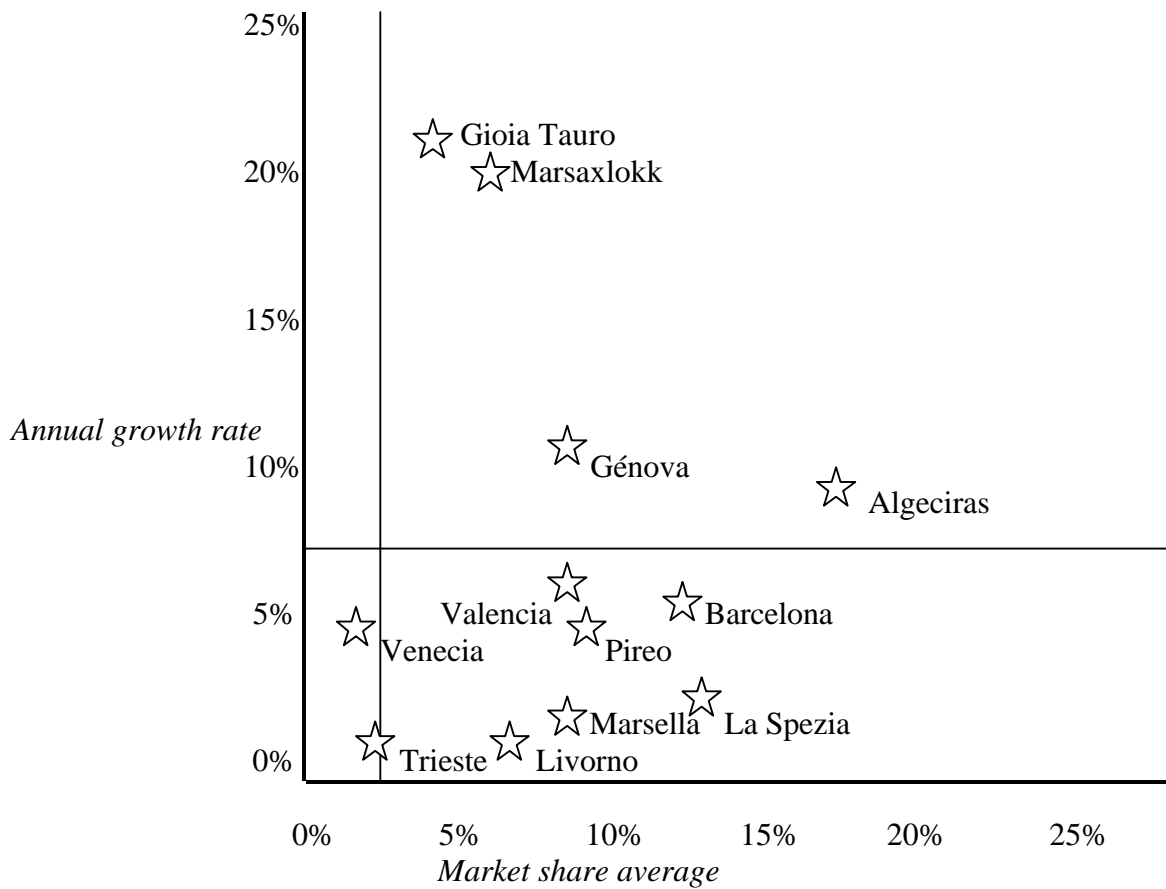
In terms of throughput, most ports consider its rate of growth and market shares increase as main determinants for assessing its competitive position(De Lombaerde, P. & A. Verbeke, 1989). In order to see dynamics has took place in this sense between major Mediterranean ports, we can use the Boston Consulting Group Matrix¹⁹. The B-C matrix mark out four market positions: “Wild cats”(future potential of the port uncertain: High rates of growth but share market no significant),“star”(high future potential; high growth rates and market share), “cash cows”(decline situation; high market share but low increase rates) and “dogs”(little or null development perspective: growth rates and market share reduced).

