# Cooperation Determinants in the Atlantic Blue Economy

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30 June 2014

*Short Communication*

# Cooperation Determinants in the Atlantic Blue Economy


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**Abstract:** Maritime and marine activities are getting significant attention from European policy as a domain that encompasses economic sectors of traditional relevance and new ones of fast growth. This short communication presents the results of a survey applied to maritime and marine organizations in Portugal, Spain, Ireland and United Kingdom. Innovation, human capital and social capital are dimensions that deserve attention in the creation and consolidation of the Blue economy. The empirical study uses survey data to estimate an econometric ordered Logit model to understand the determinants of cooperation. The study found that the participation in innovation activities and the level of absorptive capacity are critical aspects to induce cooperation.



**Keywords:** maritime cluster; proximity; innovation; social capital; human capital; absorptive capacity; LOGIT.


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### 1. Introduction

Maritime and marine activities encompass a variety of sectors that today are commonly defined as the 'Blue economy'. The Blue economy is regarded as one of central engine for the European Union (EU) competitiveness. Blue economy represents between 3% and 5% of the EU regions' gross domestic product. Maritime and marine activities have a high expression in the regional economies, especially in the coastal areas. These activities have contributed significantly to the construction of the European identity, in particular in the Atlantic Area, not only from a socio-cultural and economic perspective, but also in the shaping of cities and coastal organization (European Commission DG MARE, 2012).

Several branches of the Blue economy are currently facing a turbulent period while others offer opportunities for rapid growth and employment. As an example, activities like biotechnology and ocean renewable energy are still under-explored in Atlantic coastal areas. The development of new activities in these value-chains are of strategic relevance being also critical to the revitalization of existing sectors, such as fisheries, seafood and tourism, by the evident linkages that can be created among these activities. Both revitalization of traditional sectors and the emergence of new economic

activities are connected to the implementation of innovation though new products, processes and markets.

Many economic activities rely on to their physical location. That is the case of the Blue economy, largely located in coastal areas. Experience around the world has shown that the concept of clustering suits particularly well to maritime and marine activities. Proximity and geographical location are thus striking features to the emergence of maritime clusters, due not only to the ability of networking and effectiveness of inter-relationships, as well as the easy fulfillment of certain needs, such as access to raw materials. Clusters had in the last decades a growing attention that derives from the fact that clustering dynamics can play a central role in the successful implementation of development strategies.

The attention on clusters has particularly increased since the contribution of Michael Porter (1998) that understood clusters as geographically proximate groups of interconnected companies, suppliers, service providers and associated institutions. The emergence of clusters is based on the fact that actors are located in a geographic context strongly influenced by externalities, mainly positive, that affect productivity. These positive externalities come out through knowledge and workforce agglomerations that connect industries, technologies, skills, and purchased inputs. There are numerous benefits, ranging from specialized labor to targeted training, from increased market awareness to connections with R&D institutes and from strategic cooperation to inter-related maritime activities (Wijnolst, 2006). In this way, Chang defines a maritime cluster as *"(…) a network of firm, research, development and innovation units and training organizations, sometimes supported by national or local authorities, which cooperate with the aim of technology innovation and of increasing maritime industry's performance"* (Chang, 2011:489). For this author the development of maritime cluster needs to be based on existing manufacturing industries. An example is the crucial relevance of ports within coastal areas and their role within the logistics chain of shipping and transport. Ports have become key locations for industrial activities but also for tourism. But the changing performances and composition of maritime clusters reflect specific roles in different regions and periods (Salvador, 2013). This last author identifies four generations of maritime clusters:

- First generation - maritime activities focus on port infrastructure, specifically in cargo loading and discharging functions, and shipping functions. These functions are local and territorially dependent. Relationships and connections among and within this kind of maritime clusters are simple and rather loose. Maritime actors do not act together, when making decisions.

