Maria Scientia

Revista Científica Electrónica | Scientific e-Journal

Instituto de Estudos Políticos |Universidade Católica Portuguesa
Institute of Political Studies | Portuguese Catholic University

• • •

Revista Científica Electrónica
Maria Scientia

Um projecto da Linha de Investigação em Assuntos Marítimos da Área Científica de Estudos Europeus do Instituto de Estudos Políticos da Universidade Católica Portuguesa

Sumário

Conselho Científico

**Prof. Doutora Maria da Glória Garcia
Prof. Doutor João Carlos Espada
Prof. Doutor Adriano Moreira
Almirante Nuno Vieira Matias
Vice-almirante António Rebelo Duarte
Vice-Almirante Vitor Lopo Cajarabille
Prof. Doutor Álvaro Garrido
Prof. Doutora Elisabete Azevedo-Harman
Prof. Doutor Eduardo Lopes Rodrigues
Prof. Doutora Sónia Ribeiro
Mestre Maria Fernandes Teixeira**

De acordo com as normas de publicação em vigor, todos os artigos foram sujeitos a *blind peer-review.*

Edição nº 6 | Julho 2013

Contributions of Marine Cluster for Regional Sustainability: Economic Prospective for Azores

Luz Martin Paramio[ab]

[a]LIAM Maria Scientia, , IEP/UCP, Lisboa, Portugal; [b] Centre of Applied Economics Studies of the Atlantic. University of the Azores, Ponta Delgada, Portugal. Investigadora, Doutorada em Geografia pela Universidade dos Açores.

| lparamio@uac.pt

Teresa Borges Tiago[b]

[b]Centre of Applied Economics Studies of the Atlantic. University of the Azores, Ponta Delgada, Portugal. Professora auxiliar, Doutorada em Ciências Económicas e Empresarias, pela Universidade dos Açores.

| mariaborges@uac.pt

Flávio Tiago[b]

[b]Centre of Applied Economics Studies of the Atlantic.University of the Azores, Rua da Mae de Deus, 9501-801 Ponta Delgada, Portugal. Professor auxiliar, Doutorado em Ciências Económicas e Empresarias, pela Universidade dos Açores

| flaviotiago@uac.pt

José Cabral Vieira[b]

[b]Centre of Applied Economics Studies of the Atlantic. University of the Azores, Rua da Mae de Deus, 9501-801 Ponta Delgada, Portugal. Professor associado com agregação, Doutorado em Economia pela Universidade de Amsterdão.

| josevieira@uac.pt

Abstract

This paper points out the benefits and opportunities of using the clustering methodology applied to the endogenous economic drivers, in particular, the marine domain. In regional development context, the cluster appears as a powerful tool for governance and policy implementation. Currently, economic transition forces the regions to develop a new sustainability paradigm. In the case of small regions, such as the Azores Archipelago, the development model relies on the governance opportunities of internal resources. Using a strategic management approach the paper performs a prospective analysis to identify the framework, factors and requirements needed to define the Azores Marine Cluster. The cluster congregates the main sea activities already performed in the region and add the potential sectors recognized. This structure derives from the evaluation of the overall potential of the Sea of the Azores as an endogenous economic force. The paper weighted the contributions of the Azores marine cluster to the regional economic system and the link to other economic drivers. The Azores Marine Cluster arises as a smart mechanism to implement recommendations and requirements, especially at the European and International governance agenda.

Highlights

- Prospective regional economic development considering local determinants and players.
- Regional cluster as driver for competitiveness and sustainability.
- Smart governance and cluster life cycle dynamics assessment for the Azores Region.
- Definition of the Azores Marine Cluster.

Key words: Marine cluster; Azores Region; Regional Sustainability; Smart Governance

Resumo

O presente artigo identifica e salienta um conjunto de benefícios e oportunidades derivados da aplicação da metodologia de clustering a vetores económicos endógenos, em particular, os do ambiente marinho. Num contexto de desenvolvimento regional, os clusters têm-se demonstrado importantes ferramentas para a governação e a implementação política. O atual contexto económico força as regiões a desenvolverem um novo paradigma de sustentabilidade. Assim, para o caso das pequenas regiões como os Açores, o modelo de desenvolvimento deve dar atenção às oportunidades decorrentes da governação dos seus recursos internos. Tendo por base uma abordagem de gestão estratégica, este trabalho efetua uma análise prospetiva que identifica o quadro, os fatores e os requisitos necessários para a definição de um Cluster do Mar para os Açores. O âmbito do cluster deve abranger não somente as principais atividades existentes no Mar dos Açores, bem como outros setores com potencial para a região e que se entrecruzam pelo uso e valor do Mar. A estrutura proposta visa contribuir para o desenvolvimento do Mar dos Açores, enquanto força económica endógena. Por outro lado, a presente investigação avalia as contribuições do cluster do mar para o sistema económico regional e nacional, bem como a sua ligação a outros vetores económicos. A proposta do Cluster do Mar dos Açores surge como um smart mechanism que permite o acompanhamento das dinâmicas derivadas da agenda europeia e internacional sobre os assuntos do mar, particularmente o crescimento económico e economia azul.

Destaques

- Prospetiva económica regional.
- Clusters como vetores de competitividade e sustentabilidade regional.
- Governança inteligente e ciclo de vida dos clusters na dinâmica dos Açores.
- Dimensões do Cluster do Mar dos Açores.

Palavras-chave: *Cluster* do Mar, Açores, sustentabilidade regional, Governança inteligente e Economia Azul.

I. Introduction

The Azores Region is an archipelago composed by nine small islands located in the North-Atlantic, that encompasses a sub-area from Portuguese Exclusive Economic Zone of approximately 953,633 km2. Therefore, the proposed continental shelf extension under the UNCLOS process rises the opportunity to double this area. The importance of this Region at the economic level and also from the geostrategic and political point of view seems, thus, evident. The Azores' economy sustainability will depend on the capacity of use of this maritime potential. The prospective scenario of marine clustering will allow us to understand the relations and contributions to regional sustainability.

Globalization has changed the competitive landscape, giving a new shape to the concept of economic regions. This phenomenon is compounded by the increasing and rapid diffusion of knowledge, taking advantage of the faster innovation processes. In this context, the challenge is to look at economy in a regional perspective and strategically focus on sustainable spheres of activity. As a consequence of this paradigm shift, regional strategic clusters have gained, over the past years, a decisive role in regional development strategy.

Yet clusters, or geographic concentrations of interconnected companies, are often viewed as the result of regional policies that attempt to stimulate different industries taking advantage of local resources, since regional economies performance is strongly influenced by the strength of local clusters and the vitality and plurality of innovation.

It is now accepted that regional clusters are composed by a set of firms, geographically concentrated, working in specific value chains and taking advantage of synergistic efforts in order to generate competitive advantages [1].There are numerous theoretical and empirical works on clusters, which pointed out that clusters can stimulate innovation and firms productivity [2]. The mix of clusters differs distinctly across regions.

