JOURNAL OF MARITIME RESEARCH

Vol XI. No. I (2014) pp 53–59

ISSN: 1697-4040, www.jmr.unican.es

Maritime Clusters Evolution. The (not so) Strange Case of the Portuguese Maritime Cluster

R. Salvador[1]

ARTICLE INFO

Article history:
Received 27 January 2014;
in revised form 04 February 2014;
accepted 05 March 2014.

Keywords:
Maritime Clusters, Cluster Typology, Clusters and Innovation, Maritime Cities.

ABSTRACT

Experience around the world has shown that the concept of clustering suits particularly well to maritime businesses. There are numerous benefits, ranging from increased market awareness to connections with R&D institutes and from strategic co-operations to inter-related maritime activities. Despite the large maritime industry in Europe and worldwide, there is little systematic information concerning the degree of interaction between maritime firms: the European network of maritime clusters is one of the few pioneering initiatives. The concept of maritime cluster has a dynamic connotation. As Porter (1998, p.245) argues the "ultimate test of the health or decline of a cluster is its rate of innovation". There is a clear dependency between the commitment to innovate and profitability in businesses. As such, these clusters evolve over time in terms of the composition of the services provided, reflecting different stages of economic and social development. Maritime clusters evolution can be studied referring to biological science (Zhang and Lam, 2013) allowing for comparative and prospect analysis. A comparison between different European and non-European maritime clusters is presented, in order that a cluster typology can be established. The article finishes with the proposal of a strategy for developing the potential Portuguese maritime cluster.

1. Introduction

Experience around the world has shown that the concept of clustering suits particularly well to maritime businesses. There are numerous benefits, ranging from specialised labor to targeted training, from increased market awareness to connections with R&D institutes and from strategic co-operations to inter-related maritime activities (Wijnolst, 2006).

Benito et al. (2003) shows that the Norwegian maritime cluster is in accordance with Michael Porter's model, presenting the majority of characteristics that one can find in large industrial groups, including strong inter sectorial linkages, economic diversity and competitive rivalry.

The generality of authors agree that a good indicator of a cluster's relevance can be assessed by analysing the strength of the connections between its members, namely by the trade transactions figures that are at stake. In general terms, in a cluster, the sectors have a strong dependence on one another. In Norway these economic linkages assume highly significant figures in shipping and naval construction sectors, in particular.

Wijnolst, Jensen and Sødal (2003) present a maritime sector benchmarking - the "Global Maritime Benchmarking" - and nine indicators (structural indicators; economic indicators; internationalisation; critical mass and leader firms; level playing-field; innovation; institutional framework and business networks; labour market and education; and image and communication) that would allow evaluating a maritime cluster (in particular, those of the Netherlands and Norway) evolution and strength. The same authors also suggest public strategies that would support clusters' development -or "cluster enablers" - that include, among others, the definition of an industrial policy, strengthening of demand pull sectors or the promotion of innovation, R&D and leader firms.

[1]e-Geo - Research Centre for Geography and Regional Planning, School of Social Sciences and Humanities. New University of Lisbon. E-mail address: regina.salvador@fcsh.unl.pt.

2. *Clusters* and Mega-Clusters

The author of the cluster concept, Michael Porter, defined it as a *"geographically proximate group of interconnected companies and associated institutions in a particular field, including product producers, service providers, suppliers, universities, and trade associations, from where linkages or externalities among industries result"* (1998, p.197) .

As such, one is talking of an interactive and synergistic aggregation of interdependent economic actors. Global appreciation and sustainability call for competitiveness and innovation. International organisations (World Bank, OECD), national governments, regional development agencies, etc. have used Porter' cluster model as a tool to foster competitiveness, innovation and growth. This process was stimulated by the association to the "New Knowledge Economy" concepts that argue that economic leadership results from dynamic firms concentrations (Romer, 1992; Norton, 2013).

Even if the designation "cluster" is the most usual in economic literature, one argues that the "mega-cluster" concept (OECD, 1999) is more suitable for the maritime sector. According to the OECD Focus Group on Cluster Mapping and Cluster Policy Report a mega-cluster is *"a group of economic sectors that calls upon a set of complementary capabilities and to network associations"* (1999, p.122).

