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Full Length Research Paper

The Portuguese Maritime Mega Cluster: Assessment and Innovation

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In these last five years, the creation of a Maritime Cluster in Portugal has been an issue of first political and economic relevance. The enlargement of the Continental Shelf under national jurisdiction into a total surface of 2.2 million square kilometres (with a predictable high level of mineral, genetic and hydro thermal resources)–particularly taking into account the economic crisis in current context–awakes all kinds of hopes and ambitions. The main guidelines of the *Integrated Maritime Policy for the European Union* –requires the creation of a maritime mega-cluster. It should include both traditional (fishing, canning industry, shipbuilding, maritime transports), and modern sectors (wave and tide energy, biotechnology), in a country that it is not known for a high level of social capital or its capacity of developing joint efforts. Starting with the assumption that geographical proximity and enterprises/institutions strategic cooperation promote competitiveness and innovation and, in consequence, the development, we propose to determine the existence of cooperation relationships and/or partnerships between activities connected with the maritime sector; if those relationships exist, are they partnerships at local, regional or national scale; and if recent trends point out towards innovation. The paper quantifies these a cluster main inter sectorial linkages, based on the integrated system of Portugal's Input-Output Matrix. It is also put in evidence the multiplier factors of direct, indirect and induced effects. Taking into consideration the final quantitative results, the authors present some remarks in terms of Employment, GVA and Investment in Portuguese Sea Cluster Economic Sectors.

Keywords: Maritime Cluster, Input-Output Matrix, e-Planning

INTRODUCTION

For centuries, the sea was perceived as a source of infinite resources and as a pass age route which links communities, countries and continents. During 15th century, the maritime jurisdiction began to get shape and the "territorial sea" concept was introduced in the 17th century. Originally, this was the length of a cannon shot, hence the portion of an ocean that a sovereign state could defend from shore. In the 19th century, geo strategist Alfred Mahan (1890), in his work *The Influence of Sea Power upon History*, developed the thesis that countries with greater naval power will have greater world wide impact. In other words, Alfred Mahan sustained the idea of naval power

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superiority overland power. In the 20th century, the advance of science and technology leaded to new policies: pollution control and preservation of marine environment, maritime spatial planning and priority in domains such as food, energy, mineral, environmental and recreational. It is now a common prediction that during the current century, sea will be given a particular emphasis, especially due to resource scarcity. Portugal's geo strategic Atlantic position it implies the need for some remarks concerning location. The Country appears as the Europe Finisterre – or, as French geographer Roger Bruner once described as a "Finis sea".

The presence of the maritime element was a key factor across Portugal's History, both in terms of building a national identity and as fundamental trait of Portuguese cultural heritage. Beyond that, as a crucial resource for economic activities, it defined Portugal unique economic traits; particularly in the area we called shoreline. Since the early days, the sea has been an immense subsistence source, particularly where sea shore communities are concerned, mainly because these settlements had an almost complete dependence from fishing and correlated activities.

The main guidelines of the *Integrated Maritime Policy for the European Union*, requires the creation of a maritime mega-cluster. It should include both traditional (fishing, canning industry, ship building, ports and maritime transports), and modern sectors (wave and tide energy, biotechnology and others), in a country that it is not known for a high level of social capital or its capacity of developing joint efforts. Starting with the assumption that geographical proximity and enterprises/institutions strategic cooperation promote competitiveness and innovation and, in consequence, the development, we propose to determine the existence of cooperation relationships and/or partnerships between activities connected with the maritime sector, if those relationships exist, are they partnerships at local, regional or national scale; and if recent trends point out towards innovation.

This paper quantifies the main inter sectorial linkages of the sea cluster, based on the integrated system of Portugal's Input-Output Matrix. It is also put in evidence the multiplier factors of direct, indirect and induced effects of the maritime activities. Taking into consideration the final quantitative results, the authors present some remarks in terms of Employment, GVA and Investment in Portuguese Sea Cluster Economic Sectors.

MATERIALS AND METHODS

With a coast line of 1187 km in its mainland and two Atlantic archipelagos, Portugal has at its disposal the 11th biggest surface of jurisdictional waters (including Territorial Sea, Exclusive Economic Zone and internal waters) , which corresponds to 19 times its territory – 91763 Km^2. Therefore, Portugal is the EU Country with the largest area of jurisdictional waters located in the European Continent (and ahead of nations such as India or China), which includes the sub area 1 (Portugal Mainland), sub area 2 (archipelago of Madeira) and sub area 3 (archipelago of Azores).

