BLUE BOOST
B_B Forward Looking Activities (FLAS) Report

WPT3 BLUE_BOOST
Task 3.1 B_B Forward Looking Activities (FLAS)
Deliverable T3.1.1 FLAS report

DATE OF DELIVERY: AUGUST 2018

Partner in charge: UNICAM

TABLE of CONTENTS

THE B_B FLAS REPORT

INTRODUCTION

The purpose of the B_B FLAs is to **collect and analyse data and information functional to the realization of the different activities foreseen in the INTERREG ADRION BLUE_BOOST project** (hereafter B_B): in particular, the Blue Labs, the Blue Scenario Workshops, the Blue Hackhathons, the B_B Call for Expression of Interest for Knowledge Providers and the whole cycle of activities foreseen by the B_B Transnational Innovation Vouchers scheme.

In general, this activity has the main aim of analyzing the Blue Economy and Blue Growth (hereafter BE-BG) sectors in the regions involved in the seven project partner regions (see table n.1, page 6) and characterize their regional innovation ecosystem in relation to the BE-BG sectors, thus:

a) **accompanying Project Partners in the selection of their three most suitable BE-BG sectors to be involved in the B-B project activities;**

b) **showing the general framework of the regional research, technology transfer, innovation ecosystems of the seven involved Adriatic-Ionian territories**

c) **envisaging innovation trends and scenarios for the selected BE-BG sectors.**

The collection and analysis of information took place through a continuous interaction between the University of Camerino, the Project Partners and the LICs (B_B Local Innovation Committees). This interaction aimed at guaranteeing the comparability of the information collected for the different territories and the subsequent analysis of the regional contexts.

The B_B FLAs methodology adopted is based on three phases that were followed by Partners in order to provide an updated state of art of the maritime clusters and to define a framework for implementing the planned project strategies.

The three phases were defined as follow.

1. **Definition and analysis of BE-BG sectors**: **consistency, characteristics and development trends.**

   In this first phase, for each of the areas involved, the available information and data have been collected and systematized with regard to the **consistency, characteristics and development trends of the production sectors considered within the BE-BG**. This activity has been developed according to the following steps:

   a) Definition of the activities that identify the sectors of Blue Economy and Blue Growth;
   b) Collection of available statistical data.

The collection and systematization of this information provided an **initial picture of the sectors** that characterize BE-BG in the areas involved in the project.

2. **Identification of the regional system of innovation functional to Blue Growth**

   This phase aimed at collecting and systematizing data and information related to the regional research, technology transfer and innovation system, in **order to illustrate its potential for the BE-BG sectors**.

   To characterize the regional innovation system, it was necessary to gather information on the technological, research and innovation players present in the area and of interest for the BE-BG sectors. The analysis of the information gathered in this phase are useful to **examine the consistency of the regional innovation system** and to evaluate its functionality with respect to the needs of the Blue Growth sectors.

3. **Conclusions: innovation trends and scenarios for the selected BE_BG sectors.**

This report is organized according to the above mentioned phases.

The Appendix reports a synthesis of data and information provided by B_B Project Partners:

Table n.1: the Blue_Boost Project Partners and related targeted territories

	Project Partner	Targeted territories
LP1	Croatian Chamber of Economy	Zadar county
PP2	University of Camerino	Marche region
PP3	Thessaloniki Chamber of Commerce and Industry	Central Macedonia region
PP4	Central European Initiative-Executive Secretariat	Friuli Venezia Giulia region
PP5	Albanian Development Fund	Durres, Vlora, Saranda and Shengjin coastal areas
PP6	Patras Science Park S.A.	Western Greece region
PP7	Apulia Region	Apulia region

1. BLUE GROWTH AND BLUE ECONOMY SECTORS IN EU

The economy of the sea is not limited only to the perimeter of its business activities, but goes beyond when we take into account the many other interests that are activated indirectly, both upstream and downstream. In practice, there is a kind of multiplier effect so that for every euro produced by a blue economy activity, further ones are generated on the rest of the economy conext according to a supply chain logic.

Nevertheless, to match the approved objectives of the FLAs Report, it has been necessary to analyze each specific BE-BG according to its economic performance and available statistical databases, without considering such spillover effect.

Specifically, this section has the main goal to provide a definition and a description of the **sectors included within the BE-BG in Europe according to the related NACE code**. NACE (the term is derived from the French *Nomenclature statistique des Activités économiques dans la Communauté européenne)* is the statistical classification of economic activities in the European Union (EU). It is a four-digit classification providing the framework for collecting and presenting a large range of data in the fields of economic statistics (e.g. production, employment and national accounts) and in other statistical domains developed within the European Statistical System (ESS). Various NACE versions have been developed since 1970: the NACE Rev. 2, used in this study, is a revised classification adopted at the end of 2006 and implemented since 2007. Previous versions of NACE have been:

- NACE (1970)
- NACE Rev. 1, the first revision of the original NACE (1970);
- NACE Rev. 1.1, a minor revision of NACE Rev. 1.

1.1 BLUE ECONOMY

If we count all economic activities that depend on the sea, then the EU's blue economy represents 5.4 million jobs and a gross added value of just under €500 billion per year. In all, 75% of Europe’s external trade and 37% of trade within the EU is seaborne. Much of these activities is concentrated around Europe's coasts, but not all of them: some landlocked Countries host very successful manufacturers of marine equipment.

Nevertheless, the sea and the coasts are the main drivers of the overall economy: because of their outward-looking geography, ports and coastal communities have traditionally been centres for new

ideas and innovation. In addition to this traditional propensity for innovation, three new factors have now come into play:

- First, there has been rapid technological progress in working offshore in ever-deeper waters. Robotics, video-surveillance and submersible technology are now routinely packaged into machinery for operations that were not feasible ten years ago;
- Second, we are increasingly aware that land and freshwater are finite resources. Further clearing of forests or draining of wetland will deprive future generations of the benefits they provide. The 71% of the planet is represented by oceans that can deliver human necessities such as food and energy in a way that is more sustainable. Meeting environmental targets can also be a source of innovation and growth;
- Third, the need to reduce greenhouse gas emissions has not only driven the deployment of offshore renewable energy installations but has also provided a further impetus for energy saving and an additional reason to favour seaborne transport over land transport due to its lower emissions per tonne-kilometre. There is significant potential to reduce these emissions which account for about 3% of the total greenhouse gas emissions by further improving the energy efficiency of ships.