Different ports are placed in the matrix according to total throughput containers²⁰ in the different periods that are considered. Annual average rate of growth and average market share are showed, horizontal the former and vertically the latter. As a result, a comparable decision matrix is made in which every port position is described in terms of annual average rate and average market share. The outcomes in the period 1990-1998 are showed in figure 2.

Gioia Tauro, Marsaxlokk, Algeciras and Genova are stars. That is, ports with annual rate of growth upper than the average and a significant market share. Most ports are cash cows, that is, ports with a significant market share but with annual rate of growth lower than the average. Two Adriatic ports, Trieste and Venezia displays the worst results and appears as dogs, since its low annual rate of increase and its no significant market share.

In addition to we can examine shifts in total container throughput moved in a port in order to have a more complete understanding of this question,. For that, we use a personalised form of Shift-Share analysis

FIGURE 2. MEDITERRANEAN PORT COMPETITIVE POSITION. 1990-1998



Source: Performed by own from port data supply

At first, Shift-Share analysis was developed in regional economy context but it is easily applicable to throughput port growth (De Lombaerde y Verbeke 1989, B. E Marti, 1988, Noteboom 1997).

Although Shift-Share analysis can not describe changing conditions in the immediate competitive environment, it allows us to share the increase o decrease in one variable in two relevant segments: the share effect and the shift effect.

The share effect shows the expected increase in container throughput in a port when holding its market share and consequently evolves as the port range as a whole (that is, it shows the same growth rate of the range).

The total shift shows the total container number (in this case TEU) each port has lost or won from the intra-range port competition, with expected container throughput (share effect) as point of reference. The shift effect allow to have a better assessment of competitive position of a port when eliminating global container sector growth (in other words, when it is only considered net volume of shifts between ports). The sum of shift

effects in all considered ports is equalled to zero. Mathematically this components can be calculated in this way:

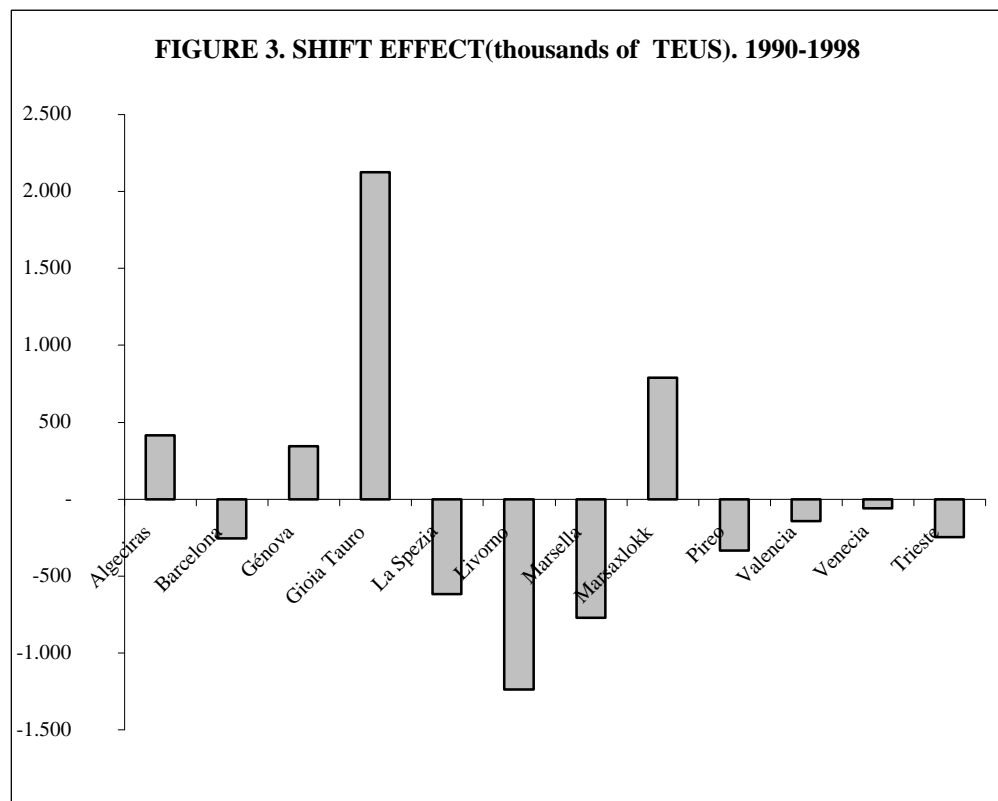
- $ABSGR_i = TEU_{it_1} - TEU_{it_0} = SHARE_i + SHFT_i$ (iii)