It is important to stress there is a strong possibility that Portugal will have under its jurisdiction maritime spaces that will double its Exclusive Economic Zone. Back in 2010, Portugal's Task Group for the Extension of the Continental Shelf presented a submission to the Commission on the Limits of the Continental Shelf (CLCS). The main goal was to extend the continental shelf up to 350 miles (strictly related with jurisdictional rights over seabed and subsoil, meaning fishing rights are not included). If accepted, Portugal will have under its jurisdiction a maritime territory of 2.150.000 Km^2. 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.

In general terms, Figure2 illustrates the cluster different components, namely research and development institutions, infrastructure sand technologies, product markets and support organizations.

According to Niko Wijnolst (2005), in order to a cluster became effective, it is absolutely necessary to identify the management exclusive domain that will turn the cluster viable, and to determine the entrepreneurs / national governments / European Union factors of collective responsibility, which will make possible its creation. The *Observatory of European SMEs (Regional Clusters in Europe, 2002*) stated that the *networking* process and the binomial structure competition / cooperation represent two fundamental characteristics of a cluster, due to its capacity to promote their enforcement of SMEs competitive advantages. These advantages result from a series of mechanisms, namely, reduction of direct and indirect costs; reduction of transaction costs; increasing capacity to credit access; obtaining certain economies of scale which are typical in larger enterprises; SMEs active involvement in innovation processes.

Studies conducted in Norway (Benitoetall (2003), clearly show that the maritime cluster is in accordance with 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. These economic linkages assume highly significant figures in shipping and naval construction sectors. This analysis revealed the existence of important economies of scale *inside* maritime industry sectors and not specifically between sectors.

A good indicator of a cluster's relevance can be assess by analyzing the strength of the connections between its members, namely by the trade transactions figures that are

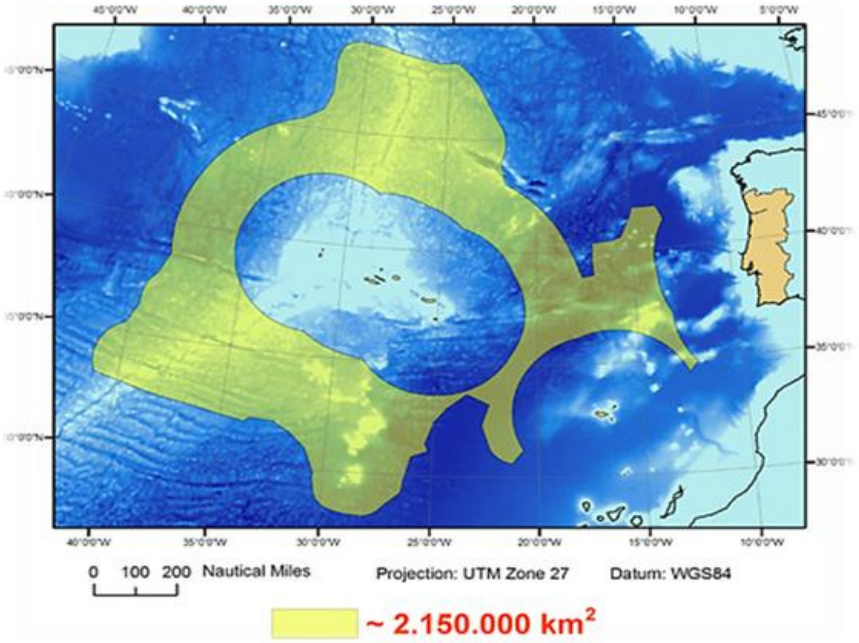

Figure1. Outer limits of the extended continental shelf

Figure2. Cluster structure

at stake. In general terms, in a cluster, the sectors have a strong dependence on one another and the way buyers and suppliers are related, define two different linkage types:

a) Backward linkage, due to increase in production that generates an increased demand for products / sectors used as inputs, which in turn will increase the demand of respective inputs and soon;

b) Forward linkage, due to increased production, which generates an increase in the quantity of your product that can be used as input in other sectors, which in turn can become available to other goods and services.