1.2 BLUE GROWTH

*These emergin factors have opened up an opportunity for blue growth – an initiative to harness the untapped potential of Europe's oceans, seas and coasts for jobs and growth. Such potential is significant, provided the appropriate investments and research are made. Growth in the blue economy offers new and innovative ways to help steer the EU out of its current economic crisis. It represents the maritime dimension of the Europe 2020 strategy. It can contribute to the EU's international competitiveness, resource efficiency, job creation and new sources of growth whilst safeguarding biodiversity and protecting the marine environment, thus preserving the services that healthy and resilient marine and coastal ecosystems provi*de.

This Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions (Blue Growth Opportunities for marine and maritime sustainable growth) drives forward the Commission's Integrated Maritime Policy and launches a process which will place the blue economy firmly on the agenda of Member States, regions, enterprise and civil society. It describes how Member States and EU policies are already supporting the blue economy. It then identifies specific areas where targeted action could provide an additional stimulus. A set of initiatives will subsequently be launched to explore and

develop the growth potential in these areas.

https://ec.europa.eu/maritimeaffairs/sites/maritimeaffairs/files/docs/body/com_2012_494_en.pdf

Therefore, according to EU definition, BLUE GROWTH refers to the sectors of the Blue Economy that have a high potential for sustainable jobs and growth (such as aquaculture, coastal and maritime tourism, blue biotechnology, etc.), while BLUE ECONOMY includes all the economic activities related to oceans, seas and coastal areas.

1.3 .BLUE GROWTH SECTORS

The Blue Growth sectors (BG) according to NACE can be found in the table below.

Table 2: Blue growth sectors

Blue Growth Sectors	Nace
Biotechnology	21.20 Manufacture of pharmaceutical preparations;72.11 Research and experimental development on biotechnology; 72.1 Research and experimental development on natural sciences and engineering; 72.19 Other research and experimental development on natural sciences and engineering;
Renewable Energy	35.11 Production of electricity
Coastal and Maritime Tourism	47.8 Retail sale via stalls and markets; 32.3 Manufacture of sports goods; 47.64 Retail sale of sporting equipment in specialised stores; 55 Accommodation; 56 Food and beverage service activities; 79 Travel agency, tour operator reservation service and related activities; 55.10 Hotels and similar accommodation; 55.20 Holiday and other short stay accommodation; 55.30 Camping grounds, recreational vehicle parks and trailer parks; 55.90 Other accommodation; 68 Real estate activities; 74.2 Photographic activities; 77.11 Renting and leasing of cars and light motor vehicles; 77.21 Renting and leasing of recreational and sports goods; 77.11 Renting and leasing of cars and light motor vehicles; 77.34 Renting and leasing of water transport equipment; 81.30

	Landscape service activities; 91.02 Museums activities; 91.03 Operation of historical sites and buildings and similar visitor attractions; 93 Sports activities and amusement and recreation activities; 93.29 Other amusement and recreation activities;
Aquaculture	03.2 - Aquaculture; 03.21 – Marine acquaculture;
Mineral Resources (Seabed mining)	07.29 Mining of other non-ferrous metal ores; 08.1 Quarrying of stone, sand and clay; 08.9 Mining and quarrying n.e. c.; 09.9 Support activities for other mining and quarrying

1.3.1 Biotechnology

Biotechnology with NACE codes:

- 72.1 Research and experimental development on natural sciences and engineering;
- 72.11 Research and experimental development on biotechnology;

Biotechnology with NACE codes:

- 72.19 Other research and experimental development on natural sciences and engineering

This class includes:

- research and experimental development on natural science and engineering other than biotechnological
- research and experimental development:
- research and development on natural sciences
- research and development on engineering and technology
- research and development on medical sciences
- research and development on agricultural sciences
- interdisciplinary research and development, predominantly on natural sciences and engineering

Biotechnology and life sciences contribute to the modernization of European industry. They are used in a variety of industrial sectors such as healthcare and pharmaceuticals, animal health,

textiles, chemicals, plastic, paper, fuel, food, and feed processing. Taking advantage of biotechnology helps the EU economy grow and provides new jobs, while also supporting sustainable development, public health, and environmental protection.

The main applications of biotechnology in the EU economy can be classified into three broad groups:

- In healthcare and pharmaceutical applications, biotechnology has led to the discovery and development of advanced medicines, therapies, diagnostics, and vaccines. For example, biotechnological breakthroughs have created new medicines for patients suffering from growth diseases, metabolic diseases, multiple sclerosis (MS), rheumatoid arthritis, cancer, and Alzheimer's disease.
- In agriculture, livestock, veterinary products, and aquaculture, biotechnology has improved animal feed, produced vaccines for livestock, and improved diagnostics for detecting diseases such as BSE, foot and mouth disease, and salmonella. It has also enabled the use of enzymes for more efficient food processing and improved the breeding of plants to obtain desired characteristics.
- In industrial processes and manufacturing, biotechnology has led to the use of enzymes in the production of detergents, pulp and paper, textiles, and biomass. By using fermentation and enzyme biocatalysis instead of traditional chemical synthesis, higher process efficiency can be obtained, decreasing energy and water consumption. This leads to a reduction in toxic waste.

https://ec.europa.eu/growth/sectors/biotechnology_en

http://ec.europa.eu/eurostat/documents/3859598/5902521/KS-RA-07-015-EN.PDF/dd5443f5-b886-40e4-920d-9df03590ff91?version=1.0

Biotechnology is also broadly defined by the Organization for Economic Co-operation and Development (OECD, 2005) in the following way:

- OECD statistical single definition of biotechnology: the application of science and technology to living organisms, as well as parts, products and models thereof, to alter living or non-living materials for the production of knowledge, goods and services (OECD, 2016)
- OECD list-based definition for biotechnology: the following list of biotechnology techniques functions as an interpretive guide in using the single definition. The content of the list-based definition is indicative rather than exhaustive and is expected to change over time as data collection and biotechnology activities evolve (OECD, 2016).