Similar approach was followed by: (i) the European Integrated Maritime Policy, as it defines itself as eco-systems based, with an inclusive and intersectorial approach; (ii) the SAER report[2] (2009) on the Portuguese maritime "hypercluster". One is talking of a reality that includes many different activities (shipyards, components, insurances, port authorities, etc.), economic sectors (fishing, shipping, tourism, etc.) and that crosses both several countries and subjects (economics, finance, environment, etc.).

Some authors (Lagendijk, 2000) argue that only through cluster development can a maritime nation escape obsolescence.

Once explained the reasons for the strength of the maritime mega-cluster model, let us analyse the present situation of maritime clusters in the European Union.

3. Maritime Clusters in Europe

When, in 2006, the European Commission published the "Green Book on Maritime Europe", a first step was taken towards an EU global maritime strategy. Among this document' proposals, maritime clusters are pointed out as a paramount tool for the development of the EU maritime territories. As such, the Commission corroborated the initiatives already undertook by some member states (Italy, Netherlands) and regions (Basque Country), through the creation of economic, technological, environmental actors networks connected to the sea.

Also in 2006, the *European Network of Maritime Clusters* was launched as well as some major reports on the sea-related activities in the EU member states. Particular reference must be addressed to the one presented, in 2008, to the European Commission by the Policy Research Corporation ("The role of maritime *clusters* to enhance the strength and development of maritime sectors").

The Policy Research Corporation analyses virtually all the EU maritime clusters in three major areas:

1. Traditional maritime sectors (shipping, naval construction, naval equipment, maritime services, maritime ports, recreational sailing, offshore, Navy, inland shipping, naval repair and others);
2. Tourism and maritime and coastal recreational activities (coastal areas tourism and cruises tourism); and
3. Fishing (fishing, fish manufacturing and aquaculture).

Traditional maritime sectors in the EU-27 + Norway employ about 1.92 million people and generate a Gross Value Added (GVA) of 123 billion euros. The member states with larger weight are (see Figure 2.) the United Kingdom, France, Germany and Italy.

Among traditional sectors particular reference should be assigned to shipping and ports. Ships carry the majority of commodities that are traded in international markets. As such, the development of the shipping industry is closely related to the development of the world economy. Economic globalisation has resulted in fierce competition from new entrants, mostly in Asia, to the detriment of the traditional shipbuilding and shipping nations.

European ship-owners control under the European flags and other open registries, some 40% of the world fleet. Given the importance of shipping for seaborne and world trade, and consequently for European exports and imports, these sectors are essential for the future of the European economy.

Coastal and marine tourism generate 47 billion euros of GVA (0.41% of total EU27 +Norway GDP) and employ about 2.42 million people (1.14% of EU+Norway total employment). In this area, the most important countries are Spain (leader both in terms og GVA and employment), Italy, France and the United Kingdom.

Fishing generates 16.2 billion euros of GVA (0.14% of EU27 +Norway GDP) and employs 444 thousand people (0.21% of total employment). In this sector, the Mediterranean countries (Spain, France and Italy) stand out.