The backwards linkages are strongly influenced by industries with high coefficients of intermediate consumption such as manufacturing. Symmetrically, the forward linkages are normally induced by

Industries and raw materials, whose outputs are integrated in other industries production processes as semi-finished products. Figure 3 summarizes the input-

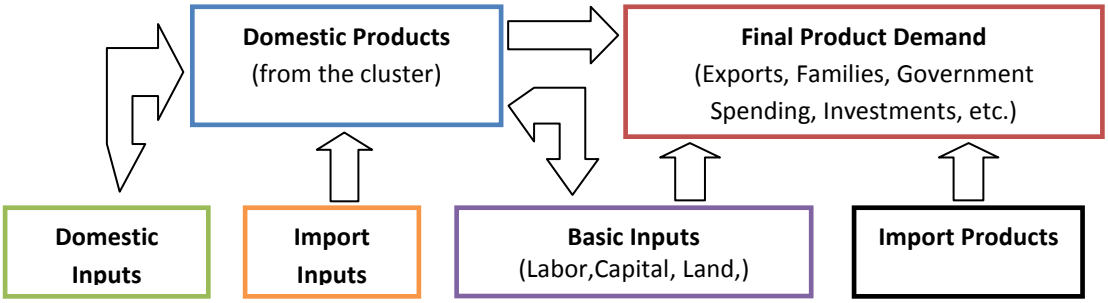

Figure 3. Input-Output model and relation with the cluster structure

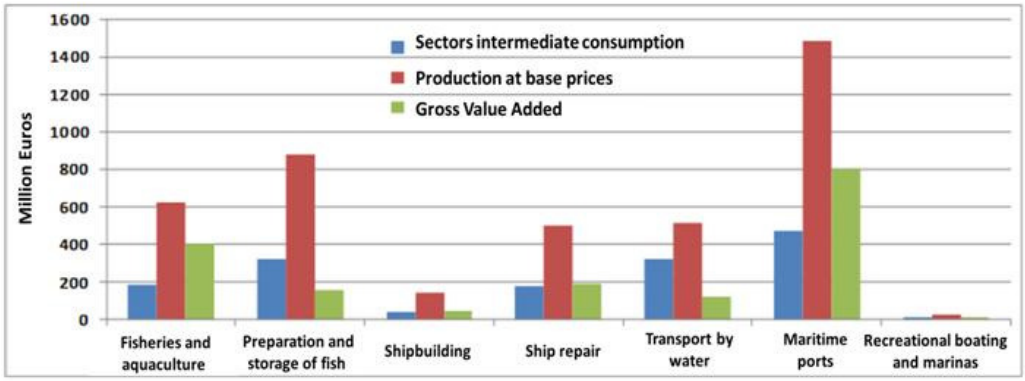

Figure 4. Turnover, GVA and intermediate consumption

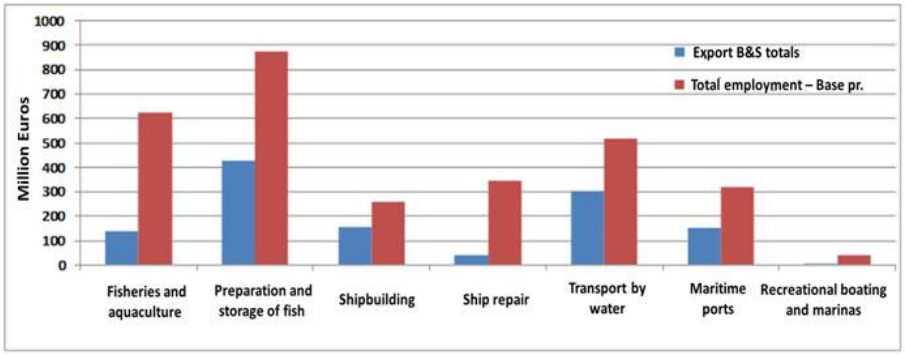

Figure 5. Exports and employment It is interesting to compare these conclusions with the data concerning the number of enterprises:

output model and clarifies the way the main inputs are related with the different demands.

The employ of input-output matrix as a source for the analysis of maritime economics has been extensively used in several different countries: in Germany, Van Der Linden, 2001; in Wales, Bryan, K., and

al., 2006, to ports; in Netherlands, De Langen, 2002; in Denmark, Sornn-Friese, 2003, in Ireland, Karyn Morrissey and Cathal O'Donoghue, 2012, to the cluster of maritime transport; in Taiwan, Chiu,R.eLin,Y.,2012.

In order to assess the strength of the linkages between the mega cluster activities it was created, back in 2011, an input-output matrix (126 products x 126 sectors), designated Sea Input / Output Matrix (SIOM). The following sectors were considered separately:

- Fisheries and aquaculture
- Preparation and storage of fish, crustaceans and molluscs
- Shipbuilding
- Ship repair
- Transport by water
- Auxiliary transport activities by water (maritime ports)
- Activities of recreational boating and marinas.