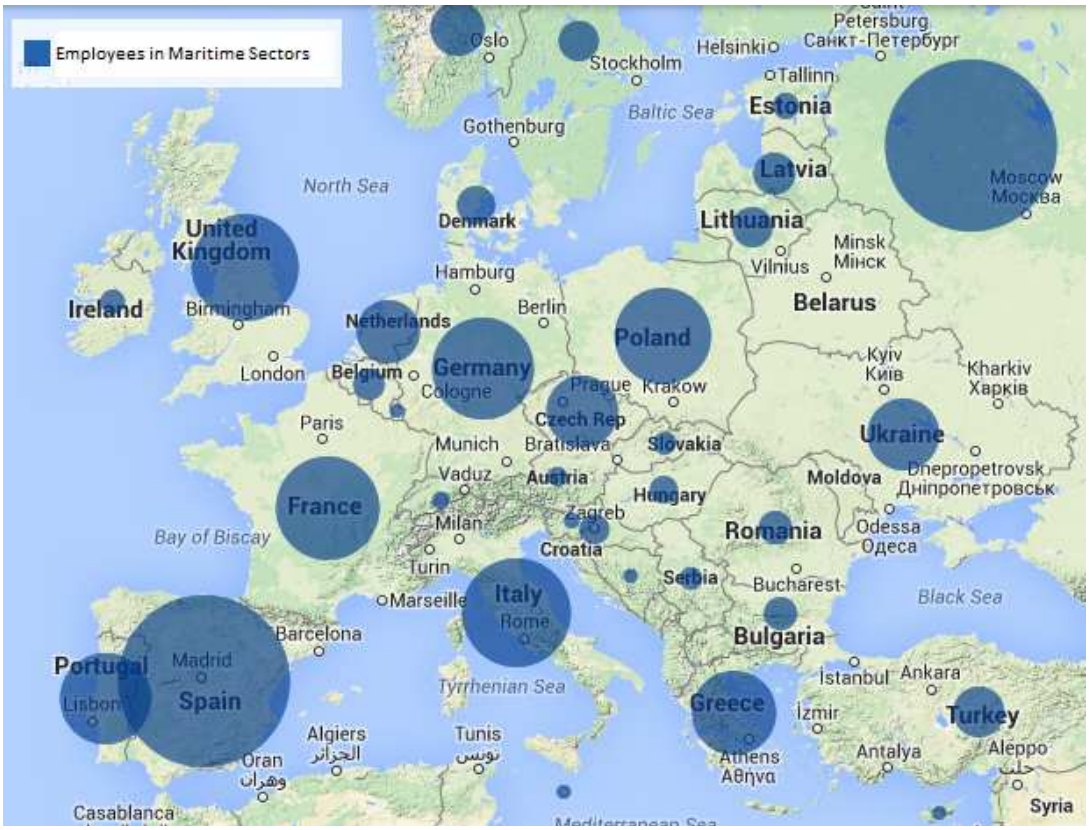
- Second generation - cargo allocation and value-added processing are at the centre of the cluster. It is the typical centre of logistics and cargo allocation, aiming to provide value-added production and services. The geographic scope is regional and larger than port in the previous generation. This type of maritime 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.

- Third generation - emerged in the 1980's in the context of global trade change and developed in depth and in dimension, calling for an extensive transport network. Maritime clusters allocated not only products and capital but the technology and intangible assets. These activities are carried out in a much larger geographical area than previous generations and the sphere of influence is often global. Maritime cluster plays a role in the supply chains for its capacity of processing and distributing information.

- Fourth generation - appeared in the 1990s with characteristics of physically separation but linkages through common operators or administration. It mainly results both from vertical and horizontal integration adopted by transport operators. This type of maritime cluster appears with new functions as a maritime service centre instead of taking port and physical cargo logistics as core activities. The concept of local or regional territory vanishes. Maritime clusters in this category are provided in a wide range of services.

Because of the relative size of maritime and marine activities, see as an example Figure 1, the emergence of relevant maritime clusters is one of the possibilities to revitalize the capacity of EU Atlantic regions to compete globally and overcome problems of recent economic downturn. However, the development of maritime clusters is complex. The current economic and financial crisis may have also delayed the EU maritime clusters operation because Blue economy has as its crucial engine international trade, which in turn depends from economic growth and stability.

**Figure 1.** Relative Size of Maritime Sectors in European Countries (Number of Employees, 2011)




Source: European Cluster Observatory (http://www.clusterobservatory.eu)

Recent policy has provided attention to these matters. An example is the Atlantic Action Plan, launched in May 2013 by the European Commission DG Mare with the overarching objective to generate Blue growth, fostering more jobs and growth in coastal areas and in the maritime economy by giving a substantial push to emerging maritime sectors (ocean energy, marine biotech and the exploration and exploitation of deep sea natural resources), but also by revitalizing traditional industries such as aquaculture and coastal tourism (European Commission, 2013).

This short communication intends to contribute for the debate about the relevance of Blue economy in the regional development of Atlantic coastal areas. For that, a recent survey implemented in the HARVEST Atlantic Area project is presented, providing insights about innovation and human capital in the Blue economy. The data collected in this survey is explored to create an econometric model to verify the variety of cooperation determinants in Atlantic Blue economy's stakeholders. In the end, the text presents some conclusions and synthetic policy implications.