- ✓ DNA/RNA: Genomics, pharmacogenomics, gene probes, genetic engineering, DNA/RNA sequencing/synthesis/amplification, gene expression profiling, and use of antisense technology.
- ✓ Proteins and other molecules: Sequencing/synthesis/engineering of proteins and peptides (including large molecule hormones); improved delivery methods for large-molecule drugs; proteomics, protein isolation and purification, signaling, identification of cell receptors.
- ✓ Cell and tissue culture and engineering: Cell/tissue culture, tissue engineering (including tissue scaffolds and biomedical engineering), cellular fusion, vaccine/immune stimulants, embryo manipulation, marker-assisted breeding technologies.
- ✓ Process biotechnology techniques: Fermentation using bioreactors, bio-refining, bioprocessing, bioleaching, biopulping, bioleaching, biodesulphurisation, bioremediation, biosensing, biofiltration and phytoremediation, molecular aquaculture.
- ✓ Gene and RNA vectors: Gene therapy, viral vectors.
- ✓ Bioinformatics: Construction of databases on genomes, protein sequences; modeling complex biological processes, including systems biology.
- ✓ Nanobiotechnology: Applies the tools and processes of nano/microfabrication to build devices for studying biosystems and applications in drug delivery, diagnostics, etc.

https://www.vistikhetmaar.nl/wp-content/uploads/2018/03/Building-Industries-at-sea-Blue-Growth-and-the-New-Maritime-Economy.pdf

1.3.2 Renewable Energy

Renewable Energy with NACE code:

- 35.11 Production of electricity

Renewable energy can be produced from a wide variety of sources including wind, solar, hydro, tidal, geothermal, and biomass. By using more renewable to meet its energy needs, the EU lowers its dependence on imported fossil fuels and makes its energy production more sustainable. The renewable energy industry also drives technological innovation and employment across Europe.

The EU's Renewable energy directive sets a binding target of 20% final energy consumption from renewable sources by 2020. To achieve this, EU countries have committed to reaching their own national renewables targets ranging from 10% in Malta to 49% in Sweden. They are also required to have at least 10% of their transport fuels come from renewable sources by 2020.

All EU countries have adopted national renewable energy action plans showing what actions they intend to take to meet their renewables targets. These plans include sectorial targets for electricity, heating and cooling, and transport; planned policy measures; the different mix of renewables technologies they expect to employ; and the planned use of cooperation mechanisms.

Renewables will continue to play a key role in helping the EU meet its energy needs beyond 2020. EU countries agreed in 2014 on a new renewable energy target of at least 27% of EU's final energy consumption by 2030, as part of the EU's energy and climate goals for 2030.

https://ec.europa.eu/energy/en/topics/renewable-energy

In 2016 renewable energy represented 17 % of energy consumed in the EU, on a path to the 2020 target of 20 %.

http://ec.europa.eu/eurostat/

The primary production of renewable energy within the EU-28 in 2016 was 211 million tonnes of oil equivalent (toe). The quantity of renewable energy produced within the EU-28 increased overall by 66.6 % between 2006 and 2016, equivalent to an average increase of 5.3 % per year.

Among renewable energies, the most important source in the EU-28 was wood and other solid biofuels as well as renewable wastes, accounting for 49.4 % of primary renewables production in 2016. Hydro power was the second most important contributor to the renewable energy mix (14.3 % of the total), followed by wind power (12.4 %). Although their levels of production remained relatively low, there was a particularly rapid expansion in the output of wind and solar power, the latter accounting for a 6.3 % share of the EU-28's renewable energy produced in 2016, while geothermal energy accounted for 3.2 % of the total. There are currently very low levels of tide, wave and ocean energy production, with these technologies principally found in France and the United Kingdom.

http://ec.europa.eu/eurostat/

Sustainable marine energy can play a vital role in social and economic development, as well as in climate adaptation and mitigation. While offshore wind energy is becoming more common, particularly in Europe, other forms of marine energy extraction are still experimental, and in most cases have not yet been developed on a commercial scale. These other forms include wave and tidal energy and ocean thermal energy conversion.

https://www.tralac.org/images/docs/11715/the-potential-of-the-blue-economy-world-bank-un-desa-june-2017.pdf

1.3.3 Coastal and Maritime Tourism

Coastal and Maritime Tourism with NACE codes:

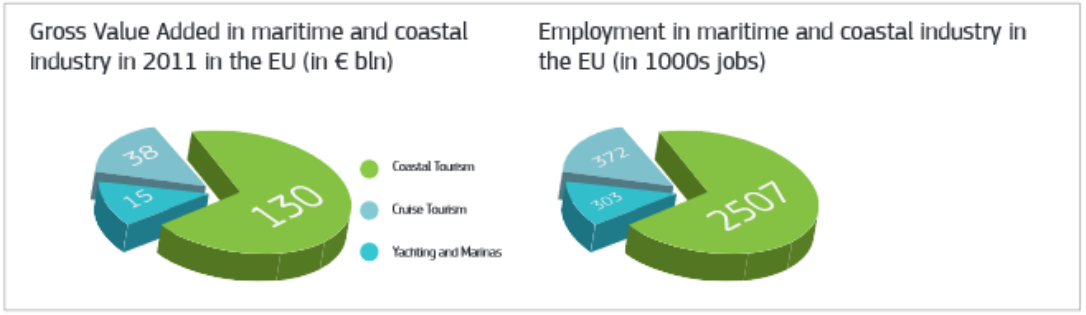
- 55 Accommodation;
- 55.10 Hotels and similar accomodation;
- 55.20 Holiday and other short stay accommodation;
- 55.30 Camping grounds, recreational vehicle parks and trailer parks;
- 55.90 Other accommodation;
- 56 Food and beverage service activities;
- 79 Travel agency, tour operator reservation service and related activities;
- 77.11 Renting and leasing of cars and light motor vehicles;
- 77.34 Renting and leasing of water transport equipment;
- 93 Sports activities and amusement and recreation activities;
- 93.29 Other amusement and recreation activities

Employing over 3.2 million people, this sector generates a total of € 183 billion in gross value added and representing over one third of the maritime economy. As much as 51% of bed capacity in hotels across Europe is concentrated in regions with a sea border.