- $SHARE = ((\sum TEU_{it_1} / \sum TEU_{it_0}) - 1) \times TEU_{it_0}$ (iv)

- $SHFT_i = TEU_{it_1} - ((\sum TEU_{it_1} / \sum TEU_{it_0}) \times TEU_{it_0})$ (v)

Where $ABSGR_i$ is the absolute growth of container throughput in port i in the period t_0-t_1 put in TEUs. $SHARE$ is the total $SHARE$ effect of port i in the period t_0-t_1 put in TEUs and $SHFT$ is the total shift of port i in the period t_0-t_1 put in TEUs.

The outcomes are showed in graphic 3. We can see from shift effects analysis that Gioia Tauro, Marsaxlokk and Algeciras again are ports with the best results. In table 2 (we exclude Adriatic ports because of data unavailability) we can see these three ports concentrate almost all its container throughput in transshipment functions and so we can deduce easily these excellent results are a consequence of its Mediterranean hub maritime status.



Source: Performed by own from port data supply

The main factors in order to reach hub status in the Mediterranean sea are geographic location, that is, being located in a crossing point of great transoceanic routes between Far East and Europe, and commercial and services demand in the area (origin/destination cargo from own hinterland). Zohil and Prijon(1999) makes a mathematical model about relationship between maritime transshipment volumes and geographical diversion from that route, in terms of additional time of call at each port, and total throughput volumes²¹ This model obtain very reliable predictions about transshipment in container throughput of main Mediterranean ports in years 1994, 1995 and 1996 and so analysed relationship is confirmed.

TABLE 2. TRANSHIPMENT CONTAINER THROUGHPUT OF MEDITERRANEAN PORTS. 1994

<u>Puertos</u>	<u>Desvío en horas</u>	<u>000 TEU</u>	<u>Transbordo</u>	<u>% transbordos</u>
Algeciras	9	1004	901	90
Barcelona	22	605	151	25
Génova	31	512	0	0
Gioia Tauro*	13	575	522	91
La Spezia	30	823	0	0
Livorno	28	371	0	0
Marsella	27	437	34	8
Marsaxlokk	9.5	383	343	90
Pireo	20	517	101	20
Valencia	18	467	44	9

Source: Containerisation international, 1995

* Date have been calculated for 1996 provided that it is first year Gioia Tauro undertake hub functions with a new terminal container start working.

Regarding port competition in order to reach gateway status, port of Genova is so far port with the best results. We can conclude Genova is the winner of the intense competition between ports of Barcelona, Valencia, Marsella and Genova for becoming southern Europe gateway with regard to traffic between Far East and North Europe. One of the possible explanations of this apparent success (based in the new container terminal managed under concession method that is working since 1995 and has allowed to this port double the number of TEUs moved in only three years) comes from concentrating traffics of Liguria and Toscana regions (we can deduce this from bad

results of Livorno and La Spezia ports). Surprisingly, although port of Marsella is the port with the biggest traffic volumes of Mediterranean sea and is the best connected with central Europe areas and instead of its last years ambitious investment plans, it shows a very negative results²² Two spanish ports, Barcelona and Valencia are in a intermediate situation, showing the latter growth rates slightly upper than Barcelona rates. The main handicap of both ports is its peripheral situation with regard to great industrial and consumption areas of North Europe which is stressed with intermodality barriers derived of different railways wide and its lower global infrastructure endowment than its italian and french counterparts²³ Its main advantages are a better geographical location for undertaking transshipment functions and a very important hinterland(Barcelona is the biggest metropolitan area of the Mediterranean sea while Valencia has excellent connections with Madrid). Both urban areas has a very diversified industrial area but specialised in light industry, by contrast to port of Marsella specialisation in heavy industries.