## 2. Results and Discussion

### *2.1. Methodological Notes*

This study is a result of one of the major outputs of the project HARVEST Atlantic. This project was developed under the Atlantic Area Programme 2007-2013 and intended to identify and exchange good practices and sustainable solutions based on innovation, diversification and marketing for the maritime economy and resources to leverage improvements in the socioeconomic situation of the Atlantic seaside territories through transnational cooperation. One of the key activities of the project was the preparation of the Observatory of the Atlantic Maritime Economy (ATOME). This observatory is intended to be a source of information about socio-economic indicators underlining the relationship between different types of dimensions at micro level (using stakeholder's information collected though specific surveys) and macro level (using regional information, specially from EUROSTAT). The activities of ATOME will focus the development of indicators and indices to measure development and variations among EU regions, the provision of information to research and to decision-making, in particular across the five countries of the Atlantic Area, and to encourage cooperation between researchers and the public and private sectors, to engage in collaborative initiatives towards innovation[1].

The transnational survey presented below was a preliminary activity of the ATOME, a way to identify key questions that should be evaluated periodically in the Blue economy. The survey departed from the notion of maritime mega-cluster to study entities participating in the blue economy. The study was applied through an online survey, which inquired companies operating in the above sectors in four countries where the HARVEST was implemented: Portugal, Spain, Ireland and Scotland. The survey resulted in a sample of 243 stakeholders of the Blue economy, the large majority private companies, and the processing and analysis of data was made with the SPSS - Statistical Package for the Social Sciences (version 21.0).

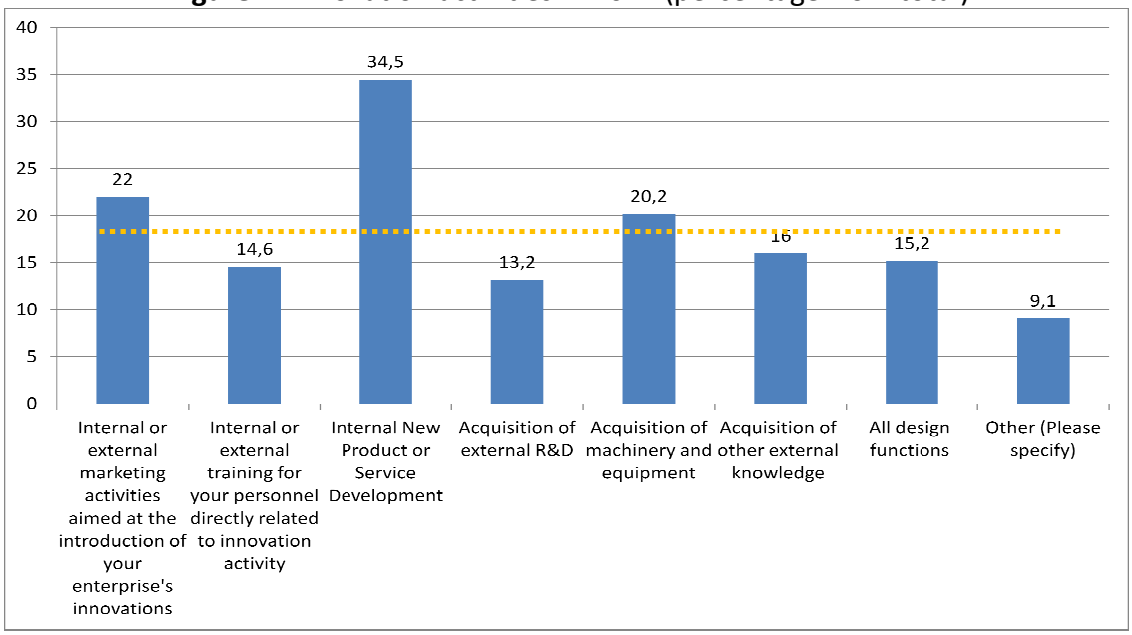
[1] ATOME will be available at http://www.harvestatlantic.eu/atome/.

The transnational survey focused in innovation and human capital and it was applied in the last trimester of 2013. It obtained answers of organizations operating in the following maritime domains: R&D and universities (17% of the answers), Coastal tourism (1.7%), Biotechnology (19.1%), Seafood (30.4%), Shipbuilding and repair (7.8%), Energy (8.7%), Environmental protection (2.2%), and Public authorities (3%). The responses obtained were from Ireland (33.3%), Portugal (32.1%), Scotland (14.8%), and Spain (19.8%). The sample is constituted by organizations that operate only at local level (15.9%), regional level (14.3%), national (27%), European (27%), and other international markets (29.4%). Regarding dimension, 40.8% of the entities have less than 10 employees, 44% have 10 to 50 employees, 8% 51 to 250, and 7.2% more than 250 employees. The annual turnover of 58.4% is less than 2 million Euros, 28.5% are between 2 million and 10 million, 7.3% are between 10 and 50 million, and only 5.8% had turnovers greater than 50 million Euros.

