



KNOWLEDGE TRANSFER TO IMPROVE MARINE ECONOMY  
IN REGIONS FROM THE ATLANTIC AREA



## MARINE RESEARCH TO INCREASE COMPETITIVENESS OF ATLANTIC REGIONAL ECONOMIES

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Revised by KIMERAA partners.

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**KIMERAA – Knowledge transfer to Improve Marine Economy in Regions from the Atlantic Area** ([www.kimeraa.eu](http://www.kimeraa.eu)) - is a European project approved in 2009 by the Atlantic Area Programme, co-financed by the European Regional Development Fund (ERDF). The partnership consists of members located in Spain, Ireland, Wales and Portugal. These regions have varied portfolios of marine research which were examined in the KIMERAA publication 'Maritime Clusters Institutions and Innovation Actors in the Atlantic Area'.

The Transnational Event held on 17<sup>th</sup> March 2011 at Cardiff University entitled Maritime Clusters: Institutions and Innovation Actors in the Atlantic Area sought to disseminate some of this research focusing on best practices of marine research in each region. This report aims to provide an overview of the event highlighting the major questions that were drawn from the day. This section will provide context to the wider issues that marine research in the Atlantic Area is facing.

## OVERALL CONTEXT

Over the last decade, the global recession, climate change and peak oil have impacted upon the countries in the Atlantic Area in a significant manner, particularly in areas of the Maritime economy such as shipping, transport, and tourism. As a result, marine research has increasingly been focusing on renewable energy development through exploring offshore energy options (offshore wind, wave and tidal) as well as blue biotechnology and aquaculture to name a few. This report, as part of the wider KIMERAA project, seeks to evaluate how marine research, in all contexts, can contribute to increasing the competitiveness of Atlantic Area economies. The economic significance of the Marine economy also varies within these countries, the KIMERAA Maritime Clusters document “Maritime clusters: Institutions and innovation actors in the Atlantic Area” summarises the economic indicators of the regions. See Table 1.

**Table 1:** Economic Overview by Partner Region

	Economic Indicators (Current Figures)					
	Population (region)	GDP (region)	Unemployment (region)	Main Sectors (region)	Value of Maritime Economy in Region	Maritime Economy Employment Figures
<b>Huelva</b>	513403 (09)	9.3m € (09)	14566 (08) 49940 (10)	Agriculture, Industry, Construction, Services	5m € (09)	11427 (07) 30246 (10)
<b>Basque (07/08)</b>	2.2m	65.9m €		Industrial, Petrochemicals, Tourism, Construction		
<b>Galway</b>	1.2m (07)		12.8% (10)	Agriculture, Industry, Services		
<b>Wales</b>	3m (09)	£44.5bn (09) *	85000 (08)	Services, Manufacturing, Finance, Health/Edu	£6.8b (08)*	169000 (08) 92600 (10)
<b>Norte Region</b>	3.7m (09)	47m € (08)	8.7% (08) 478387	Industries, Motor Vehicle, Agriculture, Construction		
<b>Algarve</b>	458,000 (10)	16.2m € (08)	15076-7% (08) 28831-13% (10)	Construction, Motor Vehicles, Tourism Finance	3.19m € (10)	116000 (07) 114000 (10)

Interestingly, this table demonstrates that maritime is not the main sector within any of the partner's regions, which is particularly notable in the case of Huelva considering the proportionate value of the maritime economy. This means that aside from some variances such as population size, there are sufficient similarities in the main sectors and maritime economy employment figures to form the foundation of an effective evaluation. All of the regions have been negatively affected by the recession, as demonstrated by the rise in unemployment.

In the current economic climate where job loss is high and job creation is low, it could be considered essential to evaluate how research institutions can contribute to the competitiveness of the region and ultimately economic growth. According to Acs (Acs, 1996, p.32) 'research that is academic and industrial does create jobs, and industrial research that is funded by private sources creates more jobs than government-funded industrial research. Basic research, however, does not appear to create jobs.' KIMERAA research has highlighted the increasing role that regional innovation actors have in creating new job roles through stimulating growth in a region.

When asked to identify clusters in the region, partners in Ireland, Wales and Portugal identified maritime services<sup>1</sup> and offshore services<sup>2</sup> as growth potential areas, signifying a high level of research and emerging technology presence in the regions. Galway (Ireland) and Pembrokeshire (Wales) both have an emerging marine renewable cluster. UPIN (Porto, Portugal) has seen many developments in blue biotechnology and coastal management. CRIA (Algarve, Portugal) has also seen an increase in research activity in coastal management and ecological education. It must be noted that whilst MIK (Basque Country) selected what would be considered a traditional knowledge sector as their chosen cluster with socio-economic growth potential, it is clear that this growth seeks to be achieved in a Keynesian state-supported and directed method. The Basque Government recognizes the economic viability of eco-tourism and seeks to develop the infrastructure to accommodate this, ensuring the sustainability of the marine sector and coastal tourism.