Clusters often involve a mix of manufacturing and services, and combine industries in different parts of traditional industrial classification systems. As Delgado et al. [3] suggested, the spillovers arising from related economic activity typically span multiple jurisdictions. The creation and promotion of clusters has been seized upon as an important policy tool and particularly in coastal regions that depend upon the maritime sector [4]. The geographical proximity in the Azores archipelagic region has the bases to apply successfully the cluster paradigm. Wijnolst et al. [5] underline how a model of governance based on the cluster concept allows greater interaction between different actors, not only companies, in the case of the maritime cluster, related to sea activities. It is assumed that the positive effects of the cluster on innovation and value creation are increasing as the co-operation and interdependency increases.

Currently, in Azores, it is possible to identify, by a general approach, some elements and components of a potential Marine Cluster, as fisheries, which provide food and employment to a considerable number of coastal inhabitants disperse by the nine islands; sea activities that support tourism; maritime spaces and activities that also sustain tourism and local demand; and other non-exploited resources with high economic value.

For decades, the marine activities suffered from a "traditional" and non-integrated management perspective. However,

important changes occurred in the last years, especially in the European Union's framework, such as: (i) establishing of common use of European marine resources; (ii) growing awareness of conservation of biodiversity and marine systems health; (iii) increasing relevance of research in the marine affairs; and (iv) recognition of the urgent need for marine resources management improvement. These changes require a tight collaboration among different stakeholders following the "smart governance" claim of European Strategies.

Azores Region presents important constrain in what concerns its development in territorial, economic and social dimensions. Establishing the Sea as a "mark of identity" requires great enforcement at environmental, social and policy levels. The initial steps of a marine governance system are evidenced by advances at integrated coastal zone management, marine spatial planning and marine protected areas policies. Nevertheless, there is a need for greater stakeholders engagement. This gap may be bridged by the cluster as a tool of governance. The paper assumes a broad concept of cluster with the intention of redialing over the economic outlook as a tool that follows the principles of marine governance and sustainability. In this sense, the concept is marine cluster, beyond maritime concept, since the environment and the social dimensions will be integrated with an important role.

Despite the numerous contributions found in the literature related to strategic regional cluster, a wide range of questions arises when looking specifically to the marine cluster. This work aims to reflect on some of these questions applied to the Azores Region: (i) can disperse, forgotten and traditional resources be articulated and promote sustainable economic growth?; (ii) how can endogenous drivers be integrated in regional economy model?; (iii) what are the impacts on region competiveness of clusters formation?; (iv) can a maritime cluster generate economic spillovers?; (v) what are the potentialities of a cluster as a marine governance tool?; (vi) is it possible to identify the components of the Azores Marine Cluster entity?; (vii) which is the current life cycle stage of the Azores Marine Cluster elements?; and, finally, (viii) how can smart governance take advantage of the Azores Marine Cluster?

II. Regional Clusters Framework

Background and today's context

Most managers and policymakers know that a competitive revolution is under way, and few contest its relevance to the enterprises and to the regions where they are implemented. As Porter [6] referred, the main goal of economic policy is to enhance competitiveness, which is reproduced in productivity gains. The region utilizes its people, capital, and natural endowments to produce valuable goods and services. Therefore, the agglomerations of related economic activities are critical to economic geography [3, 7, 8]. With the objective of reinforcing regional specialization based on linked industries in a geographical location the regional cluster approach emerged.

There is a wide range of scientific papers addressing the theme of regional clusters [1, 3, 7, 9-12]. Throughout these studies there is a common point – the "rediscovery" of the work of economist Alfred Marshall [7]. Nearly 100 years ago, Marshall wrote a document with detailed description of the "industrial district" and that was materialized on the current model of technology-based regional clusters, such as the Silicon Valley [9, 13, 14]. This

approach, however, is being challenged by the adoption of transversal clustering models, including companies from different activity sectors along the same value chain.

The wide range of work and its long history shows that the perception of regional clusters is cyclical. For instance, the concept spread rapidly through policy circles during the beginning of the nineties. Soon after, some policy makers and academics considered cluster policies out of fashion and this approach was discarded. More recently, in September 2009, the concept of regional clusters finally came back to the lexicon of economic development policy, with the publication of the Obama's administration "Strategy for American Innovation" [15]. Until then, its greater exposure had occurred with the works of Michael Porter [6, 16, 17]. This author always supported the idea of economic clusters that existed at the country level that should be developed. Obama's approach clearly defines the need to wage on regional clusters as a way to enhance regional competitive advantages.

Clusters at Azores Regional perspective

It is considered that a regional economic cluster is a geographical "group" of interrelated companies which cooperate and compete among themselves. The connection with other institutions provides complementary products and services; these include universities, banking institutions, regional governments; industry, environmental and social associations and trade unions. All these actors interact synergistically along the value chain cluster [6, 16, 18].

In this sense, Trippl [19] argues that there are four reasons that justify looking at clusters from a regional perspective, which are:

(i). Innovation activities have distinct geographic patterns. Several authors have demonstrated the existence of innovation patterns [20-22]. The Portuguese regions were targeted in the work of Natário et al. [23], which suggested the existence of four innovation patterns in Portugal. According to the authors, the Azores, as an isolated region, has a lower rate of innovation.

(ii). The diffusion of knowledge is applied in a given geographical area, contaminating agents in the innovation process [24].

(iii). Tacit knowledge and established cooperative relationships based on trust. Despite the growing trend to coding and quantification of knowledge, it appears that innovation tends to rely greatly on tacit knowledge and therefore is hard to quantify [25]. The sharing of tacit knowledge assumes the existence of a network of contacts and bonds of trust. These two aspects are normally facilitated by tight geographical boundaries [26-28].

(iv). The regional skills and institutions level. Both skills and institutions can be incrementally boosters of the business activity and promote the establishment of collaborative networks, as well as active developers of a regional innovation system [29, 30].

In this perspective, the dimensions were defined as presented below, and considering the specificities for a maritime cluster mentioned by Wiljnost et al. [5].

Table 1 - Cluster Performance Analysis for Regional Economy

Indicators	Concepts
Innovation	**Innovation is the conversion of knowledge into a benefit, which may be for commercial use or for the public good; it reflects the search and the breakthrough, experimentation, development, reproduction and adoption of new products, processes and organizational set ups.**
Knowledge	**Mixed flow of framed experience, values, contextual information, and expert insight provides a framework for evaluating and incorporating new experiences and information. It originates and is applied in the minds of the knower and can be adopted in organizational processes.**
Collaborative Networks	**A collaborative network is the group of firms, individuals and other organizational entities that work together possessing the capabilities and resources needed to achieve a specific outcome, in a business value chain.**
Smart Governance	**Encompasses an inclusive, global and directed governance of common goods and public policies. Governance is supported by the innovation and the technology towards a sustainability system.**

For all the four dimensions presented above we need to encompass a system of quantitative indicators, based on a regional regular data gathering. For instance, the innovation concept can be measured by patents registration, new products or services launched and financial return on innovation investments made. However, this data is still not being gathered at Azores Region.

There are international studies that, through the application of fuzzy analysis methodology, seek to determine which activities should be developed in delimited geographic areas, since they hold characteristics to enable endogenous development [31].