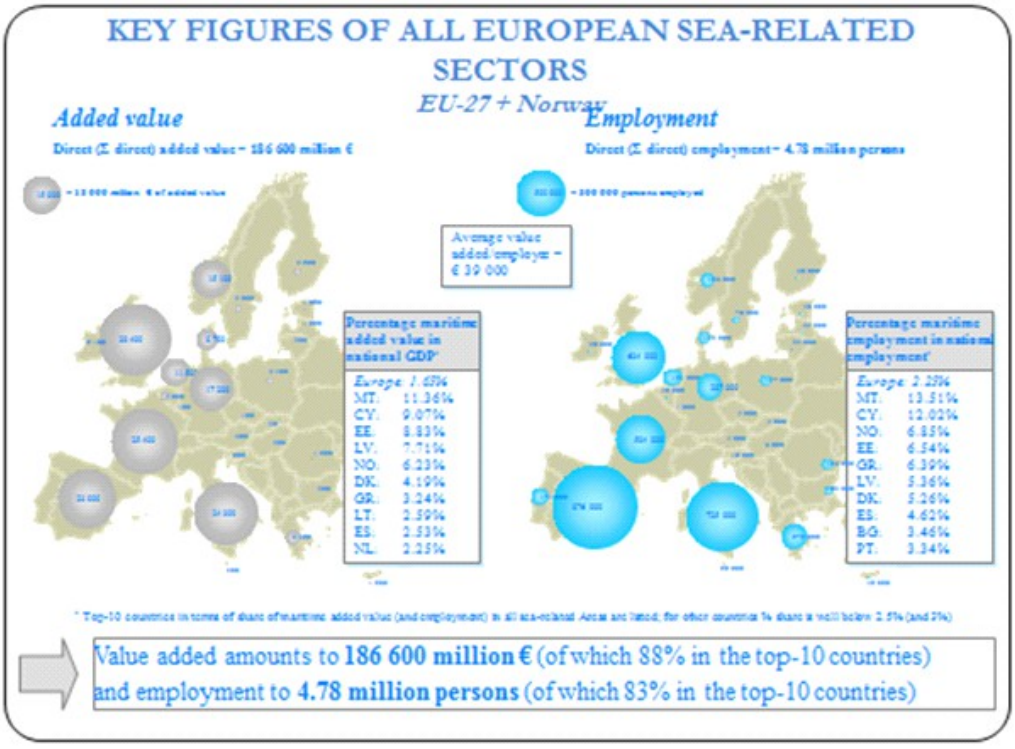
There are some problems, namely those connected with standardising all EU maritime clusters or the creation of a "large continental EU cluster". There are both regional and national clusters, some with a top-down origin (ex., Germany), others bottom-up (Norway) and finally others mixed (Netherlands). Almost all include the more traditional sectors, but activities such as tourism or banking are more controversial.

At national scale, maritime clusters are seen as lobbies and communication development tools, in order to serve the collective momentum and expectations facing government and public policies. It is in this sense that the Dutch, German and British clusters have stand out for their active role in Brussels, near the EU institutions.

At regional scale, main concerns turn around territorial competitiveness and territorial planning. In particular, certain mar-

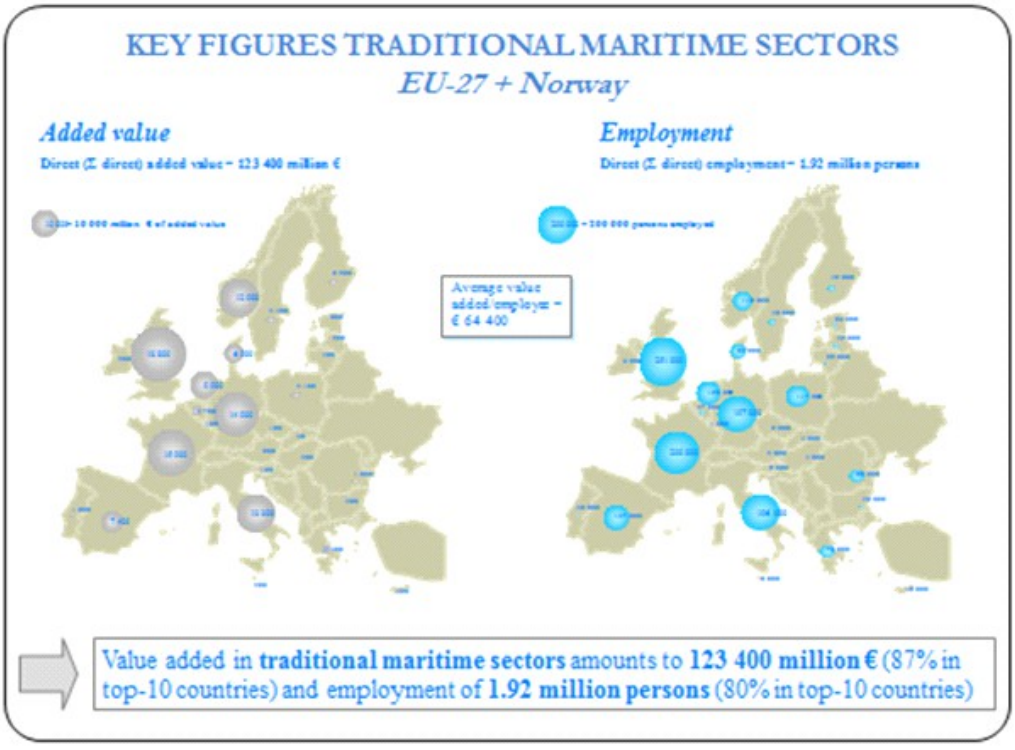
[2]Coordinated by Êrnani Lopes, former Ministry of Finance.