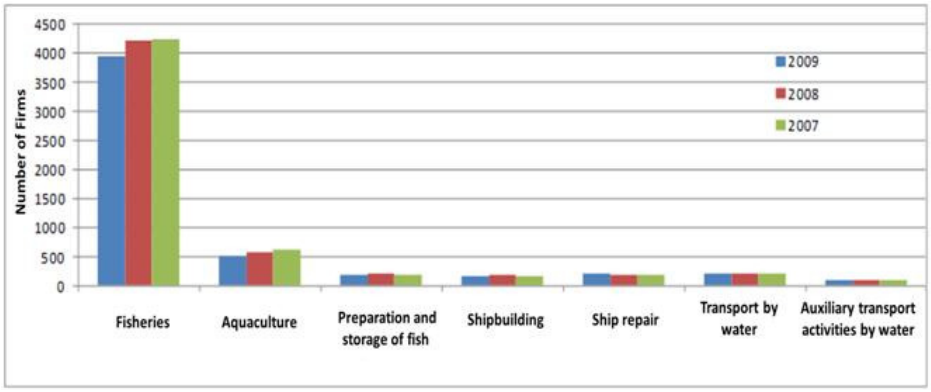

Figure 6. Number of enterprises (Source: INE)

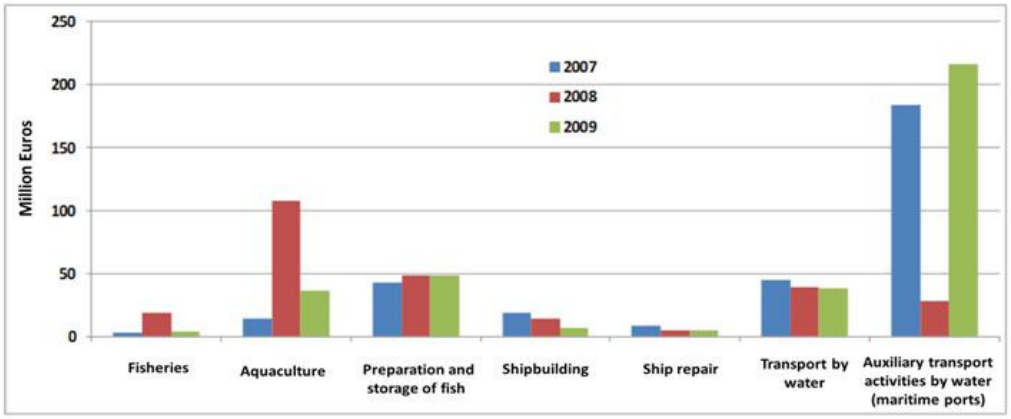

Figure 7 – Fixed gross capital formation (2007, 2008, 2009) (Source: INE)

Given the statistical inter working with other sectors, the authors did not consider a more detailed disaggregating. Therefore, the study directly assessed the seven sectors mentioned above and, in a less complete and deep analysis there main in gone s–defence and security, maritime services, maritime equipment's and infrastructures). This way, the following figures underestimate the economic weight of the "Portuguese Sea", only aiming to present an estimate of the mega cluster main core.

RESULTS AND DISCUSSION

It is possible to observe that "maritime ports" is the mega cluster main sector, being responsible for both 19% of Sea Turnover and GVA and for 0,54% of National GVA. In absolute terms it is also the sector which employs more intermediate consumption from other sectors (bigger level of integration in the mega cluster).

Where exports are concerned, "preparation and storage of fish, crustaceans and molluscs "(35% of sea products and 0,87% at national level), followed by "transport by water" (25% of sea products and 0, 62% at national level) assume the main relevance. If we take in to consideration the employment (sales to other sectors),"preparation and storage of fish" (29% of sea products and 0,27% at national level) and "fisheries and aquaculture" (21% of sea products and 0,19% at national level) take the lead (biggest integration in the mega cluster).

It is interesting to compare these conclusions with the data concerning the number of enterprises:

The data included in the figure 7, are related with variable investment (fixed capital gross formation). It is important to point out the large investment in maritime ports, in clear opposition with the trends in the others sectors.