Following a similar approach to the one employed in the study of Manca and Curtin [31], a fuzzy analysis was applied to Azores territory trying to determine which regional clusters have greater potential at the Region [32]. As endogenous drivers, there is a set of reference production industries: the milk and dairy products, meat and fisheries.
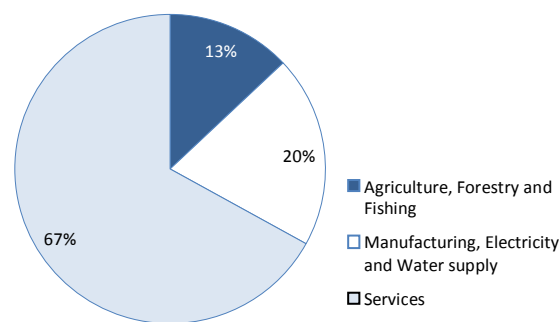

13%
20%
67%

■ Agriculture, Forestry and Fishing
□ Manufacturing, Electricity and Water supply
▢ Services

Fig. 1 - Main economic activities related to endogenous drivers of the Azores Region.

Source: SREA, 2010

The primary sector represents 13% of regional GDP and supplies almost 80% of manufacturing activities. Considering export and import trading figures, in the last five years, primary sector presents a growing path. The GVA share of fishing industry has also grown as presented above (SREA, 2010).
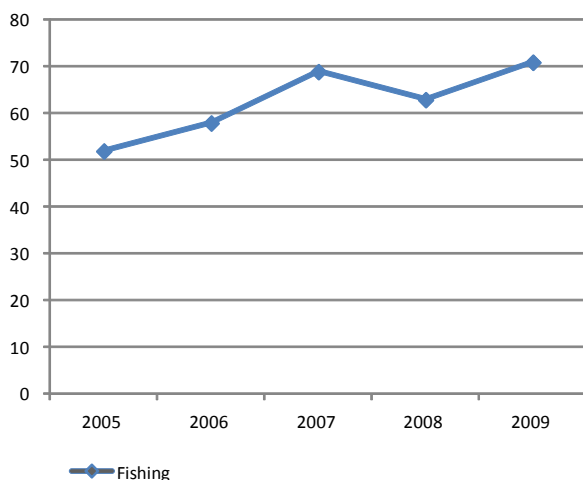
Fig. 2 - Azores GVA share of fishing industry.

Source: SREA, 2010

There are other activities that do not have the economic impact of the primary sector, but are believed to be strategic for regional development, as is the case of tourism. Due to geographic and political reasons, most activities are interconnected (agglomeration), some present a great potential in terms of spillovers. However, the scarcity of regional data does not allow quantifying the impact of each sector and the spillovers contributions.

The entrepreneurial and government initiatives lead to the definition of four major regional clusters, in different stages of development: marine cluster, agro cluster, tourism cluster and technological cluster [32].

However, these clusters definition encompasses a problem; it is further complicated, according to some definitions, to overcome the lack of the spatial dimension. Furthermore Azores has economic disintegration at the nine islands level, each one presenting a specific economic dynamic. The outcomes resulting from regional analysis allow inferring that there are activities that have greater growth potential in certain islands. It is also possible to conclude that some clusters are transversal to all islands,

and others have expression just in two or three islands.

The results of the prospective research applied to Azores Region, carried out by Bettencourt [33] with the Micmac application identified different players and dimensions of influence and dependency of regional economy future development.

As the Figure 3 puts forward, there are geographical and natural characteristics that act as inhibitors or enablers of Azores development. This kind of analysis was also used to evaluate the influence and independence of some marine activities [34]. It can be observed great dependence of a set of issues and activities interconnected with the sea (polygon areas).

The individual value of each of these activities can be small, but with impact in other dimensions. For instance, fisheries are considered the main resource of sea exploration in the Region, corresponding to an important part of the population's income source, therefore having a significant social and economic impact. In 2012, the number of registered fishermen in the Azores was above five thousand, including fish pickers and land workers that provide support to the sea activity. They represent around 4% of Azores active population. However, the transformation industry specifically, the canning industry, adds one thousand jobs. The impact of the sea in employed population grows to 5% and represents 9% of the total Azores Region GDP. Other sea activities can be considered, such as maritime transportation and logistics services. At domestic scale, shipbuilding and reparation shipyards, supply and offer maintenance of conservation equipment, commercialization
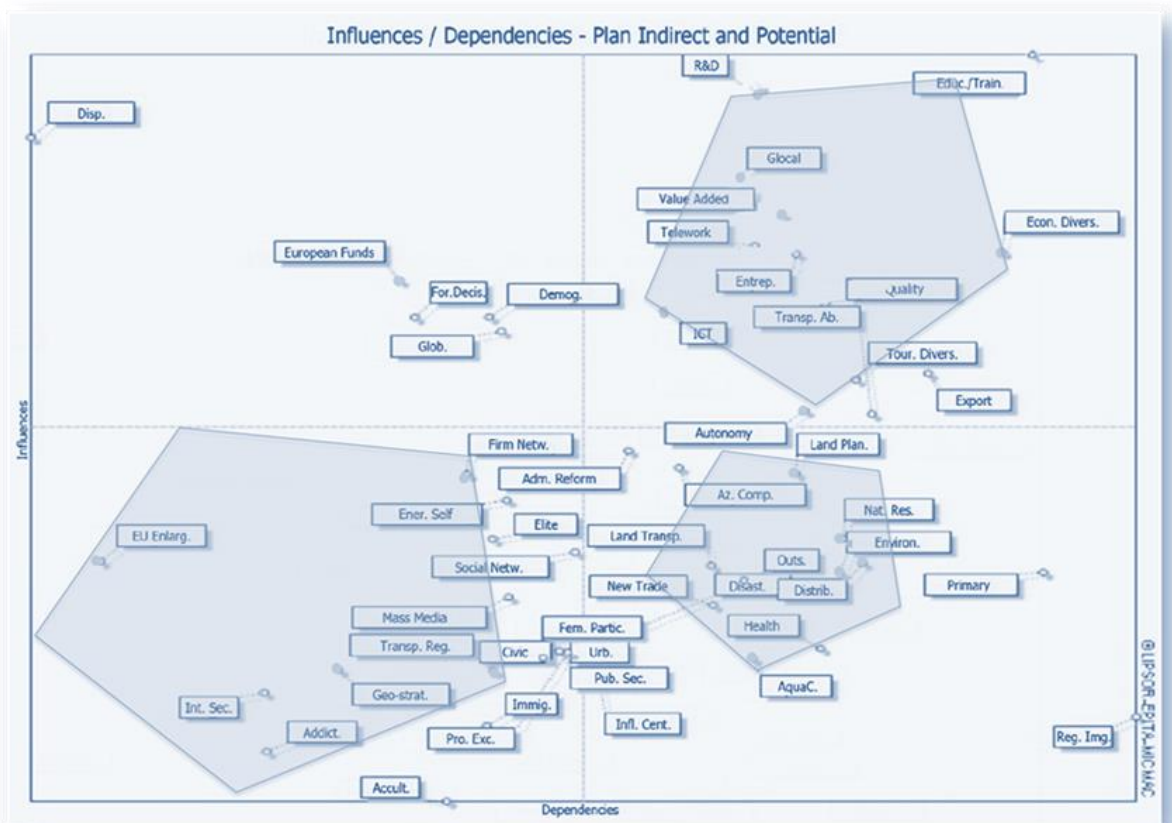
Fig. 3 - Influence dependencies of the developmental strategic factors, the highlights polygons are related to the Marine Cluster.