Figure 1: Value Added and employment in all maritime sectors



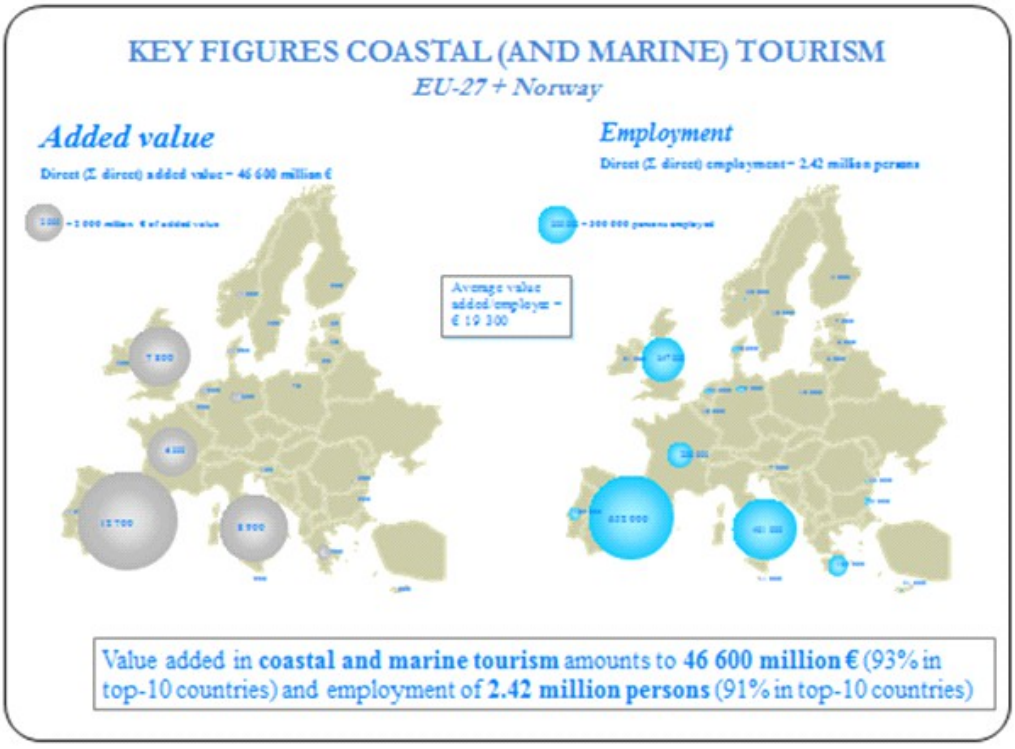
Source: PRC (2008)

Figure 2: Value Added and employment in traditional maritime sectors



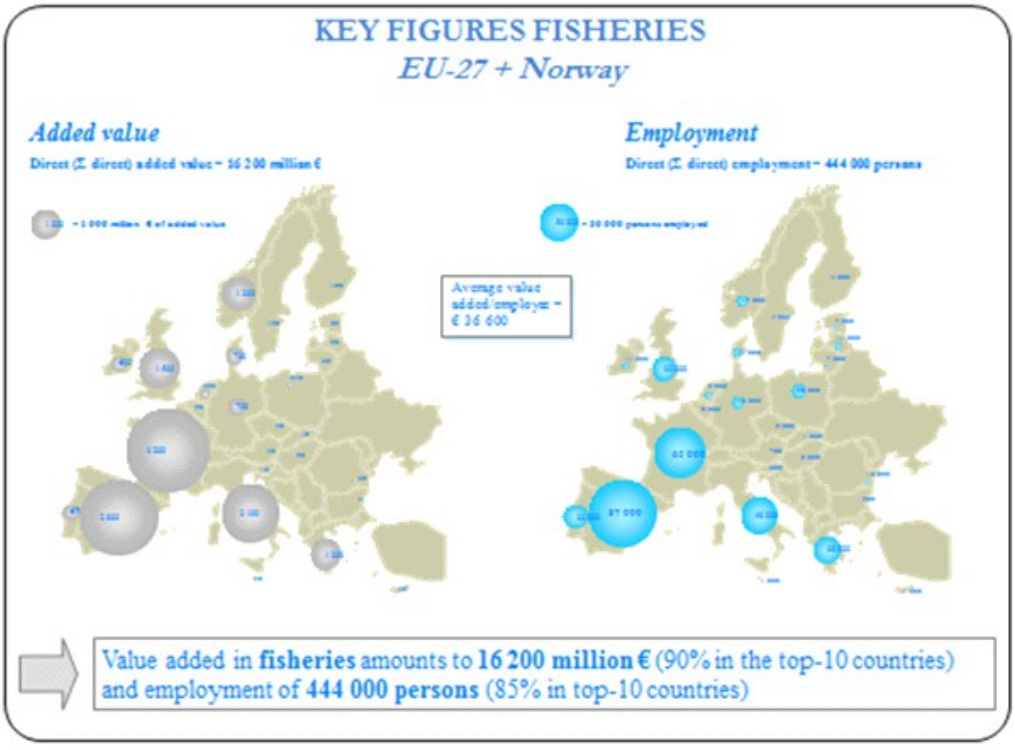
Source: PRC (2008)