### *2.2. Results from the Survey*

The first dimension to analyze in the survey regarded innovation. The idea of innovation is central in the clustering dynamics and has had, over the last years, a great deal of attention. Innovation is intrinsically connected to economic change and technological advancement, referring to the creation of new products, new processes, new sources of supply, the exploitation of new markets and new organizational forms. Companies, institutions of science and technology, knowledge transfer and the environment or the surrounding context are areas that delimitate the field of innovative processes (OECD, 2005). In this sample, there are a big proportion of innovators. When asked if the organization had engaged in innovation activities in the previous year 52% answered positively. The most common innovative activities are internal new product or service development (34.5%), internal or external marketing activities aimed at the introduction of innovations (22%) and acquisition of machinery and equipment (20.2%) (Figure 2).

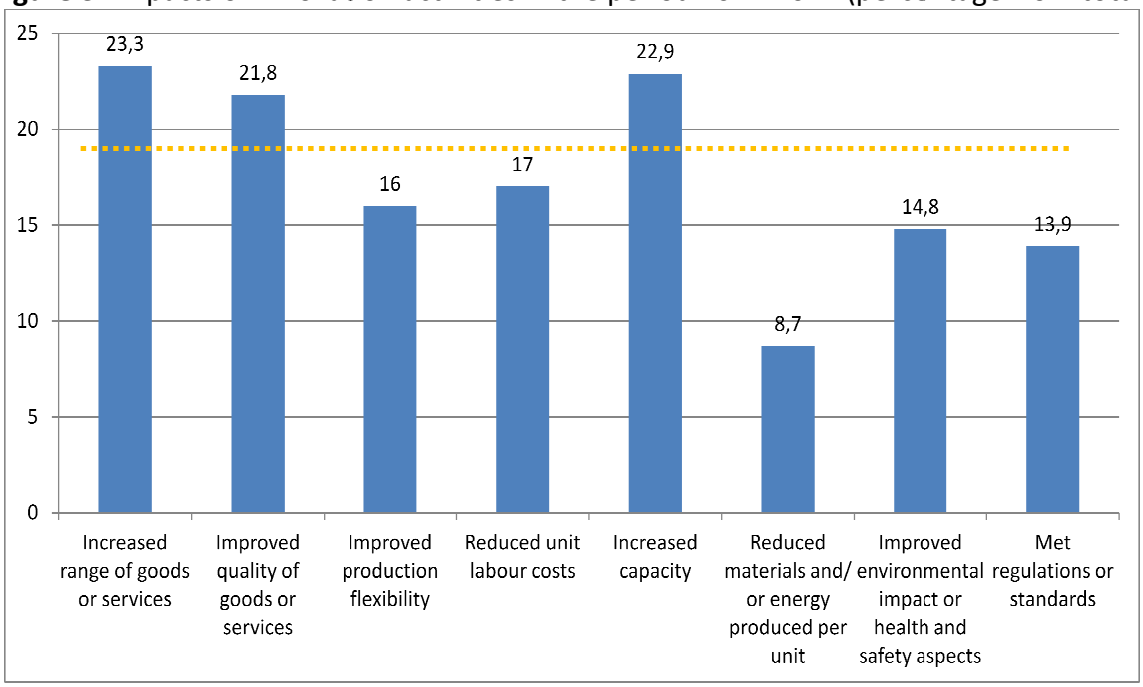
**Figure 2.** Innovation activities in 2012 (percentage from total)




Source: Own elaboration

Impacts of innovation activities regard specially the increased range of goods and services (23.3%), increased capacity for production (22.9%) and improved quality of goods or services (21.8%) (Figure 3). Regarding cooperation some interesting results were achieved (Figure 4). Consultants (19.4%) and clients or costumers (19.3%) are the preferred types of actors to engage in cooperative projects directed to innovation. Other relevant players are suppliers of equipment, materials, components or software (16.3%) and universities and other public research institutions (15.5%).