Source: Adapted from Bettencourt [33]

of fishing arts and marine equipment, among others.

There are also other growing sea related activities, like tourism and scientific research that are performed in Azores, which urge to be carefully analyzed.

III. Towards the Azores Marine Cluster

The Azorean marine related activities have suffered from a "traditional" and non-integrated management perspective, needing to set a governance model suitable to answer to global challenges. In this sense, European Commission provides guidelines to encourage the Member States to adopt any

single system of maritime governance, through the design of national integrated maritime policies. The establishment and implementation of actions and measures are critical for the success of the economy and the renewal of both traditional and developing sectors, both essential to support the creation of wealth and improving growth, social cohesion and quality of life [41, 42]. In this context, Portugal conceived in 2006, the National Marine Strategy [40]. This document sets priority actions, based in three basic pillars: knowledge, marine spatial planning and active promotion and defense of national interests. In 2013, the National Marine Strategy has been launched in a new phase, supported by and action plan for 2013 to 2020

where economy and governance assume the main foundations.

Following this framework, the aims to develop a marine cluster for the Azores Region used the methodology based in the analyses of potentialities and benefits suggested by Trippl [19] and by Wiljnost et al. [5]. The strengths and weaknesses of the Azores Region determine the profile and its competitiveness at the international set. Critical factors for regional sustainability success may be optimized. The regional clusters system seeks on the sustainability paradigm a core element of governance policies [35] where the university research projects and companies strategy supports are crucial [36, 37].

Regional strategic clusters are important sources of economic development. The clusters impact increment the local and regional conditions of governance and sustainability process assessment [38]. Previous research works link successful clusters to innovation capacity, especially in technology clusters.

Sustainability implies an ongoing dynamic development, driven by human expectations about future opportunities, encompassing different dimensions [39]: (1) conventional economic perspective; (2) environmental protection perspective; (3) intergenerational perspective; (4) holistic perspective; and (5) integrated perspective, combining the economic, environmental and social dimensions. Therefore, sustainability is not an end, but a continuum process of governance.

The history and relevance of the sea to the islands economic sustainable development led us to search the answer for the questions presented in the introduction section.

In the following sections the author presents an overview and analysis of Azores sea

dynamics, as well as an evaluation of the potential impact of the marine cluster.

Azores marine governance dynamics'

Located in the Mid Atlantic, (see Figure 4), Azores Archipelago has peculiar features that remark the insularity, territorial structure and the autonomy statute. The biggest Exclusive Economic Zone (EEZ) and their maritime space in general placed the archipelago in the spotlight, turning it into a model for the validity of the current political framework [40].

The importance of the sea in the Azores can be measured by the size of that sub-area of Exclusive Economic Zone of Portugal – 953,633 Km2 – the largest in the European Union, extending the borders of the EU to the neighborhood of the American continent. The marine environment, conservation and biological resources, have an international importance. This fact is justified by its isolated position in the middle of the Atlantic (Macaronesian Biogeographical Region) and the recent age of the Archipelago.

Azores archipelago has a set of peculiar features, like regionalization, insularity and autonomous government that provides and privileges the study of maritime/coastal governance. Its marine environment, potential resources and wide maritime domain, together, are a critical piece for its future development. Research competences and capacities should range over the various activities of the maritime domain. Co-operating in a cross sector and financing mechanisms are fundamental means to support cluster development [43].

Current discussions on "global governance" are including socio-political transformations
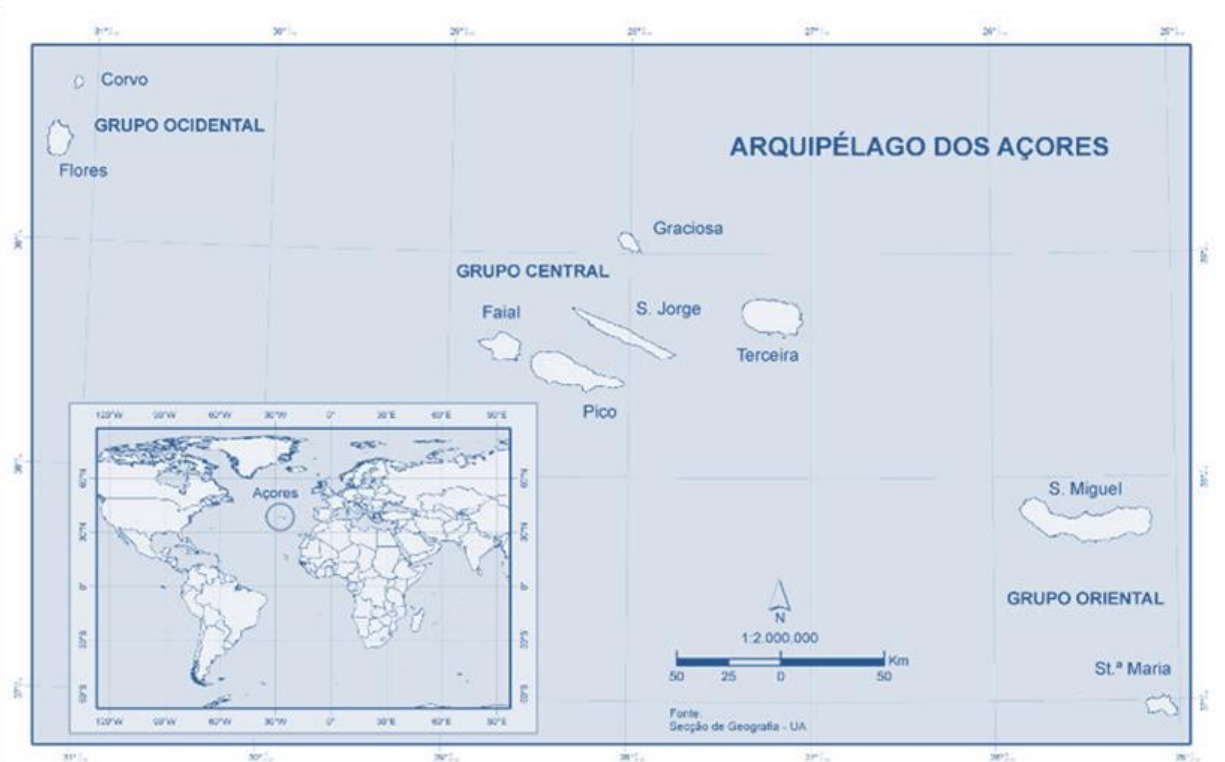
Fig. 4 - Geographic position of the Azores Archipelago.

Source: Secção de Gestão e Planeamento Ambiental – Biology Department, University of the Azores

in development strategies as a key to solve common problems at different places and levels [44]. Global governance has three important pieces that developed new functions and roles in the decision making process: (i) stakeholders (including public and private agencies); (ii) decision mechanisms and, (iii) governance levels. Thus, the marine cluster construction is an integration tool which supports the effectiveness of the smart governance considering all these pieces.