It is clear that the chosen clusters for socio-economic development will feature a level of research into the marine economy and its industries. The report will continue as follows. The next section will continue with a brief review of related literature explored in the context of KIMERAA research, with parallels drawn across the Partner regions. Following this, the findings of the articles presented at the aforementioned transnational event will be discussed and finally, there will be concluding remarks evaluating the themes explored in this article.

## Science contribution to maritime clusters consolidation

This section will seek to explore the way in which Marine Research can contribute to the competitiveness of a region and the role that knowledge has to play in consolidating a marine cluster. Significantly, knowledge is crucial in facilitating innovation which in turn stimulates economic growth and development (Howells, 2002). Porter (1990) and Patchell (1993) highlight that following changes in the international economy, the basis of industrial competitiveness has shifted from static price competition towards dynamic improvement; this ultimately benefits firms that are able to create knowledge faster than their competitors (Porter, 1990; Patchell, 1993). KIMERAA research found many illustrations of this need for innovation in the fishing sector; where following the realisation of the health benefits of consuming fish, demand is outstripping traditional supply methods. Coupled with the paradigmatic shift of sustainable development, a high level of research has been instigated as Universities and private companies alike seek to explore the conditions required to operate successfully.

<sup>1</sup> Research, education, logistics, flag registration

<sup>2</sup> Wind energy, water energy, oil & gas extraction

In North Portugal (Porto), the fisheries<sup>3</sup> sector employs 7900 people (KIMERAA Maritime Clusters). This regional figure represents 24% of the national employment in the sector. The North region accounts for 19% of all the fish unloaded on the national fish market. Sea fishing activities have been in decline since 2003, with fisheries jobs decreasing at an annual average rate of 5.2%. The fishing sector has been neglected and only recently has there been intervention under the new development paradigm, sustainability. In response to this, the GACs (translated: Coastal Action Groups) have been formed, under the operational program PROMAR. These groups are oriented towards developing the local fishing areas in a sustainable manner, with efforts being made to value fish, food and other coastal resources. The groups also seek to link fisheries with the scientific community.

Resulting from this, as employment in the traditional fishing sector has declined the number employed in aquaculture and fish farming has increased. According to the statistical data available, the production in the North region represented 12% of the national total, being almost half of that produced in the Algarve region, in Ria Formosa. This would imply that these two Portuguese regions stand to benefit from sharing and stimulating the development of knowledge in this sector. Regional scientific co-operation is important, and it is in this field that projects such as KIMERAA is able to pave the way, promoting and facilitating inter-regional cooperation to enable innovation, growth and competitive advantage. Further to this, the KIMERAA research partner the University of Porto identified that an opportunity gap exists for their region in aquaculture support services and products. Innovative knowledge in this field of expertise would enable the region to offer highly valued specialized services and products.

Following this, it could be considered obvious that knowledge itself has become a tradable commodity. Maskell and Malmberg (Pg 1, 1999) assert that the knowledge based economy is characterised by three elements: the growing importance of economic transactions focused on knowledge itself; rapid qualitative changes in goods and services; and incorporation of the creation and implementation of change itself into the mission of economic agents. (Carter, 1994; Maskell, Malmberg 1999)

The University of the Algarve identified coastal tourism as their socioeconomically significant sector which was significantly affected by the recession, most notably witnessing a reduction in national and international tourists. Where typically the economic downturn saw the postponement of investments, projects and collaborations, the University identified the role that research could play in ensuring that the economic crisis was an opportunity. This entailed the participation of CRIA in more than a dozen EU projects that enabled the professionalization of Knowledge Transfer and created the financial conditions for the growth of the Knowledge Transfer Office. This is significant as following the recession an increasing number of individuals sought support to initiate a business as a result of rising unemployment. In this way it can be seen that knowledge itself can be the comparative advantage of a region, and can ensure that the cluster is able to recover from external shocks.

The ability to draw competitive advantage following an economic shock should not be underestimated as over time, generations of embedded knowledge and other sunk costs will solidify the once chosen distribution of investments and thus limit the range of possible avenues that the firm might take in the time to come (Dosi, 1990). Those that view a large external shock as the opportunity to change the pathway of their company can stand to reap significant rewards. However, as knowledge has become a crucial asset in modern production systems (Lundvall, 1992) in order to facilitate this change, knowledge must be created internally or acquired from another source. In this way, knowledge can be viewed as a unitary article that can be bought or exchanged.