It is the biggest maritime sector in terms of gross value added and employment and, according to the Blue Growth Study, is expected to grow by 2-3% by 2020. In 2012, Cruise tourism alone represents 330,000 jobs and a direct turnover of €15.5 billion and is expected to grow.

https://ec.europa.eu/maritimeaffairs/policy/coastal_tourism_en

Figure 1



https://ec.europa.eu/maritimeaffairs/sites/maritimeaffairs/files/docs/body/coastal-and-maritime-tourism_en.pdf

Tourism/Leisure sector with NACE codes:

- 68 Real estate activities;
- 91.02 Museums activities;
- 91.03 Operation of historical sites and buildings and similar visitor attractions;
- 77.11 Renting and leasing of cars and light motor vehicles;
- 77.21 Renting and leasing of recreational and sports goods;
- 81.30 Landscape service activities;
- 74.2 Photographic activities;
- 47.8 Retail sale via stalls and markets;
- 32.3 Manufacture of sports goods;
- 47.64 Retail sale of sporting equipment in specialized stores;

This class includes:

- 3230 Manufacture of sports goods
- 4764 Retail sale of sporting equipment in specialized stores
- 4781 Retail sale via stalls and markets of food, beverages and tobacco products
- 4782 Retail sale via stalls and markets of textiles, clothing and footwear
- 6810 Buying and selling of own real estate
- 7420 Photographic activities
- 7721 Renting and leasing of recreational and sports goods
- 8130 Landscape service activities
- 9102 Museums activities
- 9103 Operation of historical sites and buildings and similar visitor attractions

Tourism, fast becoming the largest global business, employs 1 out of every 11 persons globally. According to the World Travel and Tourism Council, travel and tourism's contribution to world GDP grew for the sixth consecutive year in 2015, rising to a total of 9.8 percent (US$7.2 trillion) (WTTC 2016). The World Tourism Organization calculated that 2016 was the seventh consecutive year of

sustained growth in international arrivals, which grew by 46 million over the previous year to reach 1,235 million.

Tourism can therefore be an important source of foreign exchange and is tied to the social, economic, and environmental well-being of many countries. Maritime or ocean related tourism, as well as coastal tourism, are vital sectors of the economy in many countries. Coastal and ocean-related tourism comes in many forms and includes dive tourism, maritime archaeology, surfing, cruises, ecotourism, and recreational fishing operations. Sustainable tourism can be part of the blue economy, promote conservation and sustainable use of marine environments and species, generate income for local communities (thus alleviating poverty), and maintain and respect local cultures, traditions, and heritage.

In this context, tourism, if it is well managed and monitored, can be an important contributor to the sustainable development. The tourism sector has played a key role in the development of many island economies and in helping them advance in the fight against poverty. In addition, the sustainable development fostered by the tourism sector can trigger similar developments in other economic activities and help protect the natural and cultural resources of islands. Therefore, policies, programs, and interventions aimed at SIDS and other island economies can in some instances benefit from the inclusion of tourism as a sector to help accelerate sustainable consumption and production patterns in the development of the blue economy.

https://www.tralac.org/images/docs/11715/the-potential-of-the-blue-economy-world-bank-un-desa-june-2017.pdf

1.3.4 Aquaculture

Aquaculture with NACE codes:

- 03.2 - Aquaculture;
- 03.21 – Marine aquaculture;

Aquaculture is the breeding, rearing, and harvesting of fish, shellfish, plants, algae and other organisms in all types of water environments. As the demand for seafood has increased, technology has made it possible to grow food in coastal marine waters and the open ocean. Aquaculture is a method used to produce food and other commercial products, restore habitat and replenish wild stocks, and rebuild populations of threatened and endangered species. There are two main types of aquaculture—marine and freshwater.

https://oceanservice.noaa.gov/facts/aquaculture.html

In Europe, aquaculture accounts for about 20% of fish production and directly employs some 85 000 people. The sector is mainly composed of SMEs or micro-enterprises in coastal and rural areas. EU aquaculture is renowned for its high quality, sustainability and consumer protection standards.

https://ec.europa.eu/fisheries/cfp/aquaculture_en

According to FAO Aquaculture Quantity (t) in Greece were 107 162 *(2015) and* 123 410 (2016)