Identification and components of the marine cluster

The literature presents some recommendations to develop a maritime cluster [4,5,47, 48,50, 53, 54.] Based in the theoretical framework proposed by De Lange

to analyze the clusters, three crucial dimensions need to be considered:

1. *Cluster structure*

2. *Cluster governance*

3. *Cluster performance*

Currently, the identification of the activities and components related to the sea is the first step to define the Azores Marine Cluster. The future development of an Azores Marine Cluster will be limited by the 9 methodological phases presented in Table 2.

Recent studies related to the sea economy remark the need to integrate the several activities and uses of the sea based in a functional framework [45, 46]. In this sense the Blue Growth Study [46] proposed six global maritime functions: maritime transport and shipbuilding; food, nutrition, health and

Table 2 - Cluster methodology proposal and stages for Azores Region

Methodology	Analysis
1. Gaps and needs	Policy and opportune time to develop an economic and policy framework related to the sea and its strategic development context. Azores Region is strongly linked to the sea from the geography, history and economy. At the moment a diversification of the activities related to the sea is rising, both of small scale, as leisure activities, and also of big scales as prospecting: natural and mineral resources and other potential emerging uses as energy sector. On the other hand, the great dimension of the blue economy could be a pool of the Azores development. The transfer of knowledge and capacity building is needed.**.**
2. Planning and design	From a strategic point of view, the identification of activities, stakeholders, uses and benefits provided by the sea urges. This information is a condition for sustainability of the sea and important part of the Azores Regional Economy There are important advances in territorial planning, conservation and maritime sector plans, but the cluster needs to be seen as a nexus, as a common platform for all governance components.**.**
3. Constructing the cluster structure	Ongoing evaluation
4. Agglomeration	**Encomp** Further research needed**.**
5.Performance	Further research needed
6. Reply	**Further research needed**
7.Integration at **Azores Regional Clusters System**	Ongoing evaluation
8.Monitoring **sustainable economy**	**Further research needed**
9.Externalities: **Policies & External influence**	**Ongoing evaluation**

ecosystem services; energy and raw materials; leisure, working and living; coastal protection; and maritime monitoring and surveillance. In the case of Azores Region the main functions related with marine environment were identified, taking into attention the Azores specificities.

In this way, the main sectors identified are (Figure 5): Fisheries; Research and Ocean Development; Maritime Tourism; Maritime Heritage; Maritime Transports; Maritime Industries. There is an urgent need for a deep research to identify relations of the functions, activities and components of the cluster.

The methodology suggests an establishment of a hexagonal configuration for the Azores Marine Cluster, which drives from the sustainable development matrix. The dimension of this hexagonal configuration encompasses the approach to the six economical dimensions related to the sea: (i) natural capital; (ii) financial capital; (iii)
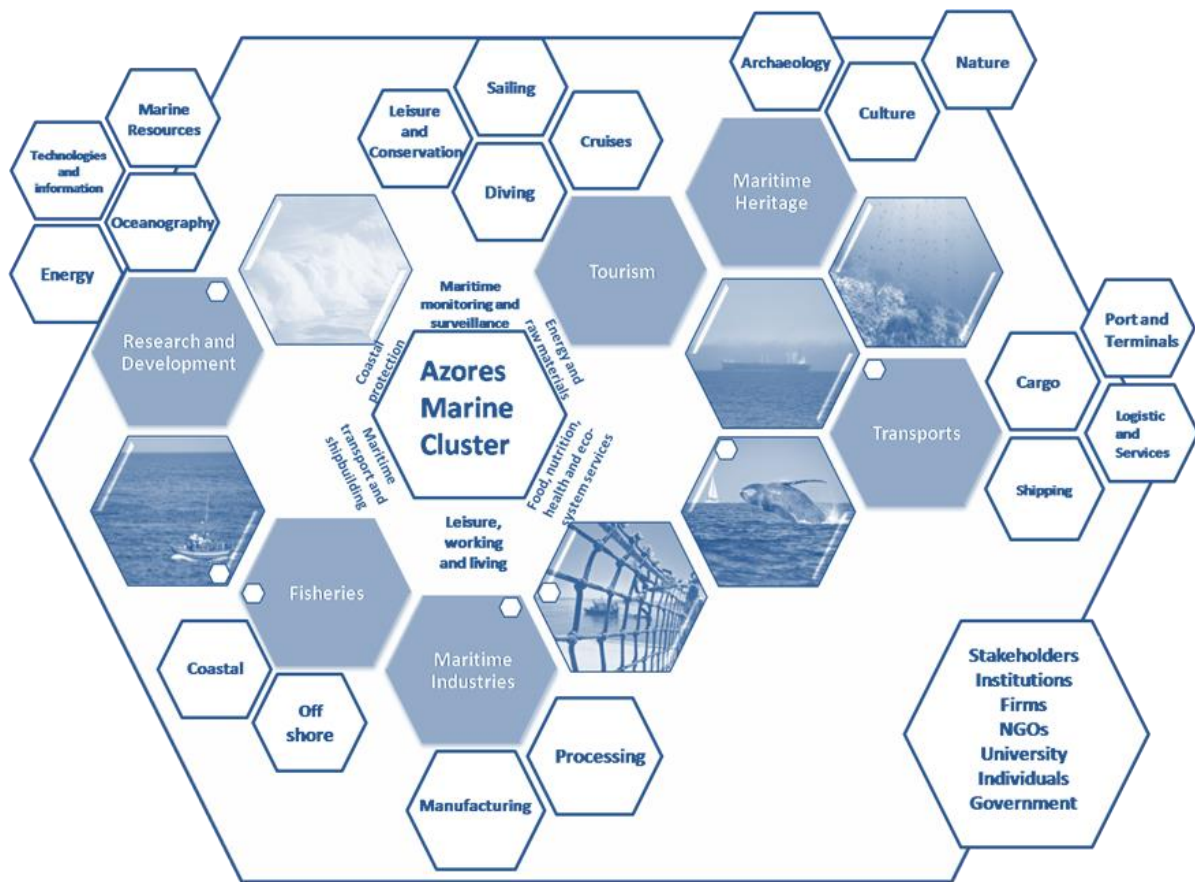
Fig. 5- Conceptual map of Azores Marine Cluster Functions

physical capital; (iv) human capital; (v) social capital; and (vi) governance capital. These dimensions are also inter-related with the six main sectors of the Azorean cluster entity, presented in the above figure (Figure 5).

Life cycle stages of the Hexagonal Azores Marine Cluster

In Azores region, inside the hexagonal marine cluster, it can be identified a set of activities, which are at different levels of development. Based on a dynamic perspective of life cycle [46], the research identifies various development stages:

• **Potential development** stage: these early path inventions need to be made, but most promising outputs and governance framework are still to be defined. Therefore,

high R&D investments are required and, as consequence, even though the output objectives are clear, commercial viability needs to be justified;

• **Growth stage**: At this stage, economic and/or employment growth are evident, impacting socioeconomic and societal dimensions. Satellites activities tend to appear and new entrants, especially smaller sized companies, which can start exploiting the market. Due to technology development processes and switching costs, prices of technologies gradually tend to be minimized;

• **Maturity stage**: In this phase the global market conditions are stable and economic infrastructure are consistent with market needs and demands. Even tough competition is fierce, there is revenue

Fig. 6 - Life cycle stages identified for the Hexagonal Azores Marine Cluster

attractiveness to all stakeholders and space for the introduction of new services and substitutes products.