Figure 3: Value Added and employment in EU maritime tourism



Source: PRC (2008)

Figure 4: Value Added and employment in EU fishing sectors



Source: PRC (2008)

itime regions have managed to minimise the effects of the world economic crisis through a governance process between public and private sectors, regional government, professional and sectorial associations (Basque Country, for instance that in the 70's has managed to restructure its economy around three or four sectorial clusters, namely those of ports and naval construction). For these reasons, the Commission recommends that monitoring and productivity data collect should continue to be carried on and that a platform should be built in order to share good practices in this area.

The current economic and financial crisis has also delayed the EU maritime clusters operation. Maritime economy has as its major engine international trade, which in turn depends from world economic growth, in general and sectorial economic growth, in particular.

4. Typology of Maritime Clusters

The changing performances and composition of maritime clusters reflect the various roles they have played in different regions and periods of time.

Following Zhang and Lam (2013), one can identify four types of maritime clusters. In the first type, maritime activities within clusters focus on port (cargo loading and discharging functions) and shipping functions. Such tasks are local and territorial dependent. Relationships and connections among and within maritime sectors are simple and rather loose. Maritime activities do not act together, when making decisions. Users are more familiar with individual sectors or various port services, rather than with the maritime cluster in its entirety.

London and Rotterdam are generally pointed out as the pioneers of this first type of maritime cluster. Today, Zhang and Lam (2013, p.163) pinpoint Dublin (Ireland) and Selangor (Malaysia) as good examples of this group.

In the second type, cargo allocation and value-added processing are at the heart of the cluster. It is the typical centre of logistics and cargo allocation, aiming to provide value-added production and services. The geographic scope is regional and larger than port in Type 1.

The port presents a transport, industrial and commercial service centre. Some maritime sectors develop towards their hinterland. Type 2 cluster performs not only the function of transportation, but has close relationships with trade partners and municipalities. Such relationships are present in a reciprocal way.

In different moments in time Rotterdam, London, Hong Kong or Singapore was this type cluster. Osaka (Japan) and Kaohsiung (Taiwan) are current examples.

The third type of maritime clusters emerged in the 1980's in the background of world trade changing its pattern and developed in depth and in dimension, which called for an extensive transport network. Maritime clusters adapted to allocate not only the products and capital but the technology and intangible information.

These activities are carried out in much larger geographical areas than Types 1 and 2 and the sphere of influence is regional or even global. Maritime clusters play a special role in the global/regional supply chains for its capacity of processing and distributing information. Such characteristics satisfy the new international trade pattern which involves in before, after and even during the production process.

Maritime clusters are regarded as the supply chain hub in global/regional economic and trade markets. Rotterdam, Hong-Kong and Singapore are top examples of this type of maritime cluster.

The fourth generation of clusters appeared in the 1990s with characteristics of physically separated but linked through common operators or administration. It mainly resulted both from vertical and horizontal integration adopted by transport operators.

Type 4 maritime clusters appears with this new function as a maritime service centre instead of taking port and physical cargo logistics as core activities. The concept of local or regional territory vanishes, as type 4 maritime clusters can provide services to users who are very far away.