However, competition analysis for becoming southern Europe gateway requires a deeper study of intermodal transport development potential and value added services provision which overflows aims and means of this communication

IV. CONCLUSIONS

The increasing maritime transport containerisation has transformed interport competition nature in two directions. Firstly, encouraging intermodality stress the terms of this competition, provided that allows to be possible between ports far away one of each other. And secondly, great shippers tend to reduce port container calls in long distance trips in order to take advantage to scale economies in sailing from the huge ships. The meeting of both process involves a reshaping of port hierarchy in regional systems. It appears load centres which are specialised in transshipment functions.

We can see in our analysis the consolidation of load centres in the Mediterranean sea, becoming Algeciras and Gioia Tauro as maritime hubs in West Mediterranean and Marsaxlokk in East Mediterranean. Regarding Gateway ports, with intermodal transshipment functions, Genova is the best placed, although we can not make definitive conclusions because there are a lot of factors must keep in mind. In any case, it seems to be obvious all ports with the objective of becoming a load centres will have to face a very competitive environment, with the requirements in terms of strategies, investments, price policies and so on this involves.

V. NOTES

1. Twenty feet equivalent unit.
2. In 2005 it is expected container throughput reaches two hundred seventy million TEUS(with an increase of 55 per cent compared to 1998).
- 3.Cargo moved in cargo unit compared to cargo moved in bulk.
- 4.P. De Lombaerde & A. Verbeke mention this literature. These authors apply shift-share analysis in order to assess competition between Northern European ports and to do it, they use the Bremen rule; the added valour which results of one general cargo tone (being containers the best in this sense within general cargo) is estimated to be from four to twelve times higher compared to added valour of one dry bulk cargo tone and one liquid bulk cargo tone.
- 5.The called social function of ports is getting blurred with technological, economical and organisational changes of maritime transport. So the concept of ports as public services providers is being replaced for the concept of ports as a economic agent, although it is considered strategic yet(Hoyle and Pinder 1992).
- 6.The called MIDA, Maritime Industrial Development Area or in French terminology ZIP, Zone Industrielle Portuaire.
- 7.Origin and destination areas of ports, that is, the inner region provided by a port. Van Klink and Van der Berk(1998) try to find out a more precise definition; those areas that can be provided from a port with the least generalized transport costs(direct monetary costs and costs related to the time and risks).
- 8.For container global lines, services in land is now a critic point in order to keep the market share. Last years, several maritime carriers have set up intermodal firms separated in order to manage transport surface routes(Charlier & Rodolfi 1994). The merger between Sealand and CSX, the main container shipping line with the main railway firm of The United States is an example of this process.
- 9.Nowadays, the three main routes in maritime trade are the Transatlantic, between North of Europe and East coast of U.S.A, the Transpacific and one that joins Far East and Middle East with North of Europe. So container throughput is shared in this way: Far East(45%), Europe(23%), North America(16%), Middle East(6%), Central and South America(4%) and Africa(3%).
- 10.The called Round-The-world services consist in sailing in one direction all over the world instead of undertaken trips from port to port.

11. Cullinane and Khana (1999) models the trade-off between scale economies in the sea (the greater size of the ship the less are ship costs per tone or TEU) and diseconomies in ports.