Presently, as showed in Figure 6, there are several elements and components of the Azores Marine Cluster. The fishery activities provide food and employment to a considerable number of coastal inhabitants dispersed by the nine islands and is one of the oldest economic activities of these islands, being therefore in a maturity phase. There are also sea activities that support tourism, such as cruises, which are at a mature stage, even though they are recent in the Azorean economic context.

The R&D activities in the Azores are in a growth phase, being promoted especially by the research centers of the University of the Azores in cooperation with and integrated in international research projects. In this same stage, there is leisure and tourism sustainable activities, which started to show a clear employment growth and impact on the socioeconomic dimension. Some of these growing activities can be enhanced and sustained by the quality of natural environment of the islands. In this sense,

some precautionary measures are needed and a regulation framework needs to be defined.

Maritime ecosystem services, as well as energy and prospecting, can be considered to be in an earlier stage, especially at deep sea domain, since they present a high economic value potential, but still need high R&D investment, which compromises present commercial/economic results. Especially for these activities, a governance framework needs to be defined.

As referred by Shinohara [47], the different life cycle stages encompass different governance and management interventions: (i) at the potential stage, a strong government support is required for industry incubating and definition of the legal set; (ii) in the growth stage, governance occurs at three domains: improvement of legal set; supervision of the actors; and support to business networking, especially long-term relationship between companies; and (iii), at the maturity level, governance intervention occurs specially for supervision and redefinition of boundaries. In all stages, human resource management based on the long-term co-working spirit is vital.

IV. Azores Marine Cluster's Economic Prospective

The urgent need for a design mechanism of environmental governance adequate to the new economic paradigms induces this research work. The Blue Economy is understood as maritime sector and also the services provided by marine environment. The Blue Economy starts to be seen as a driver for a territorial development context. In the domain of the economic tools, the adoption of the clustering model for a strategic view of the sea and its integration at the regional economy level is suggested.

Several theoretical perspectives have been applied in the study of clusters [5, 48]. The concept of clusters goes beyond geographical proximity; it emphasizes the relationships and social ties among the actors in the cluster. The personal interaction, frequent communication, and a sense of a common identity that can arise out of a cluster's diverse networks, from project cooperation to cluster organizations and networking arrangements, are what enhances the linkages that foster the cluster dynamics [49].

Porter's [1, 8] cluster definition can be usefully applied to maritime cluster activities, specially, at the performance at geographical level [50]. The benefits of the clustering should be highlighted as it stimulates innovation, increases productivity, creates flux at networks level and the emergence of new spheres of activity [51].

It is important that the cluster consists of a critical mass of heterogeneous activities, in order to make the value of the cluster bigger than the sum of its parts, as well as enable increased specialization of companies. By "heterogeneous" is meant that cluster actors should be well distributed across vertical and horizontal dimensions, so that the different

levels of the supply chain are represented, along with a number of activities horizontally within each sector [5].

Overall, institutional settings play a significant role in enabling competitiveness and expansion, retaining maritime activities, attracting foreign companies, as well as increasing the level of innovation. This includes government policy, interest organizations, educational institutions, and research bodies. Cluster-based policy shifts the role of government towards building appropriate legislative frameworks for cooperation and growth [49].

The study of the European Clusters developed from Policy Research and the several documents of the European Commission [41, 42, 46, 52-55] have highlighted the importance of the maritime cluster for EU economy. Therefore, the concept of clusters has been widely integrated into the conduct and political governance of maritime activities. As empirical studies conducted all over Europe show, maritime clusters exist and are of significant economic importance to local and regional economies.

It is also important to notice that the economy of the nature capital has been appointed as the next step by the political and development strategies [42, 46, 55, 56]. In this line of thought, the green economy has been established and is now part of the business of development.

There is still a gap related to the relevance of the goods and services linked to the ocean economy. It is our aim to minimize the gap and, therefore, following a sustainable approach, we put forward the designation of marine cluster as an integration of the maritime activities and the services provided by the ocean as ecosystem. Our efforts are based in the Hexagonal Azores Marine
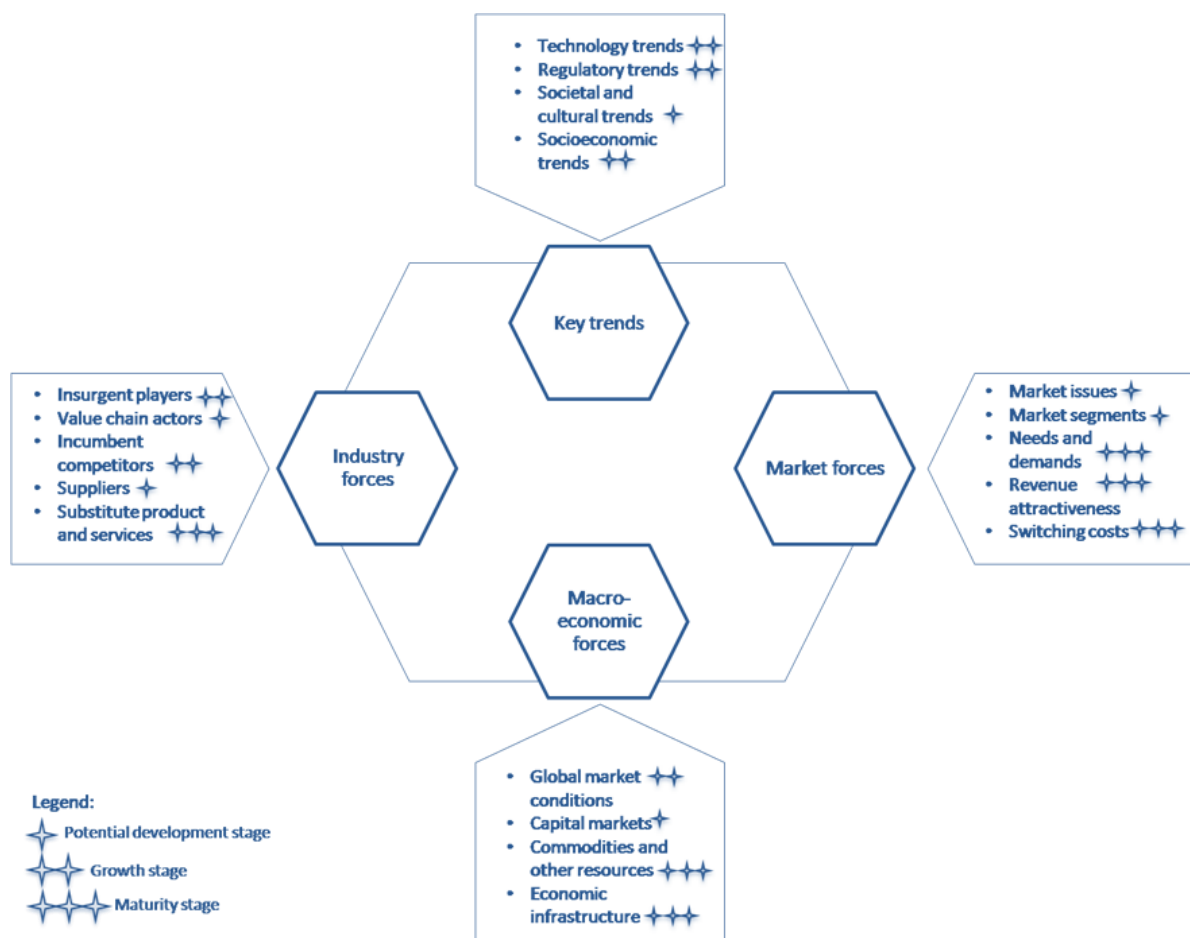
Fig. 7 - Hexagonal Azores Marine Cluster Entity Trends.