Maritime services in this category are provided in a wide range, such as ship finance, maritime law, marine insurance, ship registry, ship chartering, ship brokering, etc. London represents a typical example from today's maritime world.

5. The Portuguese Maritime Cluster

With a coast line of 1,187 km in its mainland and two Atlantic archipelagos, Portugal has the 11^th biggest surface of jurisdictional waters (including Territorial Sea, Exclusive Economic Zone and internal waters) , which corresponds to 19 times its territory (91,763 sq. km), i.e. more than 1,700 million sq. km.

In this way, the maritime area under Portuguese jurisdiction: a) it will be bigger than India's land surface; b) it will cover 40 times more territory than Portugal's land space; c) it will represent more than 80% of EU 27 member states terrestrial area.

However, in 2010, the contribution of all maritime activity for the Portuguese GDP was estimated to be only 2.8% (Simões and Salvador, 2013, p. 156), recurring to an input-output methodology.

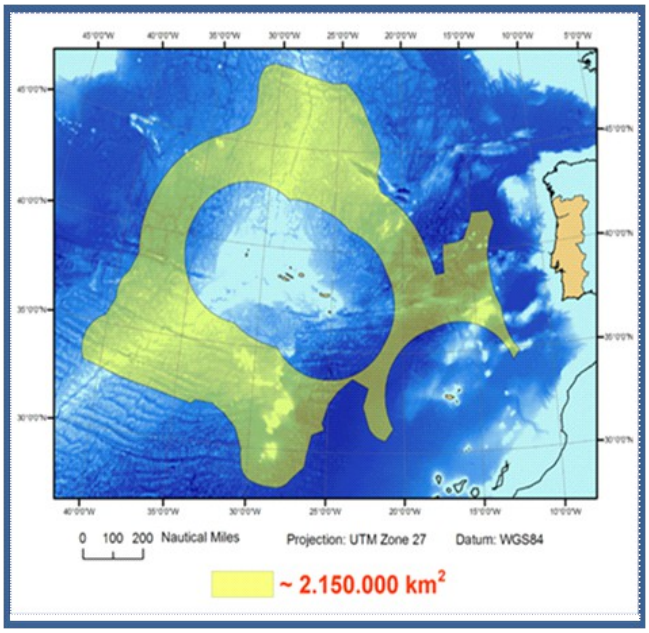
The use of the Leontief (input-output matrix) as a methodology for the analysis of maritime clusters has been used in different countries: in Germany, Van Der Linden (2001); in Wales, Bryan et al. (2006), to ports; in Netherlands, De Langen (2002); in Denmark, Sornn-Friese, (2003), in Ireland, Morrissey and O'Donoghue, (2012), to the cluster of maritime transport; in Taiwan, Chiu and Lin (2012).

In Portugal, it was proposed as a methodology to study the national maritime cluster by Salvador and Guedes Soares (2008).

In order to assess the strength of the linkages between the Portuguese mega cluster activities it was created an input-output matrix (126 products x 126 sectors), with data from the year 2010.

Also relationships and connections among the potential cluster' sectors are rather loose, as Ferreira et al. (2011) acknowledged through interviews and inquiries. Ports and Universities

Figure 5: Continental Shelf limits future enlargement



Source: Portuguese Mission Structure for Continental Shelf Enlargement

(both teaching and R&D) were the sectors identified as having more intense intersectorial connections.

Ports are the Portuguese mega cluster main sector, being responsible for 19% of maritime Gross Value Added (GVA) and for 0.54% of national GVA. In absolute terms it is also the sector which employs more intermediate consumption from other sectors (higher level of integration in the mega cluster).

The strength and dynamics of a mega cluster depends, at first glance, on the financial and commercial relations between its enterprises and sectors. The intermediate flows inside the mega cluster are represented on figure 6. It is possible to observe that inter sectorial linkages are, in general terms, extremely weak (meanwhile, comparatively, inter sectorial relations-inside each sector - are more important). Analysis also revealed the existence of important economies of scale inside maritime industry sectors and not only specifically between sectors.

For its relevance, one should highlight the linkages between Water Transport and Ports (75.5 m. euros) and between Fisheries and Preparation and Storage of Fish (24.5 m. euros)[3].