**Figure 3.** Impacts of innovation activities in the period 2011-2012 (percentage from total)

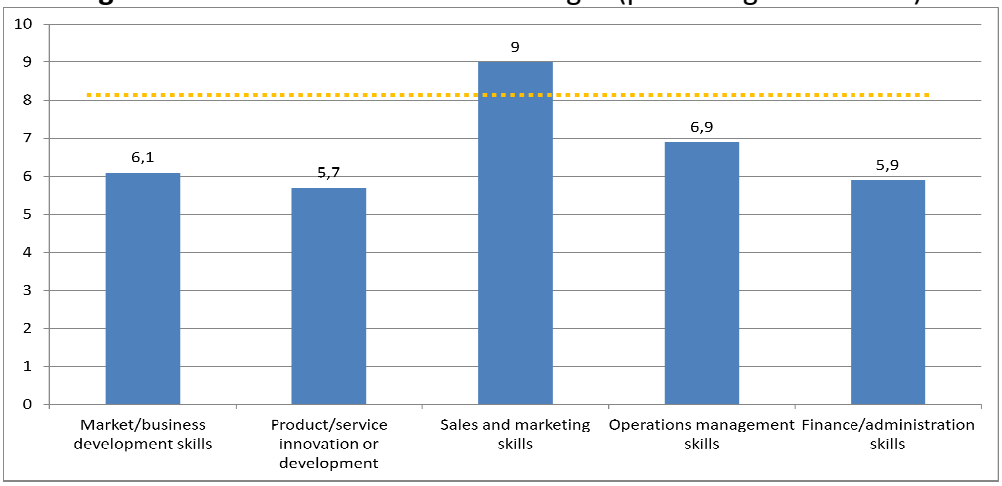



Source: Own elaboration

**Figure 4.** Cooperated with any of the following actors to drive innovation activities in 2011-2012 (percentage from total)


Source: Own elaboration

**Figure 5.** Areas of evident staff shortages (percentage from total)



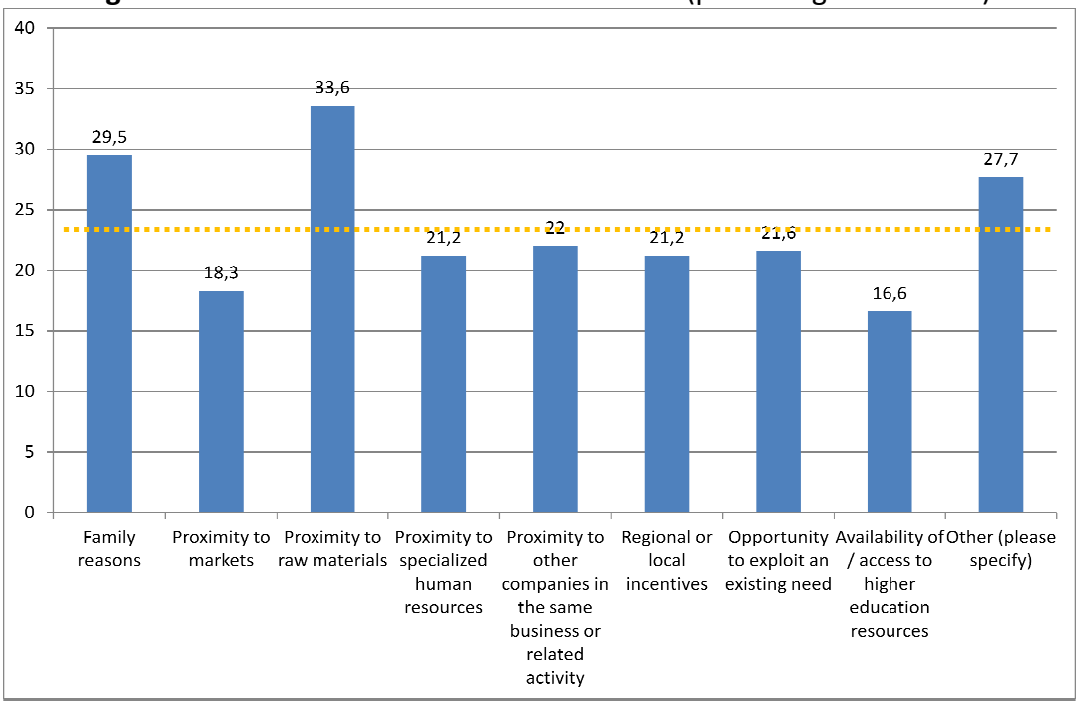

Source: Own elaboration

A second dimension analyzed by the survey was Human Capital. The shift of focus from the physical capital to the intellectual contribution of employees is a central feature to generate innovation, providing the adequate conditions for clustering dynamics. Highly associated with this notion is the idea of absorptive capacity (Cohen and Levinthal, 1990). Absorptive capacity can be understood as the ability of a firm to recognize the value of new and external knowledge, assimilate and apply it. Absorptive capacity is crucial by facilitating the interactions between different types of actors generating socioeconomic benefits from cooperation and thus stimulating the generation of 'industrial atmospheres'. Around 70% of companies referred not having a PhD, Msc and Bsc but only 25% believed having qualification shortages and only 26.1% skill shortages third level institutions could meet. This situation reveals some lack of trust in the contribution that third level institutions can provide to improve competencies of the staff. The main area of evident lack of capacity in the perspective of the respondents is sales and marketing skills (Figure 5).