Source: Adapted from Osterwalder & Pigneur, Business Model Generation [57].

Cluster, which is a potential economic priority for the Azores region, taking into account the geostrategic position and the large maritime territory.

Inside the Azores Marine Cluster entity there are several main and satellite activities, which impact governance and economy trends, varying during cluster life cycle stage.

The macroeconomic, market and industrial forces, and key trends are beneficiated by the agglomeration of the maritime sectors. The benefits at internal economy are evident and there are showed indicators that are directly related as the maturity stages of these activities..

V. Conclusions

The bibliography available suggests that the evolution of maritime industry policy development and implementation from fragmented (sector) approach towards a Cluster Strategy approach has very significant successful results, especially in the policy implementation [58].

The opportunities for design and development of regional marine clusters from a governance perspective, in the Azores, are:

- The development of the bases for a sea economy, by the integration of different sectors and stakeholders, towards a dynamic and sustainability strategy;

- Integration of the marine cluster into the regional economic vision;

- Leverage the potentialities of a Blue Economy, and the direct and indirect goods and services for a maritime logistic value chain;

- Promotion of the marine cluster as a governance tool, which implies a bigger weight of the sea in the political agenda.

There is an urgent need for a deep research to identify relations of the functions, activities and components of the cluster. There is a lack of data regarding main sea activities. The versatility of Azores Marine Cluster should congregate the business provided by marine ecosystem services. The international agenda put forward a set of hints in this domain. Therefore, Azores could gain from the development in the future within a blue carbon and an environment externalities market.

The establishment of a core of Cluster-based Regional System with an endogenous driver, as the Sea, could be a "smart" option for a sustainable Regional Development. Therefore, this work contributes to the theory of regional clusters by considering a wide set of players and attributes applied to the Azorean reality related to the sea. On the other hand, the work aims to call deeper knowledge on impacts and correlations between maritime activities. The research in the Blue Economy field is appointed as key to integrate marine ecosystem services in a traditional maritime cluster. It also considers the smart governance

implications and the possibility of exploiting a cluster articulating several sectors at different life cycle stages. However, these findings should be viewed in light of some limitations. Regional data available is one of the major weaknesses of any research performed at this level in Azores and, therefore, one of the research paths that will be carried out is data collection at different levels and in all sectors presented in the hexagonal model developed in the current study.

Further work is clearly needed, in order to evaluate the possible inclusion of new elements supported by data and a multi-level analysis of the smart governance process. Aside from these considerations, it would be interesting to compare the results from marine cluster with the remaining strategic clusters. Following the hint of the international and national agenda, future research will be put forward regarding the blue carbon and environment externalities market. Certainly, there is scope for further research in this area.

References

[1] Porter ME. The Adam Smith address: Location, clusters, and the" new" microeconomics of competition. Business Economics 1998;33(1):7-13.

[2] Asheim BT, Coenen L. Contextualising Regional Innovation Systems in a Globalising Learning Economy: On

Knowledge Bases and Institutional Frameworks. Journal of Technology Transfer 2006;31(1):163-73.

[3] Delgado M, Porter ME, Stern S. Clusters and entrepreneurship. Journal of Economic Geography 2010;10(4):495-518.

[4] Doloreux D, Shearmur R. Maritime clusters in diverse regional contexts: The case of Canada. Marine Policy 2009;33(3):520-7.

[5] Wijnolst N, Jenssen JI, Sodal S. European maritime clusters: global trends, theoretical framework, the cases of Norway and the Netherlands, policy recommendations: Foundation Dutch Maritime Network; 2003.

[6] Porter ME. Clusters and economic policy: aligning public policy with the new economics of competition. White Paper (Institute for Strategy and Competitiveness, Harvard Business School, 2007) 2007.

[7] Marshall A, Marshall MP. The economics of industry. London: Macmillan and Co.; 1920.

[8] Porter ME. The competitive advantage of nations: with a new introduction: Free Pr; 1990.

[9] Akoorie MEM. A challenge to Marshallian orthodoxy on industrial clustering. Journal of Management History 2010;17(4):451-70.

[10] Becattini G. The Marshallian industrial district as a socio-economic notion. Industrial districts and inter-firm co-operation in Italy 1990:37-51.

[11] Behkami NA, U Daim T. Research Forecasting for Health Information Technology (HIT), using technology intelligence. Technological Forecasting and Social Change 2010.

[12] Pyke F, Becattini G, Sengenberger W. Industrial districts and inter-firm co-operation in Italy: International Institute for Labour Studies; 1990.

[13] Bellandi M. Innovation and change in the Marshallian industrial district. European Planning Studies 1996;4(3):357-68.

[14] Bellandi M. Italian industrial districts: An industrial economics interpretation. European Planning Studies 2002;10(4):425-37.

[15] White House. A strategy for american innovation: Securing Our Economic Growth and Prosperity. National Economic Council. Council of Economic Advisers,and Office of Science and Technology Policy. Washiton, DC USA; 2011 (February).

[16] Porter ME. Competitive advantage, agglomeration economies, and regional policy. International regional science review 1996;19(1-2):85-90.

[17] Porter ME. Location, competition, and economic development: Local clusters in a global economy. Economic development quarterly 2000;14(1):15-34.

[18] Isard W, editor. Methods of regional analysis: an introduction to regional science. Cambridge: MA: John Wiley & Sons, Incorporated; 1960.

[19] Trippl M. Cross-Border Regional Innovation Systems. 2006.

[20] Doloreux D. Regional innovation systems in Canada: a comparative study. Regional Studies 2004;38(5):479-92.

[21] Howells J. 5 Regional systems of innovation? Innovation policy in a global economy 1999:67.

[22] Vang J, Coenen L, Chaminade C, Asheim B. Universities, Regional Innovation Systems and the Bangalore Experience: Towards a Contextual and Evolutionary Perspective. In: Chen Jin XQ, Wu Xiaobo, (Ed.), editor. 5Th international Symposium on Management of Technology (ISMOT'07); 2007; Hangzhou: Zhejiang University Press; 2007. p. 884-8.

[23] Natário MMS, Couto JPA, Tiago MTB, Braga AMM. Factors and Dimensions of National Innovative Capacity. Innovation in Business and Enterprise: Technologies and Frameworks 2010:92.