An analysis in terms of sectorial technical coefficients allows to conclude that in all the I-O matrix, there are only 10 strong linkages (> 0.05) including at least one maritime sector, half of which between or inside maritime sectors, and only four of average significance (> 0.03 and < 0.05). Transports by water and maritime recreational activities are the sectors with the largest number of linkages.

In terms of ”interdependence coefficients” (that measures the indirect effects of other sectors demands on each sector production), the analysis allow to conclude that inside the main sectors there is only one interdependency of average greatness (0.17) between ”Auxiliary transport activities by water” (maritime ports) and ”Transports by water”.

How can the Portuguese Maritime Cluster be developed? Which is the best public strategy to support the cluster development?

One argues that the Portuguese maritime cluster belongs to the first type: maritime activities focus on port and shipping functions, as the I-O (Leontief matrix) analysis (Simões and Salvador 2013) has identified. Also the connections among maritime sectors are quite loose.

As such, its development strategy should consist in making it going through the next phases, as quick as possible. In order to transform it into a type 2 maritime cluster, support should be addressed, on one hand, to ports, maritime transports and logistic centres.

As referred above, these are the sectors with more intersectorial connections. Major firms can be found in them. Logistic infrastructures were already planned or developed during the last five or six years (Bobadela, Poceirão, Leixões, Sines Pole B, for instance).

Ports, in particular, have a sound financial situation and good perspectives (due to the growing exports by sea, namely to extra EU markets). They also can have access to the Spanish market.

On the other hand, public strategy should also prioritise Universities and R&D centres, as these are also sectors largely interconnected with the other sectors of the Cluster, with large international connections.

It adds that they are the best placed to bring the Cluster to the following phases, through technology and information transfers, facilitating innovation and increased competitiveness.

[3]The Navy data was obtained from the respective annual budget and not from the Input-Output Matrix (Navy is included in the Public Administration Sector). As such, the 120 m. euros of commercial relations between the Navy and Shipbuilding have a different statistical source than the rest of all data.

References

Benito G.; Berger E.; Dela F. and Shum, J. (2003) A cluster analysis of the maritime sector in Norway. *International Journal of Transport Management* 1, 205-216.

Blonigen, B. A. and Wilson, W. (2013) The growth and patterns of international trade. *Maritime Policy & Management* 40 (7), 618-635.

Bryan, K.; Munday, M.; Pickernell, D. and Roberts, A. (2006) Assessing the economic significance of port activity: evidence from ABP Operations in industrial South Wales. *Maritime Policy & Management* 33 (4), 371-386.

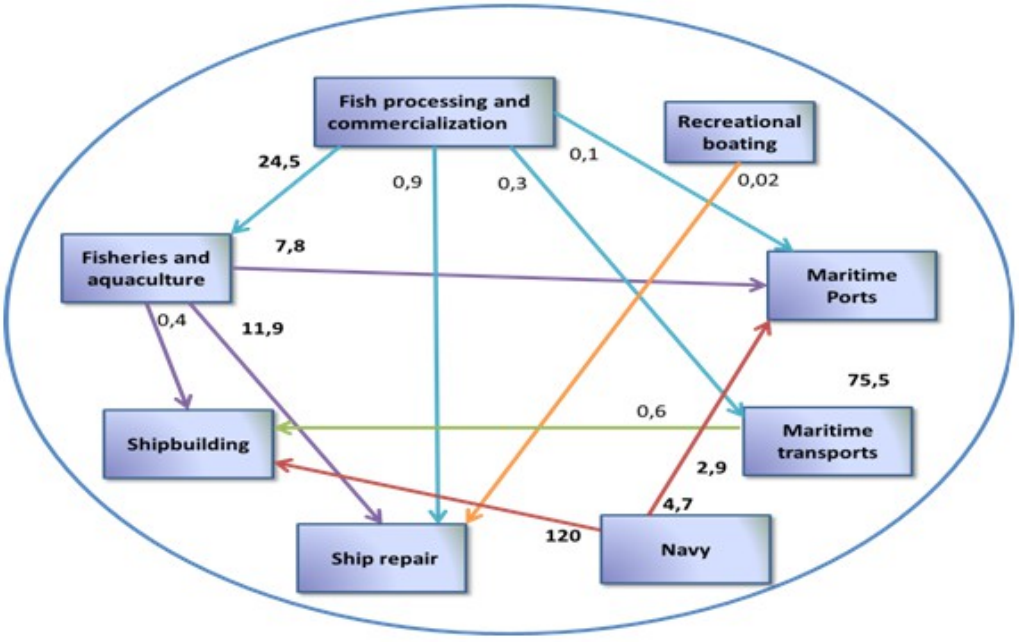
Chiu, R. and Lin, Y. (2012) The inter-industrial linkage of maritime sector in Taiwan: an input-output analysis. *Applied Economics Letters* 19 (4), 337-343.