http://www.fao.org/fishery/statistics/global-aquaculture-production/query/en

Figure 2

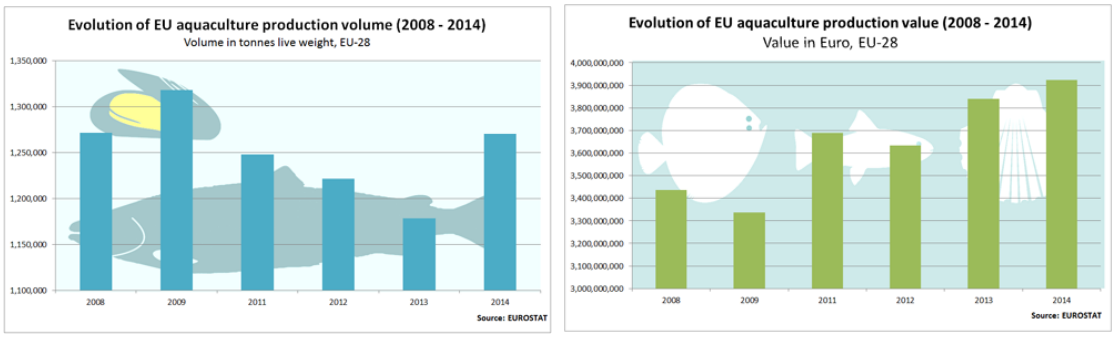


Figure 3

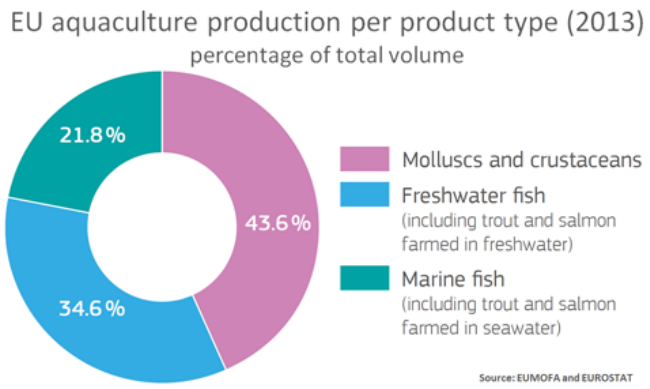


Figure 4

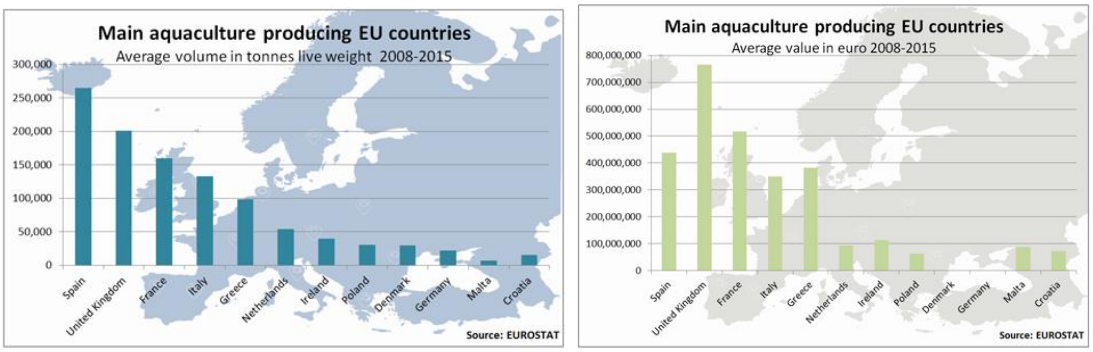
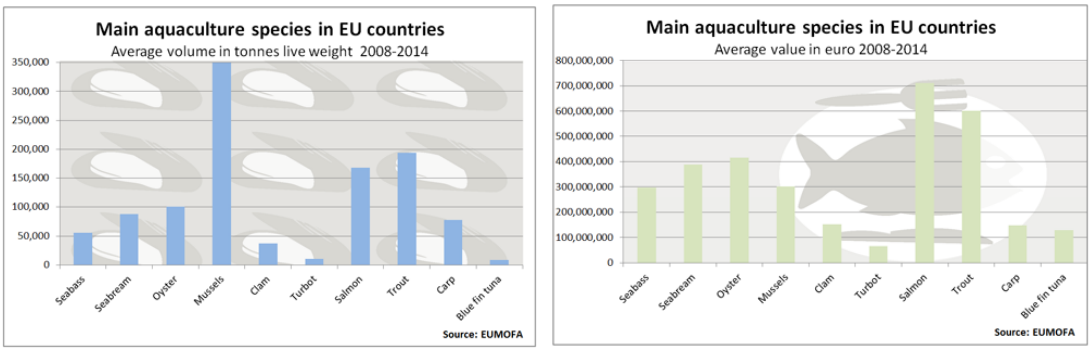


Figure 5



https://ec.europa.eu/fisheries/cfp/aquaculture/facts_en

The world's population is expected to rise to 9.6 billion by 2050, creating a considerable demand for food and sources of protein. Today, fish and fish products supply a significant portion of the daily intake of animal protein in many developing countries. As aquaculture supplies 58 percent of fish to global markets (FAO 2016), invigorating this sector can contribute to food security as well as social and economic inclusion for some of the poorest people in the world. Locally, aquaculture can help lessen the need for fish imports and increase employment, as well as contribute to food security and meet nutrition needs.

Regardless of the size of operations, sustainable aquaculture, by definition, must be economically viable and environmentally sound. Additionally, in regions where aquaculture and fisheries have played a culturally significant role over a long period of time, it must also be culturally appropriate and must not be carried out at the expense of reducing access to essential resources by small-scale fishers and others.

Examples of environmentally sustainable aquaculture include integrated multitrophic aquaculture, seaweed aquaculture, shellfish aquaculture, and well-planned fish rearing based on an ecosystem approach.

https://www.tralac.org/images/docs/11715/the-potential-of-the-blue-economy-world-bank-un-desa-june-2017.pdf

1.3.5 Marine aquatic products

The pharmaceuticals manufacturing (Division 21) sector in the EU-27 is characterized by its small number of very large, capital-intensive enterprises. In total, there were 4.0 thousand enterprises in the pharmaceuticals manufacturing sector in 2010; together they employed 542 thousand persons across the EU-27 and generated EUR 85.9 billion of value added.

The large average size of enterprises in the EU-27's pharmaceuticals manufacturing sector can be seen from the share of the pharmaceuticals manufacturing sector within the non-financial business economy (Sections B to J and L to N and Division 95): as it represented just 0.02 % of all non-financial business economy enterprises, employed 0.4 % of the workforce, and generated 1.4 % of its value added. Within manufacturing (Section C), the EU-27 pharmaceuticals manufacturing sector contributed 1.8 % of the total workforce and 5.4 % of total value added in 2010.

The apparent labor productivity of the EU-27's pharmaceuticals manufacturing sector in 2010 was EUR 158.4 thousand per person employed, 3.5 times as high as the non-financial business economy average of EUR 44.8 thousand per person employed and the second highest ratio among the manufacturing NACE divisions in 2010 (behind coke and refined petroleum products manufacturing, Division 19). Associated with this high apparent labor productivity ratio were high average personnel costs, EUR 59.9 thousand per employee for the EU-27's pharmaceutical manufacturing sector in 2010, approximately double the EUR 30.9 thousand per employee average for the non-financial business economy and again the second highest level among manufacturing NACE divisions (again behind the coke and refined petroleum products manufacturing subsector).

The wage-adjusted labor productivity ratio for the EU-27's pharmaceuticals manufacturing sector in 2010 was 264.4 %, showing that apparent labor productivity in this sector was approximately 2.6 times as high as average personnel costs. Among manufacturing NACE divisions, this wage-adjusted labor productivity ratio was lower only than that recorded for tobacco manufacturing (Division 12), while among the NACE divisions within the whole of the non-financial business economy this was the eighth highest ratio.

The gross operating rate shows the relation between the gross operating surplus and turnover and this indicates that the pharmaceuticals manufacturing sector had relatively high operating profitability. Its gross operating rate stood at 23.2 % in the EU-27 in 2010, more than twice as high as the non-financial business economy average (10.1 %) and two and a half times as high as the manufacturing average (9.0 %). This was the highest level of profitability (using this measure) among the NACE divisions within manufacturing. It should be noted that this measure does not take account of depreciation or financial expenditure, which are typically higher in capital-intensive activities.

The EU-27's pharmaceuticals manufacturing sector is split between the large subsector of pharmaceutical preparations manufacturing (Group 21.2) and the smaller basic pharmaceutical products manufacturing subsector (Group 21.1). In fact, as much as nine tenths of sectoral value added and employment in the EU-27's pharmaceuticals manufacturing sector in 2010 could be attributed to pharmaceutical preparations manufacturing

Although varying considerably in size, the two subsectors displayed similar characteristics, quite high levels of labor productivity, high average personnel costs and high operating profitability. The smaller basic pharmaceutical products manufacturing subsector recorded higher EU-27 apparent labor productivity (based on incomplete data) and lower average personnel costs than the pharmaceutical preparations manufacturing subsector. As a result, this subsector had a notably higher wage-adjusted labor productivity ratio, 313.3 % in 2009, which was the second highest among all manufacturing NACE groups in 2009 and the tenth highest among all NACE groups within the non-financial business economy. The basic pharmaceutical products manufacturing subsector recorded a wage-adjusted labor productivity ratio of 235.9 % in 2009, which was also well above the manufacturing and non-financial business economy averages and was the fourth highest among all manufacturing NACE groups.