[24] Bottazzi L, Peri G. Innovation and spillovers in regions: Evidence from European patent data. European Economic Review 2003;47(4):687-710.

[25] Polanyi M. The logic of tacit inference. Philosophy 1966;41(155):1-18.

[26] Morgan K. The exaggerated death of geography: learning, proximity and territorial innovation systems. Journal of Economic Geography 2004;4(1):3-21.

[27] Storper M. The regional world: territorial development in a global economy: The Guilford Press; 1997.

[28] Tödtling F, Trippl M. One size fits all?: Towards a differentiated regional innovation policy approach. Research Policy 2005;34(8):1203-19.

[29] Cooke P. Regional innovation systems, clusters, and the knowledge economy. Industrial and corporate change 2001;10(4):945-74.

[30] Goodwin M, Jones M, Jones R. Devolution and economic governance in the UK: Rescaling territories and organizations. European Planning Studies 2006;14(7):979-95.

[31] Manca G, Curtin K. Fuzzy Analysis for Modeling Regional Delineation and Development: The Case of the Sardinian Mining Geopark. Transactions in GIS 2012;16(1):55-79.

[32] Tiago MTB, Tiago F, Botelho M. Modeling Regional Development in Azores region based on fuzzy analysis. In proceedings: Association ERSA, editor. ERSA 2012 - Regions in Motion - Breaking the Path 2012; Bratislava; 2012.

[33] Bettencourt R. Strategic prospective for the implementation of employment policies in the Azores. Technological Forecasting and Social Change 2010;77(9):1566-74.

[34] Ekstrom JA. Navigating fragmented ocean law in the California Current: Tools to identify and measure gaps and overlaps for ecosystem-based management. 2008.

[35] Young OR, Osherenko G, Ekstrom J, Crowder LB, Ogden J, Wilson JA, et al. Solving the crisis in ocean governance: Place-based management of marine ecosystems. Environment: Science and Policy for Sustainable Development 2007;49(4):20-32.

[36] Cornelissen A, Van den Berg J, Koops W, Grossman M, Udo H. Assessment of the contribution of sustainability indicators to sustainable development: a novel approach using fuzzy set theory. Agriculture, ecosystems & environment 2001;86(2):173-85.

[37] Tiago MTB, Tiago F, Botelho M. Dinâmicas regionais: ideias e desafios. In: iBook, ebook. Ponta Delgada; ISBN 978-989-97942-0-7; 2012.

[38] Neto P, Serrano MM. Governance and Creativity on Urban Regeneration

Processes. CEFAGE-UE Working Papers 2011.

[39] Lozano R. Envisioning sustainability three-dimensionally. Journal of Cleaner Production 2008;16(17):1838-46.

[40] Ministerio de Defesa Nacional M. National Strategy of the Sea. Portuguese Republic; 2006.

[41] European Commission. An Integrated Maritime Policy for the European Union.: Communication from the European Commission, COM(2007) 575 Final.; 2007.

[42] European Commission. EUROPE 2020 : A strategy for smart, sustainable and inclusive growth. Communication from the European Commission, COM(2010) 2020 final.; 2010.

[43] Paramio L, Alves F, Porteiro J, Gomes FV. New Challenges for Coastal Governance in the Azores: Marine Clusters. Littoral 2008; 2008 25-28 November; Venice, Italy; 2008.

[44] Paramio Martin ML. Governança oceânica: bases estratégicas para o desenvolvimento do" Mar dos Açores". Ponta Delgada: University of the Azores; 2012.

[45] SAER/ACL. The hypercluster of the Sea. Lisbon; 2009.

[46] European Commission. Blue Growth: Scenarios and drivers for Sustainable Growth from the Oceans, Seas and Coasts. In: MARE D, editor.; 2012.

[47] Shinohara M. Maritime cluster of Japan: implications for the cluster formation policies. Maritine Policy Managment 2010;37(4):377-99.

[48] Benito GRG, Berger E, De la Forest M, Shum J. A cluster analysis of the maritime sector in Norway. International Journal of Transport Management 2003;1(4):203-15.

[49] Hansen J, Clasen J. The Economic Significance of Maritime Clusters.Lessons Learned from European Empirical Research. Working Paper: The Danish Shipowners' association; 2010.

[50] De Langen PW. Clustering and performance: the case of maritime clustering in The Netherlands. Maritime Policy & Management 2002;29(3):209-21.

[51] Doloreux D, Melançon Y. On the dynamics of innovation in Quebec's coastal maritime industry. Technovation 2008;28(4):231-43.

[52] European Commission. Green Paper: Towards a Future Maritime Policy for the European Union: A European Vision for the Oceans and Seas. In: Commission E, editor.: COM(2006) 275 final; 2006.

[53] European Commission. Maritime Clusters. In: Commission Staff Working Document, editor.: SEC (2007) 1406; 2007.

[54] European Commission. The Concept of Clusters and Cluster Policy and their Role for Competitiveness and Innovation: Main Statistical Results and Lessons Learned. In: Commission E, editor.: SEC (2008) 2637 2008.

[55] European Commission. Developing a Maritime Strategy for the Atlantic Ocean Area. Communication from the European Commission In: Commission E, editor.: COM(2011) 782 final; 2011.

[56] TEEB. Why valuing the Oceans? . Discussion Paper UNEP/GRIDA: Duke University; 2012. p. 33.

[57] Osterwalder A, Pigneur Y. Business model generation: a handbook for visionaries, game changers, and

challengers. New Jersey: John Wiley and Sons 2010.

[58] World Bank, 2009. Clusters for Competitiveness: A Practical Guide &Policy Implications for Developing Cluster Initiatives. International Trade Department..

Glossary

Hexagonal marine cluster – There are six main clusters entities along the blue ocean economy value chain, which can be sustainable management using a hexagonal dimensions matrix: (i) natural capital; (ii) financial capital; (iii) physical capital; (iv) human capital; (v) social capital; and (vi) governance capital.

Smart governance – smart governance encompasses an inclusive, global and directed governance of common goods and public policies. Governance is supported by the innovation and the technology toward a sustainability system.

Collaborative network - A collaborative network is the group of firms, individuals and other organizational entities that work together possessing the capabilities and resources needed to achieve a specific outcome, in a business value chain.

Innovation - Innovation is the transformation of knowledge into a benefit, which may be for commercial use or for the public good; it reflects the search for and the innovation breakthrough, experimentation, development, reproduction and adoption in new products, new processes and new organizational frameworks.

» voltar ao Sumário

Instituto de Estudos Políticos
Universidade Católica Portuguesa
Palma de Cima | 1649-023 Lisboa
Tel.: (+351) 217 214 129
Fax: (+351) 217 271 836
E-mail: secretariado.iep@iep.lisboa.ucp.pt
Web: www.iep.lisboa.ucp.pt

Linha de Investigação em Assuntos Marítimos
Instituto de Estudos Políticos
Universidade Católica Portuguesa
Palma de Cima | 1649-023 Lisboa
Tel.: (+351) 217 214 129
E-mail: investigacao.mar@iep.lisboa.ucp.pt
Web: www.iep.lisboa.ucp.pt/LIAM