Today is also understood that innovation and human capital do not work alone in the clustering emergence. A third factor is usually underlined. The existence of social capital is of central relevance to the emergence of a cluster. Social capital regards the features of social organization such as networks, norms, and social trust that facilitate coordination and cooperation for mutual benefit. Social capital is a spatial phenomenon (Rutten and Boekema, 2007). It depends mainly from the embeddedness of firms in localized social relations. Shared norms and values facilitate collaboration for mutual benefit. As innovation is increasingly a collective effort, embeddedness and social capital also help to explain how and why clusters are more or less successful. A third dimension analyzed in the survey was the factors related with location of the organization. The main reason is the proximity to raw materials (33.6%), particularly relevant if we take into consideration that we were dealing with companies based in marine and maritime resources. Nonetheless the second justification for the decision of localization is family reasons (29.5%), a situation that directly connects with the existence of social capital in the territory. One aspect analyzed in the survey regarded the benefits from the location in the Atlantic Area. 61.3% of the organizations admitted that its position or market image of the organization benefits from being located in the Atlantic Area or from using Atlantic products or resources. The organizations considered that their activity, products or services were adding value to

the image of their region and of the Atlantic Area because they were innovation leaders (33.8%), engaged in adding value to the territory through social responsibility (30.5%), and environmental leaders in the sector (26.3%).

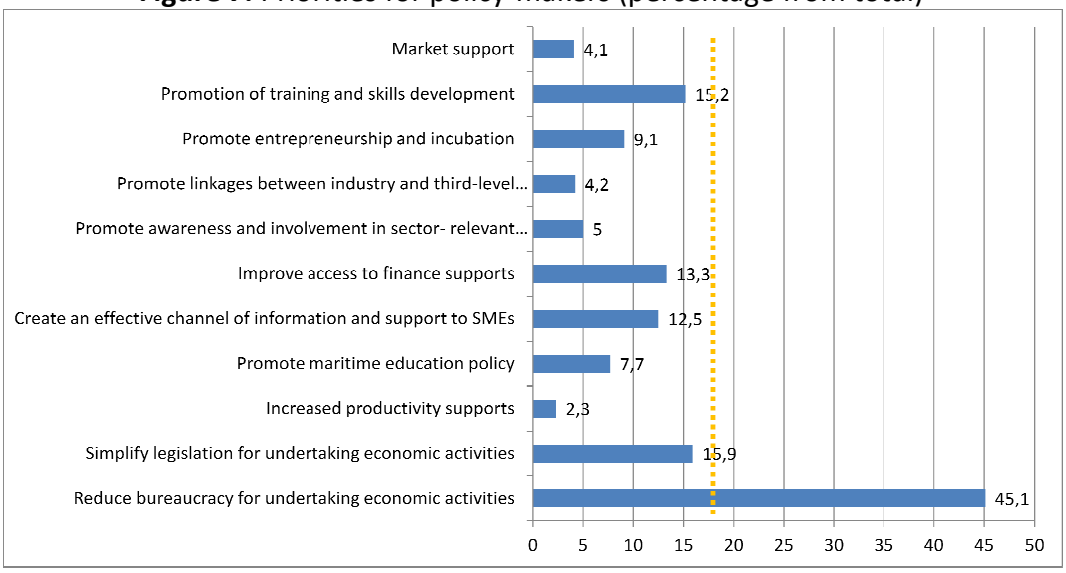
**Figure 6.** Reasons for the selection of location (percentage from total)




Source: Own elaboration

A final dimension was centered in the intervention that decision-makers could do to stimulate a favorable environment to businesses in the Blue economy. Here the priority to be address by policies was very clear. 45.1% of the respondents revealed that the reduction of bureaucracy for undertaking economic activities is the main area for change by policies (Figure 7).

**Figure 7.** Priorities for policy-makers (percentage from total)




Source: Own elaboration

## 3. Model Estimation

Cluster emergence and consolidation requires both competition, between firms in the markets, and cooperative behavior. In this section we are interested in checking the main determinants of the variety of cooperative behavior. Based in the survey data we tried to understand the factors that induce cooperation. The dependent variable selected was the variable "COOP". It is a construct that may vary from 0 to 9 depending if the organization cooperates with other enterprises of the same group, suppliers, clients, competitors, consultants, commercial laboratories, HEIs, government organizations, private research institutes. The variable "COOP" assumes 152 times the value of zero, meaning that around 62.5% of the respondents do not cooperate at all. Cooperation with one, two and three types of actors is similar (around twenty observations) and it diminishes with the increase of the variety of types of actors cooperating. The independent variables are binary variables that assume the value 1 if the qualitative characteristic under analysis in present. All independent variables are presented in Table 1.