The strength and dynamics of a mega cluster depends, at first glance, on the financial and commercial relations its enterprises and sectors. The intermediate flows inside the Mega cluster are represented on figure 8. It is possible to observe that the inter sectorial linkages are, in general terms, extremely weak (mean while, comparatively, the inter sectorial relations–inside each sector–are more important). For its relevance, one should notice the linkages between Navy The Navy data were obtained from

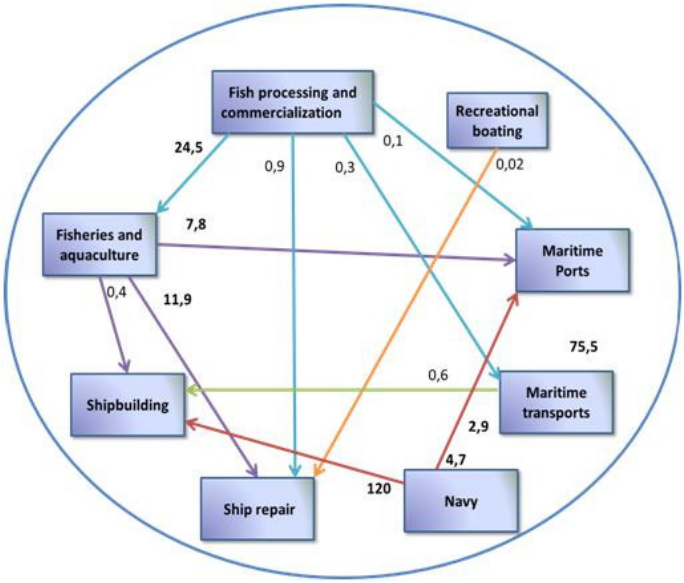

Figure 8. Commercial relations inside the mega cluster (in millions of euros)

the respective annual budget and not from the Matrix (Navy is included in Public Administration Sector).

And Ship Repair (120M.Euros); between Water Transport and Ports (75,5M.Euros); and between Fisheries and Preparation and Storage of Fish (24,5M.Euros).

If we used as source of comparison the Dutch and the Danish sea clusters, one can conclude that that inter sectorial exchanges are not representative. Shipbuilding depends, on a large scale, on Navy contracts.

Takingintoconsiderationotherstudiesandtherealityofourna tionaleconomy,weadoptedthefollowingmethodology:

a) Technical Coefficients ≥0, 05–strong linkage (represented on orange color);

b) Technical Coefficients ≥0, 03 and <0, 05–average (represented on green color);

c) Technical Coefficients ≥0, 01 and <0, 03–weak linkage (represented on blue color)

d) Technical Coefficients <0, 01–little or no relevance (not represented)

From the analysis of technical coefficients (Matrix A), it is possible to draw them a in connections which are represented on Table1.

As it is possible to conclude, in all the 126 sectors considered in this study, there are only 10 strong linkages, half of which between or inside maritime sectors, and only four of average significance. One should notice that recreational activities and transports by water are the sectors with the largest number of linkages, which allows concluding that a stimulus over these particulars segments of the economic structure will have a bigger impact in terms of number of activities.

In order to measure the indirect effects it is required to have the Inter dependence or Inter sectorial coefficients, which are derived from the Inverse Matrix, meaning output values X are a function of final demand Y. Basically, the production of a specific sector depends, not only on the sector own demand, but also on the demand from other sectors. The interdependence coefficient sex press and quantify this dependence. We canal so give the following meaning to the interdependence coefficients: if there is one euro of sector 1 final demand that implies not only the sector 1 total output grows by b1 euros but also sector 2 total production increases by b2 euros. And the same occurs in the matrix remaining sectors.

Taking into account the reality of Portuguese maritime economy, we established the following reference figures:

a) Interdependence Coefficients ≥ 0,5 –strong linkage (represented on orange color);

b) Interdependence Coefficients ≥ 0, 1 and <0, 5–average (represented on green color);

c) Interdependence Coefficients ≥ 0,0 5 and <0,1–weaklinkage (represented on blue color);

d) Interdependence Coefficients <0,05–little or no relevance (not represented).

Table 2 represents the quantification, in terms of interdependency, inside the maritime sectors and with other connected activities of Portuguese economy.

Inside the main sectors there's only one interdependency of average greatness (0,17) between Auxiliary Transport Activities by Water (maritime ports) with transports by water.

Table1–Technical coefficients matrix (orange-strong; green-average, blue-weak).