Both subsectors also recorded high gross operating rates within the EU-27 in 2009, 23.5 % for the pharmaceutical preparations manufacturing subsector and 20.7 % for the basic pharmaceutical products manufacturing subsector; these were the highest and third highest gross operating rates respectively among manufacturing NACE groups in the EU-27 in 2009.

http://ec.europa.eu/eurostat/statistics-explained/index.php/Archive:Manufacture_of_pharmaceuticals_statistics_-_NACE_Rev._2

1.3.6 Mineral Resources

Mineral Resources with NACE codes:

- 07.29 Mining of other non-ferrous metal ores;
- 08.1 Quarrying of stone, sand and clay;
- 08.9 Mining and quarrying n.e.c.;
- 09.9 Support activities for other mining and quarrying

The European mining industry has a long tradition, yet today it is also among the continent's most modern and most innovative industrial sectors. Discovering new deposits, mining and ore dressing all require major emphasis on research and development. Mining exploration, extraction and beneficiation are now supported by high-level technologies. The industry also promotes advancements in the areas of environmental, health and safety protection.

The European mining industry is fundamental for the continent's economic well-being. Consumption of aggregates, industrial minerals and metals in Europe have grown rapidly over the past decade. Today, Europe is almost self-sufficient in producing many industrial minerals and aggregates. However, it is a significant net-importer of most metals and metal ores.

Europe is rich in natural resources and the extraction and supply of minerals continue to play a crucial role in the European economy and society as it has done for thousands of years. Minerals are used in everyday life, as construction materials (crushed rock, sand and gravel) for infrastructure, buildings, and roads, and for industrial purposes (e.g. metals, lime, kaolin, silica sand, talc) in the production of steel, cars, computers, medicines, human and animal foodstuffs and fertilizers, to name just a few key applications.

http://www.euromines.org/mining-europe

1.4 BLUE ECONOMY SECTORS

Table 3: Blue Economy sectors

Blue Economy Sectors	Nace
Offshore oil and gas	06 Extraction of crude petroleum and natural gas; 09.1 Support activities for petroleum and natural gas extraction; 19.20 Manufacture of refined petroleum products;
Shipbuilding and Ship Repair	33.15 Repair and maintenance of ship and boats; 30.1 Building of ships and boats; 30.11 Building of ships and floating structures; 30.12 Building of pleasure and sporting boats
Sea shipping/Transport	50 Water transport; 50.10 Sea and coastal passenger water transport; 50.2 Sea and coastal freight water transport; 52.22 Service activities incidental to water transportation;
Fisheries	03.1 - Fishing ; 03.11 – Marine fishing; 10.2 Processing and preserving of fish, crustaceans and molluscs ; 10.9 Manufacture of other food products n.e.c.; 13.94 Manufacture of cordage, rope, twine and netting.46.38 Wholesale of other food, including fish, crustaceans and molluscs; 47.23 Retail sale of fish, crustaceans and molluscs in specialized stores;
Coastal Protection	91.04 Botanical and zoological gardens and nature reserves activities
Desalination	08.93 Extraction of salt; 10.84 Manufacture of condiments and seasonings
Marine mineral mining/Aggregates mining	24.5 Casting of metals; 24.4 Manufacture of basic precious and other non-ferrous metals; 35.21 Manufacture of gas;
Utilities	42.2 Construction of utility projects; 42.9 Construction of other civil engineering projects; 36 Water collection, treatment and supply; 37 Sewerage; 52.10 Warehousing and storage; 82.92 Packaging activities

1.4.1 Offshore oil and gas

Offshore oil and gas with NACE codes:

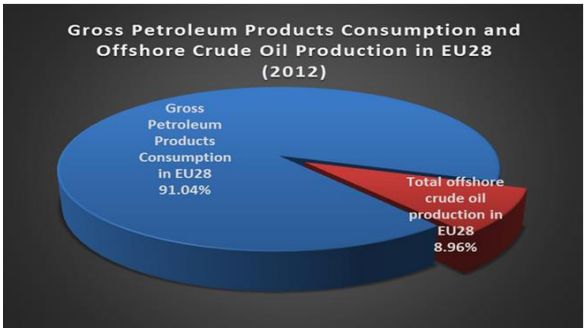
- 06 Extraction of crude petroleum and natural gas;
- 09.1 Support activities for petroleum and natural gas extraction;
- 19.20 Manufacture of refined petroleum products.

Over 90 per cent of oil and over 60 per cent of gas produced in the European Economic Area (EEA) comes from offshore operations. Offshore operations (prospecting and exploration) are planned or ongoing on the continental shelves and, to a lesser extent, the territorial waters of 20 EEA States; production is ongoing in 12 EEA States. In total, over 1,000 offshore installations are operating in EEA waters. There are more than 6,000 wells, over 400 of them in Italian and Spanish waters. These numbers are growing despite an overall decline in hydrocarbon production in the European Union (EU)

https://ec.europa.eu/energy/sites/ener/files/documents/BIO_Offshore%20Civil%20Liability_Revised%20Final%20Report%20%2831102014%29.pdf

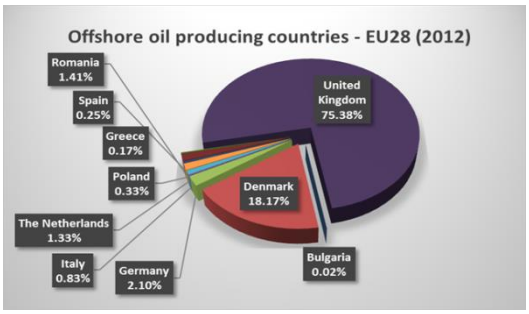
Offshore oil and gas production constitutes an important indigenous energy source of hydrocarbons in Europe. In 2012, offshore oil production in the EU totalled approximately 60 million tons produced in the continental shelves of different EU member states. According to data from EUROSTAT and the petroleum national authorities, in 2012 the Offshore Crude Oil Production of EU-28 corresponded to almost 9% of the Gross Petroleum Products Consumption. Most of the crude oil in the EU Member States is produced in the North Sea, with the UK as the major contributor (75.38%), followed by Denmark (18.17%).