12. The world container industry has been transformed last years after the making-up of five great alliances that control the main world trade routes by means of providing global services. The biggest of these alliances is formed by Sealand-Maersk, a fleet of 167 ships whose capacity is 418.000 TEUS. Secondly is the Grand Alliance which includes Hapag-lloyd, MISC, NYK and P&O-Nedlloyd, a fleet of 93 ships whose capacity is 325.000 TEUS. Thirdly is the New World Alliance with HMM, APL and MOL, a fleet of 90 ships whose capacity is 325.000 TEUS. The fourth is the Hanjin/Tricon alliance, a fleet with 85 ships whose capacity is 227.000 TEUS. Lastly is the COSCO/Yangmin Alliance, a fleet of 65 ships whose capacity is 212.000 TEUS. Of top ten shippers, only Evergreen and MSC are not in one of these alliances.

13. In specialised literature, we can find several names used to point out the most important ports in port range, such as “centre port”, “megaport”, “pivot port”, “hub port” and “main port”. The load centre concept is the most appropriate regarding container ports.

14. Gioia Tauro port, which latter will be showed is one of Mediterranean maritime hubs, moved 0 TEUs in 1994 while now is the biggest Mediterranean port in container throughput and the fourth of the whole of Europe, with more than two millions of TEUs moved and with a growth in the interval 1995-1998 over 326 per cent. This spectacular increase is consequence of quite a few shipper strategies based on concentrating in this port transshipment cargo whose destination is West Mediterranean. A change in this strategy, likely if we keep in mind dynamic context, it could make Gioia Tauro lose all its throughput almost immediately.

15. In fact, in the throughputs between Far East and Middle East, a line that provides weekly services to these areas and calls at one or some Mediterranean ports would need seven ships instead of nine; it could do the complete trip in forty five days instead of sixty three days, it would save more than sixteen per cent of slot cost (that is, space in ship) and would obtain the financial savings of having two ships less in the circuit. This is a consequence of the fact the lines that calls at Egypt, in the exit of Suez, are able to do a almost direct way to Gibraltar, picking up the cargo in the centre of Mediterranean sea and the area of the Straits.

16. In all Europe is broadening the port management model that it is called “landlord model”, in which the port authority is responsible for the basic infrastructures and co-fund the superstructure with private financial operators that face up to management of these superstructures. However, we can see important differences regarding the port ownership. In the “Latin model” port are more and more autonomous although central government influence is significant yet. In the “Anglo-Saxon model”, ports are more and more similar to private business. And lastly, in the “Hanseatic model” management is undertake directly by the city Council.

17. We use this time interval because 1990 is the first year most major Mediterranean ports have a terminal specialised in container throughput. So, it is not until 1990 that ports such as Barcelona, Valencia, Marsaxlokk o Trieste begin to account significant throughput levels.

18. He call it the peripheral port challenge.

19. The Boston Consulting Group terminology is not referred here to financial situation or profitability in Mediterranean port system. The terminology is used to discriminate between competitive position of each port on the basis of market share and rate of growth in container throughput.

20. We prefer TEUS instead of total container weight because of statistic comparability.

21. It is a econometric model in which dependent variable is the number of TEUs transhipped (TRANSTEU), while independent variables are; diversion in terms of hours (HOURS), port total throughput (TRAFFIC) and the quotient (TRAFFIC/HOURS). The estimated equation is next:

$$\text{TRANSTEU} = \alpha + \beta_1 \times \text{HOURS} + \beta_2 \times \text{TRAFFIC} + \beta_3 \times \text{TRAFFIC/HOURS}.$$

22. In 1990, port of Marsella was the top Mediterranean port in container throughput. In 1998, it was not only overcome by hubs maritime but its gateway competitors as well, such as Barcelona, Valencia, Genova and even La Spezia. Although we have to keep in mind the limits of focusing conclusions exclusively in the number of Teus moved, the results of ambitious policy undertake by port of Marsella last years seem to be unlucky.

23. The report of Dieter Biehl for European Commission entitled **Infrastructure impact on regional development(1986)** makes infrastructures endowment general index on 168 European regions. The results for regions of our interes are next: LIGURIA (Génova);56.09, PROVENCE-COTE D'AZUR(Marsella);48.44, CATALUÑYA (Barcelona);33.87, COM. VALENCIANA (Valencia);22.48.

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