Homogeneous Economic Branches Product Description	Fisheries and aquaculture	Preparation and storage of fish,	Shipbuilding	Ship Repair	Transport by Water	Auxiliary Transport Activities by Water	Activities of Recreational boating and marinas
Fisheries and aquaculture	0,05	0,03	0,00	0,00	0,00	0,00	0,00
Preparation and storage of fish, crustaceans	0,00	0,12	0,00	0,00	0,00	0,00	0,00
Shipbuilding	0,00	0,00	0,01	0,00	0,00	0,00	0,00
Ship Repair	0,02	0,00	0,00	0,09	0,01	0,00	0,00
Transport by water	0,00	0,00	0,00	0,00	0,14	0,00	0,00
Auxiliary Transport Activities by Water	0,01	0,00	0,00	0,00	0,15	0,01	0,00
Activities of Recreational boating and marinas	0,00	0,00	0,00	0,00	0,00	0,00	0,00
Paper and paper board items	0,00	0,01	0,00	0,00	0,00	0,00	0,00
Printing and reproduction of recorded media	0,00	0,00	0,00	0,00	0,00	0,00	0,01
Manufacture of refined petroleum products	0,05	0,00	0,00	0,00	0,05	0,00	0,00
Manufacture of basic chemicals and fertilizers	0,00	0,00	0,01	0,00	0,00	0,00	0,00
Metallurgy	0,00	0,00	0,02	0,01	0,00	0,00	0,00
Manufacture of metal products	0,00	0,01	0,10	0,03	0,00	0,00	0,00
Repair and installation of machinery	0,01	0,01	0,00	0,10	0,00	0,00	0,01
Generation, transmission, distribution and trading of electricity	0,01	0,02	0,00	0,00	0,00	0,00	0,02
Construction of buildings	0,00	0,01	0,00	0,01	0,00	0,00	0,06
Civil engineering works	0,01	0,00	0,00	0,00	0,02	0,01	0,02
Sale, maintenance and repair of motor vehicles	0,01	0,00	0,01	0,01	0,00	0,00	0,00
Wholesale Trade	0,01	0,07	0,03	0,02	0,01	0,00	0,02
Retail Trade	0,02	0,00	0,00	0,00	0,02	0,00	0,00
Road transport services of goods and services	0,00	0,01	0,01	0,00	0,00	0,00	0,00
Auxiliary transport activities	0,00	0,00	0,00	0,00	0,02	0,24	0,00
Monetary intermediation	0,01	0,02	0,01	0,00	0,02	0,02	0,02
Rental services and assets exploration	0,00	0,00	0,01	0,00	0,01	0,01	0,01
Management consulting services	0,00	0,00	0,00	0,01	0,00	0,00	0,01
Architecture and engineering activities	0,00	0,00	0,00	0,01	0,00	0,00	0,01
Rental activities	0,00	0,00	0,00	0,00	0,10	0,00	0,02
Services to buildings and maintenance services	0,00	0,00	0,00	0,00	0,01	0,00	0,01
Administrative and support services provided to companies	0,00	0,01	0,00	0,00	0,01	0,01	0,01
Sporting services	0,00	0,00	0,00	0,00	0,00	0,00	0,03
Amusement and recreational services	0,00	0,00	0,00	0,00	0,00	0,00	0,02

Table 2–Direct and indirect interdependency coefficients relations (Orange–strong relation; green–average relation; blue–weak relation)

Homogeneous Economic Branches / **Product Description**	**Fisheries and aquaculture**	**Preparation and Storage of fish,**	**Shipbuilding**	**Ship Repair**	**Transport by water**	**Auxiliary Transport Activities by Water**	**Activities of Recreational boating and marinas**
Fisheries and aquaculture	1,06	0,03	0,00	0,00	0,00	0,00	0,00
Preparation and storage of fish, crustaceans	0,00	1,14	0,00	0,00	0,00	0,00	0,00
Shipbuilding	0,00	0,00	1,01	0,00	0,00	0,00	0,00
Ship Repair	0,02	0,00	0,00	1,09	0,01	0,00	0,00
Transport by Water	0,00	0,00	0,00	0,00	1,16	0,00	0,00
Auxiliary Transport Activities by Water	0,01	0,00	0,00	0,00	0,17	1,01	0,00
Activities of Recreational boating and marinas	0,00	0,00	0,00	0,00	0,00	0,00	1,00
Manufacture of refined petroleum products	0,06	0,02	0,01	0,01	0,07	0,01	0,01
Manufacture of metal products	0,01	0,01	0,12	0,06	0,01	0,00	0,01
Repair and installation of machinery	0,02	0,02	0,00	0,12	0,01	0,01	0,01
Construction of buildings	0,00	0,01	0,01	0,02	0,02	0,01	0,09
Wholesale Trade	0,02	0,09	0,05	0,04	0,02	0,01	0,03
Auxiliary transport activities	0,01	0,00	0,00	0,00	0,08	0,28	0,00
Advertising, market studies and surveys	0,01	0,02	0,01	0,01	0,01	0,00	0,05
Rental activities	0,00	0,00	0,01	0,01	0,13	0,01	0,03