**Table 1.** Independent variables

| Independent variables | Nr of 1s | Expected effects on cooperation |
|---|---|---|
| INNO - Participation in innovation activities | 78 | H1: participation in innovation activities induces cooperation (+) |
| UNC - Uncertainty and economic turbulence is the main restriction to innovation | 52 | H2: firms affected by uncertainty and economic turbulence are less cooperative in these activities (-) |
| PROXHR - Proximity to qualified human resources is the main justification for location | 51 | H3: firms localized in pools of qualified human resources are more willing to cooperate (+) |
| ABS_CAP – Absorptive capacity measured by if firm has PhD, Msc, Bsc | 77 | H4: Firms with absorptive capacity cooperate more (+) |
| EXP - Firm compete in the external markets | 54 | H5: Firms that export are more cooperative (+) |
| TURNOV - Turnover greater than 50M€ | 8 | H6: Bigger firms are more cooperative than smaller firms (+) |
| TOUR - Sectoral dummy for Tourism | 44 | H7: Tourism firms are less cooperative than the average |
| SEAF - Sectoral dummy for Seafood | 70 | H8: Seafood firms are less cooperative than the average |
| BIOT - Sectoral dummy for Biotechnology | 27 | H9: Biotechnology firms are more cooperative than the average |

Source: Own elaboration

The correlation table is presented below (Table 2). It be can noticed that Cooperation is highly correlated with absorptive capacity and innovation activities.

**Table 2.** Correlation table

| | ABS_CAP | BIOT | COOP | EXPOR | INNO | UNC | PROXHR | SEAF | TOUR | TURNOV |
|---|---|---|---|---|---|---|---|---|---|---|
| **ABS_CAP** | 1.000 | 0.162 | 0.566 | 0.189 | 0.271 | 0.076 | 0.409 | -0.160 | 0.350 | 0.073 |
| **BIOT** | 0.162 | 1.000 | 0.078 | 0.134 | 0.112 | 0.041 | -0.032 | -0.299 | -0.166 | -0.027 |
| **COOP** | 0.566 | 0.078 | 1.000 | 0.209 | 0.563 | 0.285 | 0.156 | -0.023 | 0.063 | 0.211 |
| **EXPOR** | 0.189 | 0.134 | 0.209 | 1.000 | 0.311 | 0.180 | -0.008 | 0.119 | 0.000 | -0.043 |
| **INNO** | 0.271 | 0.112 | 0.563 | 0.311 | 1.000 | 0.436 | -0.051 | 0.088 | -0.159 | 0.268 |
| **UNC** | 0.076 | 0.041 | 0.285 | 0.180 | 0.436 | 1.000 | -0.023 | 0.067 | -0.121 | 0.241 |
| **PROXHR** | 0.409 | -0.032 | 0.156 | -0.008 | -0.051 | -0.023 | 1.000 | -0.216 | 0.364 | -0.038 |
| **SEAF** | -0.160 | -0.299 | -0.023 | 0.119 | 0.088 | 0.067 | -0.216 | 1.000 | -0.225 | 0.086 |
| **TOUR** | 0.350 | -0.166 | 0.063 | 0.000 | -0.159 | -0.121 | 0.364 | -0.225 | 1.000 | -0.065 |
| **TURNOV** | 0.073 | -0.027 | 0.211 | -0.043 | 0.268 | 0.241 | -0.038 | 0.086 | -0.065 | 1.000 |

Source: Own elaboration

As "COOP" is an ordinal variable, different ordinal LOGIT models were estimated for understanding the cooperative behavior. A general model (aggregated data for all types of entities), and specific models for cooperation with suppliers, cooperation with clients and cooperation with HEIs were estimated but there was not found significant statistical differences.

**Table 3.** Global Model for Dependent Variable COOP

| Independent variables | Coefficient | Std. Error | z-Statistic | Prob. |
|---|---|---|---|---|
| INNO | 2.975*** | 1.0055 | 2.9589 | 0.0031 |
| UNC | -0.351 | 0.7197 | -0.4873 | 0.6261 |
| PROXHR | -0.0296 | 0.8030 | -0.0369 | 0.9706 |
| ABS_CAP | 3.3871** | 1.3265 | 2.5535 | 0.0107 |
| EXPOR | 0.1978 | 0.7019 | 0.2818 | 0.7781 |
| TURNOV | 2.2870 | 7.1438 | 0.3201 | 0.7489 |
| TOUR | -39.710*** | 2.4310 | -16.335 | 0.0000 |
| SEAF | -0.6006 | 0.5789 | -1.0375 | 0.2995 |
| BIOT | -1.8836*** | 0.5884 | -3.2011 | 0.0014 |

Akaike info criterion: 11.398 Schwarz criterion: 11.642 Log likelihood: -1367.80
Hannan-Quinn criterion: 11.496 Avg. log likelihood: -5.629
*** Significant at 0.01, ** significant at 0.05.
Source: Own elaboration