<sup>3</sup> considered as a sector to include maritime and inland fishing, fish processing and aquaculture

However, the sale of knowledge as a product is more complex. Due to the fact that one unit of any piece of knowledge is enough (Carter, 1989) the potential buyer requires full disclosure to ensure that what is offered for sale is not a duplicate unit of knowledge already possessed. However, when fully informed of the content of the knowledge offered, the good has in effect been acquired without cost. It is this awareness of such a flaw in the transaction that easily discourages the seller from offering the piece of knowledge for acquisition. Such market failure can only be overcome by the development of specialised formal and informal institutions, which remove this kind of interaction between firms from the world of pure market relations (Maskell and Malmberg, 1999).

This development is evident in the Basque Country, which has traditionally possessed a strong shipbuilding sector which has been one of the mainstays of the economy. However, the economic recession that commenced in 2008 has only served to accentuate the difficulties that the sector was encountering due to the introduction of countries like South Korea and China. These competitors are notable in their low prices and have destabilised the market in their favour; problems experienced by the sector in the Basque region are directly related to competitiveness. KIMERAA research found that in terms of knowledge management or innovation, there is an important gap to be covered and it is a challenge to address these kinds of issues in such a traditional sector. In light of this, the Basque Maritime Forum (BMF) was initiated and identified as a Priority Cluster, with the aim of consolidating and improving competitiveness in the sector by means of the services it offers in line with its Core Strategic Areas – internationalisation, technology, management excellence, finance and taxes, training and people and communication. KIMERAA research found that the BMF was considered to be the key innovation actor and knowledge transfer facilitator. The BMF works extensively with Universities and R&D Centres organising workshops and work groups to enable knowledge transfer and to stimulate innovation in the shipbuilding sector.

In this way, Universities are able to bolster and consolidate the cluster using projects like INTERREG and KIMERAA to provide third party knowledge that stimulates the cluster to achieve better innovation and create knowledge faster than their international competitors. Viewed on a regional or national basis, if learning institutions can facilitate the cluster as a whole achieving comparative advantage over clusters in other countries, firms are then in a position to capitalise on this. This allows the region to break away from static price comparison to competition on the basis of innovative product improvements.

It must not be forgotten that within the cluster itself, firms will have different internal methods of operation. These behaviours come as a result of successful courses of action taken in the past, and will continue to be reproduced and reinforced as long as they seem reasonably efficacious (Nelson and Winter, 1982). This would suggest that given the same situation with new information on how to become more competitive or innovative, individual firms will set about the same task in different ways. This in turn stimulates competition within the cluster or region, where competitive advantages are created in the interplay between company rivalry, factor conditions, demanding customers, and the quality of related and supporting sectors (Porter 1990).

Maskell and Malmberg emphasise that whilst often overlooked, a logical consequence of the present development towards a global economy is that the more easily codifiable or tradable knowledge is, the more crucial tacit knowledge becomes for sustaining or enhancing the competitive position of the firm. If all factors of production, all organisational blueprints, all market information, and all production technologies were readily available in all parts of the world at (more or less) the same price, the market process of competition between firms would dwindle (Nelson and Winter, 1977; Loasby, 1990)

Further to this, KIMERAA research discovered the value of Marine Research in a facilitation role. The University of Porto found that OCEANOXXI, the Sea Knowledge and Economy association responsible for promoting the Sea Knowledge and Economy cluster was facilitating communication and collaboration between stakeholders. An example of this practice was the matching of Walk On Wind (WOW) with a technological partner that could help the company to develop a new ship. OCEANOXXI facilitated this contact by matching the request with one of the marine cluster's associates INEGI – the Institute of Mechanical Engineering and Industrial Management.

University based marine services have an increasingly significant role to play in the development of alternative uses for a region's natural resources. This can be seen in the biotechnology developments in the use of seaweed, which is attracting attention and venture capital to dozens of start-ups (Holzman, 2008). In Wales, due to the large supply, seaweed has been incorporated into Welsh cuisine for decades. Currently, there are some small firms in West Wales that work with seaweed. In addition to this, with widespread support for algae as a bio fuel, Welsh Universities have provided funding for research into its applications. An example of this is the Centre for Sustainable Aquaculture Research at Swansea University. They are currently researching different methods of extracting oil from the type of algae which grows on ponds (microalgae) and seaweed (macro algae) commonly found on the Welsh coast. This 'algaol' could be an interesting discovery, particularly as major non-renewable sector firms such as Shell and Exxon Mobile also completing research on it; however, there is no collaboration at this time. This emergence of University-led research groups related to seaweed is also occurring in many of the KIMERAA partners' regions, suggesting opportunity for collaborative work.