Where interdependency relations between maritime sectors and there maining sectors are concerned, it is possible to point out the following remarks:

a) There are no strong linkages within and outside of the maritime cluster;

b) The average interdependency (0,28) between ports and auxiliary transport activities (roads, railways, aerial and logistics);

c) The average interdependency between transports by water and rental activities (0,13);

d) The average interdependency of ship building with metal manufacturing (0,12);

e) The average interdependency of ship repair with repair, maintenance and installation of machinery and equipment's (0,12).

Considering the total number of activities that develop, in some significant form, relations with maritime sectors, only 12 products (from a universe of 126), presents interdependency coefficients superior to 0,1. This is an extremely low amount, which denotes a substantially fragile situation, taking into consideration the sea economy cluster potentialities.

In table3, it is represented the number of products positively influenced by a possible increase in the final demand per sector.

It is the increase in the Transport by Water Final Demand that generates Highly Relevant Impacts in a larger number of products (5). Nevertheless, it is the increase in the Boating/Marin as Final Demand that generates impact sin bigger number of products (24).

The weight of the mega cluster direct GVA (taking in to consideration all the sectors mentioned above) corresponds to 7823 million of Euros–2,81% of national GVA. Nevertheless, in order to evaluate the real impact of

Table 3 – Number of products significantly influenced (direct + indirect effects)

Homogeneous branches Products subject to type-1 multiplier (dir+indir)	Fisheries Aquacult	Fish Preparat	Ship building	Ship Repair	Transport by Water	Ports	Boating / Marinas
Relevant Number of Products (**Coefficient>0,01**)	13	14	9	11	21	7	**24**
Highly Relevant Number of Products (**Coefficient>0,05**)	2	2	2	3	**5**	2	3

Table 4- Type-1 and type-2 multipliers

Homogeneous branches Products subject to type-1 and type-2 multiplier	Fisheries Aquacult	Fish Preparat	Ship building	Ship Repair	Transport by Water	Ports	Boating / Marinas
Type 1	1,46	1,63	1,45	1,60	**2,10**	1,56	1,77
Type 2	2,59	2,34	2,51	2,75	**3,09**	2,66	**3,07**

Table 5 - GVA (SIOM, 2008)

National GVA (M€)	**DirectValue-7sectors**	**Estimated Value–remaining sectors**	**Total-Sea**
149.311,1	1.749,7	2.446,7	4.196,5
100%	1,17%	1,64%	2,81%

Portuguese maritime economy, it is necessary to add its "Indirect Effects" (increase in demand for its suppliers) and the "Induced Effects" (which derives from maritime workers extra spending). This way, the authors proceeded to evaluate the multiplier effects for the maritime activities considered on this study, which are represented on the following table 4.

Table4 clearly demonstrates the significance of the "Transports by Water" and "Boating / Marinas" sectors, since it have the more relevant multiplier effects (3,0 9 and 3,07 respectively).

Taking in to consideration these a cluster weight on the national output, the direct maritime activities sectors mentioned above and by estimating the weight of there maining sea sectors, it was possible to calculate the figures of Table 5 on GVA:

From the analysis of the Type–2 multiplier, one can verify the importance of transports by water sector (3,090) and boating /marinas (3,075), both with highly significant values in terms of induced effects. This allows to conclude that these two segments of economic activity might have a very promising future inside the national maritime economy.

Based on the SIOM closed matrix, discriminating the products where the effects of maritime sector demand are more intense, the number of products highly influenced it is represented on Table 6. In the same table it is also included a comparison with type – 1 multipliers.