Figure 6: Gross Petroleum Products Consumption and Offshore Crude Oil Production in EU-28. Source: Eurostat and national authorities, 2012



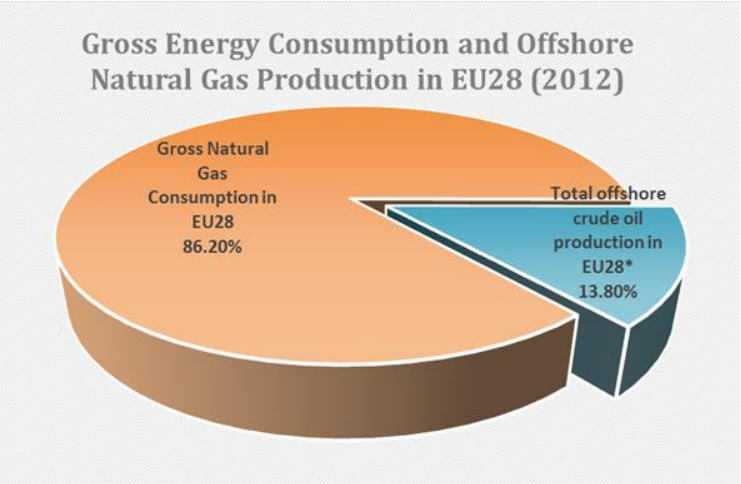
The distribution of offshore oil production in different EU member states for 2012 is shown in Figure 6.

Figure 7: Offshore Crude Oil Production in EU-28. Source: Eurostat and national authorities, 2012.



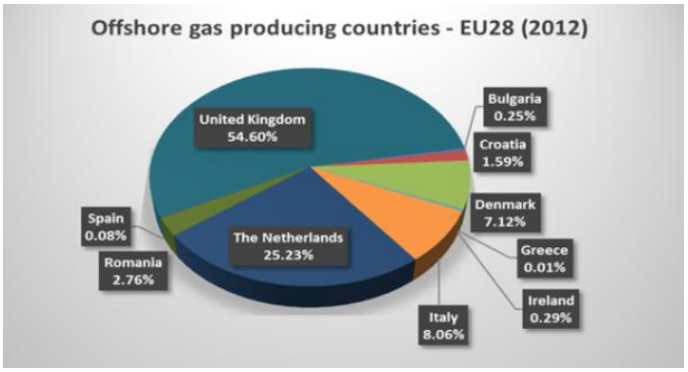
Data for natural gas are more interesting for the EU-28 offshore production. In 2012 offshore natural gas production in EU-28 was approximately 63 million tons of oil equivalent. In this case EU-28 offshore production covered 13.8% of the gross energy consumption.

Figure 8 Gross Energy Consumption and Offshore Production of natural gas in EU-28. Source: Eurostat and national authorities, 2012



Additional considerable quantities of natural gas came also from the offshore production of Norway. In 2012 natural gas offshore production in Norway was over 84 million tons.

Figure 9: Natural Gas Offshore Production in EU-28. Source: Eurostat and national authorities, 2012



Currently there are more than 600 platforms (not counting the large number of subsea structures connected to them) operating in the continental shelves of the European Member States. The distribution of offshore oil and gas installations in the European Union waters and in Norway is shown in Figure 5. In the North Sea, hydrocarbon offshore production takes place in the Danish, Dutch, German, Irish, Norwegian and UK sections. Offshore production is also taking place in the Mediterranean (mainly in the Italian continental shelf, but also in Greece, Spain and Croatia), in the Polish sector of the Baltic Sea and in the Black Sea (mainly in the Romanian and Bulgarian continental shelves). Apart from explorations in the North sea which are ongoing, increasing exploration plans are foreseen for the Mediterranean region (in the Cypriot, Greek and Maltese continental shelves), the Black Sea (Bulgarian and Romanian continental shelves) as well as for the Atlantic East coast (Portuguese continental shelf). Oil and gas exploration or production also takes place in close vicinity of the EU, off the coasts of Algeria, Egypt, Israel, Libya, Tunisia, Turkey and Ukraine.

https://euoag.jrc.ec.europa.eu/node/63

1.4.2 Shipbuilding and Ship Repair

Shipbuilding and Ship Repair with NACE codes:

- 33.15 Repair and maintenance of ship and boats;
- 30.1 Building of ships and boats;
- 30.11 Building of ships and floating structures;
- 30.12 Building of pleasure and sporting boats

The shipbuilding industry deals with the production of larger (mainly seagoing) vessels intended for the merchant fleet (cargo or passenger transport), the off-shore energy industry or military

purposes. It also includes products and services supplied for the building, conversion, and maintenance of these ships. The European Commission promotes the industry's development and addresses competitiveness issues it faces.

The European shipbuilding industry is a dynamic and competitive sector. It is important from both an economic and social perspective. It is also linked to other sectors including transport, security, energy, research, and the environment.

- There are about 150 large shipyards in Europe. Around 40 of them are active in the global market for large seagoing commercial vessels;
- Some 120,000 people are employed by shipyards (civil and naval, new building, and repair yards) in the EU;
- With a market share of around 6% in terms of tonnage and 35% for marine equipment, Europe is a major player in the global shipbuilding industry (total turnover of EUR 60 billion in 2012);

Shipbuilding is an important and strategic industry in a number of EU countries. Shipyards contribute significantly to regional industrial infrastructure and national security interests (military shipbuilding).

The European shipbuilding industry is the global leader in the construction of complex vessels, such as cruise ships, ferries, mega-yachts, and dredgers. It also has a strong position in the building of submarines and other naval vessels.

The European marine equipment industry is a world leader for a wide range of products ranging from propulsion systems, large diesel engines, environmental, and safety systems, to cargo handling and electronics.

The sector faces fierce international competition from countries like China and South Korea. The industry has also suffered from the absence of effective global trade rules and state supported over investment. This is because shipyards offer a wide range of technologies, employ a significant number of workers, and generate foreign currency income, due to the fact the global shipbuilding market is dollar-based.

https://ec.europa.eu/growth/sectors/maritime/shipbuilding_en

Traditionally, shipbuilding and ship-repair existed at the same shipyard. However some countries and yards decided to split repair activities from newbuild activities. This is driven by various factors including the higher revenues and lower labor requirements in shipbuilding and the possibility to

increase efficiencies in shipbuilding.

Some countries and yards, including some yards in Europe, have chosen to combine repair and newbuild activities, with a view of product portfolio diversification. In general however, repair activities are physically separated from newbuilding, e.g. at other yards or even within other companies.