The Gambelas campus of the University of Algarve houses significant research units in the field of Marine Sciences and have been investigating the topic of algae applications for several years. Marine Sciences is the scientific field with the most weight in the UAlg's scientific production in terms of critical mass and productivity. The research has also extended to small firms operating in the region such as Necton, a biotech company focused in the international cosmetics and pharmaceuticals markets and also researches biofuel production. The challenges of building an internationally recognisable biotech company in the Algarve, which is a predominant tourism-based region were extensive. However, Necton has been successful in producing revenue in the region.

Extensive research is also taking place into the use of seaweed in cosmetics in West Ireland, where KIMERAA partner Westbic has identified this sector as socio-economically significant. The Ri Na Mara firm is a commercial producer of seaweed cosmetic products which were established after extensive research in France, Italy and Spain. The products were researched and developed in conjunction with the Irish Seaweed Centre. Research found that when the Ri Na Mara firm had gaps in knowledge and expertise, they were purchased using R&D grants and company resources. This evidence supports Maskell and Malmberg's (1999) assertion that knowledge itself has become a tradable commodity.

In Huelva, CIECEM (translated: International Centre for Ecological and Environmental Research and Conventions) is the centre of the Andalusian Research Plan attached to the University. There are a number of research projects that are related to the improvement of algae processing, particularly biofuel production and as such the University of Huelva intends to provide services to the scientific community. Alongside the algae research, other research units are involved with this fieldwork in different areas such as coastal tourism, aquaculture, blue biotechnology and ecology. This huge diversity and broad scope of maritime activities is significant and could lead to the consolidation of the cluster. Audretsch and Feldman (1996) following on from Krugman's (1991) work found that industries which were more knowledge-intensive (measured by industry R&D, academic research and skilled labour) were more

spatially concentrated. In turn, as clusters become consolidated, critical mass can add to the significance and competitive identity of a region.

## Findings of present articles

The earlier session of the transnational event focused on increasing knowledge transfer between the traditional and marine sciences within the larger maritime economy. In this capacity, the KIMERAA maritime cluster report was cited extensively which will be the case in this section as well due to the research dissemination efforts of the partnership. Unlike the earlier session, this session highlighted the use of the marine sciences in the individual regions to increase the competitiveness of the region. There were many examples already discussed in this report such as the networked research centres in Portugal but this section will focus solely on the presentations given.

### 1. 'The Future of Marine Energy in Wales: Networks, Industry & the SEA' by the Cardiff University Partners

The SMEs in the emerging marine energy cluster in West Wales, facilitated by Marine Energy Pembrokeshire, have the potential to make a large contribution to the economy of the region and the wider UK. The catalyst to transition the marine energy SMEs from research to application is funding from the MNCs that are also located in the region. However, the involvement of industry is linked to the findings from the Strategic Environmental Assessment (S.E.A.) that are due shortly. Using data acquired through the KIMERAA project, this presentation aims to highlight the current state of the marine energy cluster in West Wales; the obstacles that it faces; and its future growth. To fully understand the impact of 'future growth', examples from the more advanced marine energy cluster in Scotland will be used for comparison.

### 2. 'The University of Porto Approach to Marine Sciences and Technologies: The OceanScan case' by the University of Porto Partners

The presentation will aim at presenting University of Porto contribution to the development of the sea knowledge and economy in the Northern region of Portugal and the specific case of OceanScan, a successful start-up company operating in the sea sector. On the one hand, the investment on a marine sciences and technologies campus, a project involving high quality facilities to host advanced studies in marine Science & Technology, R&D groups, a business incubator and a business park specialized in marine technologies and commercialization. On the other hand, the OceanScan start-up company case will be presented as a good example of a spin-off that reached high level expertise on underwater systems and technologies and that is involved in several marine sciences projects. This cluster associate start-up collaborates closely with several entities inside and outside the marine cluster, such as research centres, incubation facilities, industry, the navy, etc. We intend to show how the academic entrepreneurial endeavours foster regional development and how the creation of links between the academy and other actors in the marine area reinforce regional collaboration, innovation and competitiveness.

### 3. 'A Tool to Support Overcoming the Gap between Invention and Innovation: The rationale behind the creation of KIMERAA's catalogue of competencies and services' by the University of the Algarve Partners

The innovation paradox in European Union is a problem underlined in several analysis that regards the problem of good scientific research reaching the market in the form of valuable goods and services. In the Sea Cluster this problem is particularly active due to the prominence of traditional sectors that characterize several branches of this cluster. This communication sets the rationale behind the creation of KIMERAA's Catalogue of Competencies and Services, a online tool that is expected to provide access to different types of information regarding Sea Cluster economic activities and supporting the reducing of the gap between companies and research organizations. The online tool is going to be presented and its main functionalities are going to be underlined.

Similar to the first session being opened by Professor Philip Cooke, the second and final session was closed by Flavio Martins, the Vice-Rector of the University of the Algarve, who provided an overview of the event and recommendations for future actions.

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