The data was also controlled by country but again there was no significant differences. Confronting the hypotheses elaborated with the results, the model confirms H1, the participation in innovation activities induces the variety of cooperation, it has a positive and statistically significant coefficient. The model does not achieve a clear result for H2. The sign is negative but not significant providing some evidence that firms affected by uncertainty and economic turbulence are less cooperative. The coefficient associated with the fact that firms are localized in pools of qualified

human resources is not significant (H3) but is also negative suggesting ambiguous effects of this variable in cooperation. H4 is clearly confirmed. Firms with absorptive capacity are more willing to cooperate. The coefficient associated with export activity is positive has expected but it is not significant in statistical terms (H5). It is not clear if the dimension of firms affects its cooperation patterns (H6). The coefficient relative to the association of bigger firms is positive but statically it is not significant. Regarding the sectoral dummies, the model clearly confirmed that tourism firms are less cooperative than the average (H7), the model does not shown conclusions regarding if the seafood firms are less cooperative than the average (H8) but has found that biotechnology firms are less cooperative than the average (H9), what rejects the initial assumption that this emergent high-tech sector was more prone to cooperation.

## 4. Conclusion

Clusters are omnipresent in the world of policy-making and have become a policy fashion item (Ebbekink and Lagendijk, 2012). The maritime cluster is being transformed into a strategic ambition in EU Atlantic regions to engage a positive dynamics of development. Blue economy depends in fostering more jobs and growth in coastal areas by giving a substantial push to emerging maritime and marine sectors (ocean energy, marine biotech and the exploration and exploitation of deep sea natural resources), but also by revitalizing traditional industries such as aquaculture and coastal tourism. The consolidation of maritime clusters is complex, depending on competition in the markets and the cooperative behavior between a variety of companies, suppliers and customers, knowledge producers and decision-makers within the Blue economy.

In this short communication, the emergence of clusters was debated, linking these phenomena with innovation, human capital and absorptive capacity, and social capital. Using a transnational survey applied in 2013 to 243 actors operating in the Atlantic Area in Ireland, Portugal, United Kingdom, and Spain in maritime sub-sectors (R&D and universities, coastal tourism, biotechnology, seafood, shipbuilding and repair, energy, environmental protection, and public authorities), the communication presented insights regarding innovation and human capital. The results of the survey show that actors in the Blue economy participate in innovation activities to increase productive capacity, more quality and obtain a larger range of products. Actors participate in innovation activities investing in new products and processes, marketing innovations and acquisition of machinery and equipment. Central sources of innovation are clients, consultants and suppliers. Location is mainly justified by the co-location of social capital (family networks) and by the utilization of coastal products and resources in the organization's value-chain. The market image of the Atlantic is commonly explored as a differentiation characteristic. More than seventy percent of actors do not have third-level educated employees but only a quarter identify their educational shortages, specially affecting marketing and sales skills. Excessive bureaucracy and complex legislation are identified as policy problems that need to be addressed in a multi-level governance perspective for the emergence of the maritime cluster. We tried to clarify the determinants of cooperation estimating ordinal LOGIT models. This approach has found that cooperative behavior depends mainly on the capabilities of the

firm – absorptive capacity – and the previous experience in participating in innovation activities. Tourism is a less collaborative branch in the maritime cluster.

The policy implications for Blue growth of these results are quite straightforward. For instigating the emergence of a maritime cluster, policy-makers must induce cooperation. Currently we can notice that cooperation is still in a level that can be considered very low as the majority of organizations do not participate at all in cooperative activities. Programmes that focus directly the collaboration, networking and knowledge exchange between firms and other types of organizations, such as universities and other public research organizations or governance bodies, would be of major relevance. Other two types and interventions seem relevant. The first regards the direct stimulus to participation in innovation activities because actors persisting in innovation are more willing to cooperate with others. A second is the improvement of human capital in the organizations. By doing the enhancement of competencies, qualification, and skills, organizations increase their absorptive capacity and gain the ability to recognize the potential and value of cooperation for their own advancement and economic benefit. Finally, it is important to refer that some particular activities should not be considered the core of the maritime cluster as they reveal a cooperation-adverse profile. This is the case of tourism. Today coastal tourism is having much attention by policy makers in the context of maritime cluster emergence but the lack of collaboration between organizations in this sector may prevent the initial dynamics and consolidation of a more transversal maritime cluster. The sector to be selected by policies as the core of a maritime cluster should be relevant in terms of competitiveness but should also be cooperative in its essence.

## Acknowledgments

Hugo Pinto benefits from a Postdoctoral grant from FCT - *Fundação para a Ciência e a Tecnologia* (reference SFRH/BPD/84038/2012) funded by POPH - NSRF - Typology 4.1 - Advanced Training, co-financed by the ESF and by national funds of the Portuguese Ministry of Education and Science. This short communication was stimulated by HARVEST Atlantic – Harnessing all resources valuable to economies of seaside territories on the Atlantic, project co-financed by the European INTERREG Atlantic Area through the ERDF. The contribution of Ana Rita Cruz and Carla Nogueira in this project is acknowledged.

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