Comparing the effects of multipliers type–1 and type–2 in the number of products that are highly and very highly affected, it is possible to verify the following:

a) The number of significant products and, in particularly, the very significant increased in a relevant proportion;

b) It is the Boating / Marin as sector which affects the largest number of significant products (39;:

c) The Transports by Water and the Boating / Marin as sectors presents the biggest number of very significant products (9);

Table 6 – Number of products/multipliers type-1 and type-2

Number of Products submitted to the multiplier	**Multiplier–Type-1**		**Multiplier–Type-2**	
Maritime Sectors	Relevant >0,01	Highly relevant >0,05	Relevant >0,01	Highly relevant >0,05
Fisheries and Aquaculture	13	2	31	7
Preparation and Storage	14	2	25	5
Shipbuilding	9	2	27	7
Ship Repair	11	3	29	8
Transports by Water	21	**5**	**35**	**9**
Auxiliary Transport Activities	7	2	27	6
Boating/Marinas	**24**	3	**39**	**9**

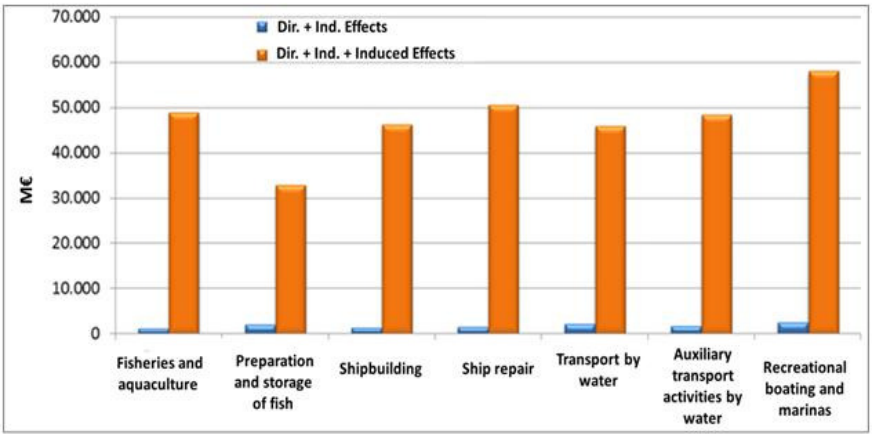

Figure 9. Multipliers: type – 1 and type - 2

Table 7 – Imports and GVAtype-1 and type-2 multipliers

Imports and GVA Multipliers **Maritime Sectors**		Fisheries Aquacult	Fish Preparat	Ship building	Ship Repair	Transport by Water	Ports	Boating / Marinas
Imports	Tipo-1	**3,167**	1,296	1,261	1,523	2,173	1,920	2,382
	Tipo-2	**4,801**	1,397	1,464	1,875	2,762	3,591	3,775
GVA	Tipo-1	1,290	2,278	1,496	1,607	**2,935**	1,535	1,874

d) Taking into consideration the 126 products, the induced impacts are only sensible, with some significance, in a very restrict number of products, which translates in weak linkages inside these a cluster.

Comparing the initial figures, with the multipliers estimated values, it is noticeable the existence of significant increases, specially, and as one could expect, in the induced effects (type–2 multiplier), as shown in Figure 9.

Analyzing the impact of type-1 and type-2 in Imports and VAB for the maritime sector, there were obtained the values of the multipliers are presented in the table 7.

From table 7, considering only the values of the multipliers, it appears that imports in the fisheries and

aquaculture sector has the highest value, so in terms of the political economy of the sea, is fundamental counter this, through import substitution by national competitive products. In GVA notes that it is the shipping the industry who has a more significant multiplier, so in terms of political economy of the sea, it is essential to encourage this sector, which will translate into more jobs and income.

CONCLUSIONS

In this paper, it is clearly demonstrated that the sectors of maritime activity represent a segment that generates employment and wealth, but which needs to be potentiated, taking into account that its contribution for the national economy is only 2 to 3%.

The calculus of the technical coefficients allowed to verify the existence of a low level of inter sectorial linkages, with corresponds to allow intensity of commercial exchange.

Through the interdependence coefficients, it was possible to verify the absence of strong linkages, and the existence of some average connections between sectors. Also, of all the 126 sectors that were taking into consideration on this study, only eleven presents' significant linkages with the maritime sectors, a fairly reduced amount, taking into account the vast potentialities offered by the sea.

From the analysis of direct and indirect impacts (type–1), it was possible to verify the multiplier effect, with a particular relevance to the transports by water, followed by boating / marinas.

From the analysis of induced impacts (type–2), it was demonstrated the multiplier effect, with a higher importance to the transports by water, followed by boating / marinas, with effects that treble the initial investment.

Even if it is not a part of the current study, we should make a reference to the emergence of new maritime sectors, such as: mining; carbon extraction and storage; exploitation of wave and tide energy; exploitation of wind energy, which can have, in the short run, a significant impact over the national economy.

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