De Langen, P.W. (2002) Clustering and performance: the case of maritime clustering in The Netherlands. *Maritime Policy and Management* 29 (3), 209-221.

Ferreira, A.; Salvador, R. and Guedes Soares, C. (2011) As relações intersectoriais no cluster do mar Português. In Guedes Soares, C. Ans Santos, N. A. eds. *Engenharia e Tecnologia Marítima. Salamandra,* 85-98.

Liberato, J.; Salvador, R.; Guedes Soares, C., and Ferreira, A.M. (2008) O Cluster Marítimo Português no Contexto Mundial e Europeu. In Guedes Soares, C. and Costa Monteiro C. Eds. *O Sector Marítimo Português*. Salamandra, 41-58.

Figure 6: The Portuguese Maritime Cluster Commercial Relations (In millions of euros)



Source: Simões and Salvador (2013, p. 153)

Morrissey, K. and O'Donoghue, C. (2012) *The Potential for an Irish Maritime Transportation Cluster: An Input-Output Analysis*. The Socio-Economic Marine Research Unit (SEMRU) Working Paper 12-WP-SEMRU-09.

Norton, D. (2013) *Institutions, Institutional Change and Economic Performance*. Cambridge: Cambridge University Press.

OECD (1999) *Boosting innovation: the cluster approach, Focus Group on Cluster Mapping and Cluster Policy Report*. OECD.

OECD (2013) *The competitiveness of global port-cities: synthesis report*. OECD.

Policy Research Corporation (2008) *The role of maritime clusters to enhance the strength and development of maritime sectors*. European Commission.

Porter, M. (1998) *On Competition*. Harvard Business School Press.

Romer, P. (1992) *Increasing Returns and New Developments in the Theory of Growth*. National Bureau of Economic Research.

Salvador, R. and Guedes Soares, C. (2008) O modelo de Leontief como Instrumento de Análise do Cluster do Mar. In Guedes Soares, C. and Costa Monteiro C. Eds. *O Sector Marítimo Português*. Salamandra, 59-68.

SAER (2009) *O Hypercluster da Economia do Mar*, SAER. Associação Comercial de Lisboa.

Simões, A; Salvador, R., and Guedes Soares, C. (2012) Planeamento do espaço marítimo e do cluster do mar português. In Guedes Soares, C. and Santos, N. Eds. *Engenharia e Tecnologia Marítima*. Salamandra, 99-122.

Simões, A. and Salvador, R. (2013) The Portuguese Maritime Mega Cluster: Assessment and Innovation. *Journal of Geography and Regional Planning* 2(7) 148-159.

Sorrn-Friese, H. (2003) *Navigating Blue Denmark: the Structural Dynamics and Evolution of the Danish Maritime Cluster*. Danish Maritime Authorithy.

Teixeira, M. F. (2011) Clusters Marítimos na Europa: Potencialidades, Complexidades e Debilidades de um Modelo Organizacional que Traduz a Natureza Holística dos Mares e Oceanos. *Maria Scientia* Novembro, 37-58.

Van der Linden, J.A. (2001) The economic impact study of maritime policy issues: application to the German case. *Maritime Policy and Management* 28(1): 33-54.

Wijnolst, N. (2006) *Dynamic European maritime clusters*. European Network of Maritime Clusters.

Wijnolst, N.; Jensen, J.I. and Sødal, S. (2003) *European maritime clusters: global trends, theoretical frameworks. The cases of Norway and the Netherlands*. Dutch Maritime Network/Agder Research Foundation.

Zhang, W. and Lam, J. (2013) Maritime cluster evolution based on symbiosis theory and Lotka-Volterra model. *Maritime Policy & Management* 40 (2), 161-176.