The position of Europe in the ship repair market is relatively strong. Total turnover in Europe in this industry was €3.5 billion in 2007. Compared to the estimated size of the world repair market this represents a share of some 35%.

https://www.google.com/url?sa=t&rct=j&q=&esrc=s&source=web&cd=1&ved=0ahUKEwiYtvKLhPHbAhVIK1AKHRHbCx8QFggqMAA&url=https%3A%2F%2Fec.europa.eu%2Fdocsroom%2Fdocuments%2F10506%2Fattachments%2F1%2Ftranslations%2Fen%2Frenditions%2Fnative&usg=AOvVaw3o7ebe3XvIIUGWTqVOzWSa

1.4.3 Sea shipping/Transport

Sea shipping/Transport with NACE codes:

- 50 Water transport;
- 50.10 Sea and coastal passenger water transport;
- 50.2 Sea and coastal freight water transport;
- 52.22 Service activities incidental to water transportation;

For Europe, maritime transport has been a catalyst for economic development and prosperity throughout its history. Maritime Transport enables trade and contacts between all European nations. It ensures the security of supply of energy, food and commodities and provides the main vehicle for European imports and exports to the rest of the world. Almost 90% of the EU's external freight trade is seaborne. Short sea shipping represents one third of intra-EU exchanges in terms of ton-kilometers. Ensuring a good quality of life on Europe's islands and in peripheral maritime regions depends on good maritime transport services. Each year, more than 400 million passengers embark and disembark at European ports. Overall, maritime industries are an important source of employment and income for the European economy.

https://ec.europa.eu/transport/modes/maritime_en

1.4.4 Fisheries

Fisheries with NACE codes:

- 03.1 - Fishing ;
- 03.11 – Marine fishing;

The EU fishing industry is the world's 4th largest, supplying some 6.4 million tonnes of fish each year. Fishing and fish processing provide jobs for over 350,000 people.

Seas and oceans are major drivers of the European economy. The EU has the world's largest number of commercial ports (1,200) and largest merchant fleet. 90% of trade with non-EU countries and 40% of trade within the EU is seaborne. This sector represents roughly 5.4 million jobs and generates a gross added value of almost €500 billion a year.

https://europa.eu/european-union/topics/maritime-affairs-fisheries_en

In several EU regions the fishing sector plays a crucial role for employment and economic activity – in some European coastal communities as many as half the local jobs are in the fishing sector (as shown in the map on the right-hand side).

Employment in the fishing sector tends to be concentrated in a handful of countries. Spain alone accounts for a quarter of total employment, and the four countries with the highest levels of employment (Spain, Italy, Greece and Portugal) make up around 70%.

https://ec.europa.eu/fisheries/facts_figures_en?qt-facts_and_figures=3

Sustainable fisheries can be an essential component of a prosperous blue economy, with marine fisheries contributing more than US$270 billion annually to global GDP (World Bank 2012b). A key source of economic and food security, marine fisheries provide livelihoods for the 300 million people involved in the sector and help meet the nutritional needs of the 3 billion people who rely on fish as an important source of animal protein, essential micro-nutrients, and omega-3 fatty acids (FAO 2016).

The role of fisheries is particularly important in many of the world's poorest communities, where fish are a critical source of protein and the sector provides a social safety net. Women represent the majority in secondary activities related to marine fisheries and marine aquaculture, such as fish processing and marketing. In many places, employment opportunities have enabled young people to stay in their communities and have strengthened the economic viability of isolated areas, often enhancing the status of women in developing countries. For billions around the world -many among the world's poorest-healthy fisheries, the growing aquaculture sector, and inclusive trade

mean more jobs, increased food security and well-being, and resilience against climate change.

While the impacts of climate change are being felt throughout the ocean realm, they are particularly acute for fisheries, the fish stocks they target and the marine coastal ecosystems on which they depend. Understanding of these impacts is constantly improving and can be organized around several main “vectors”: acidification, sea-level rise, higher water temperatures, and changes in ocean currents. These different vectors, however, are unequally known and hard to model, in terms of both scope -where they will occur, where they will be felt the most- and severity. For instance, while not as well understood as the other impacts, and more difficult to measure, the impacts of acidification are likely to be the most severe and most widespread, essentially throughout any carbon-dependent ecological processes. Likewise, the effects of sea-level change will be felt differently in different parts of the world, depending on the ecosystems around which it occurs. Most importantly, however, and unlike in terrestrial ecosystems, further uncertainty results from the complex interactions within and between these ecosystems. In spite of this uncertainty, the current state of knowledge is sufficient to understand that these impacts will add to the current global fisheries crisis, thus adding a renewed and increasing sense of urgency.

All this is at risk from overcapacity, overfishing, unregulated development, and habitat degradation, driven largely by poverty and enabled by ineffective policy. Based on FAO’s analysis of assessed commercial fish stocks, the share within biologically sustainable levels decreased from 90 percent in 1974 to 68.6 percent in 2013. Thus, 31.4 percent of fish stocks were estimated as fished at a biologically unsustainable level and therefore overfished (FAO 2016). Fish stocks are further affected by illegal, unreported, and unregulated fishing, which as noted earlier accounts for roughly 11–26 million tons of fish catch, or US$10–22 billion in unlawful or undocumented revenue. Thus, IUU fishing is responsible for about the same amount of global harvest as would be gained by ending overfishing and rebuilding fish stocks (United Nations 2016). In fact, poor fisheries management results in foregone revenues of more than US$80 billion annually, which could be recovered if global fisheries were reformed significantly, including through a 44 percent reduction in the level of fishing (World Bank 2017).

Since 2002, distorting fisheries subsidies that contribute to overcapacity and overfishing have been the subject of negotiations to establish disciplines at the UNWTO, where from the outset a positive outcome has been identified as a potential win-win-win for trade, sustainable development, and the environment. In addition, the persistently high volume of post-harvest losses removes large quantities of fish from the market—up to 25 percent in many developing countries (FAO 2016). Minimizing post-harvest losses is one key to increasing revenues and food security with-out the need to increase the level of fishing effort.

https://www.tralac.org/images/docs/11715/the-potential-of-the-blue-economy-world-bank-un-desa-june-2017.pdf

Also, there Fisheries with NACE codes:

- 10.2 Processing and preserving of fish, crustaceans and molluscs ;
- 10.9 Manufacture of other food products n.e.c.;
- 46.38 Wholesale of other food, including fish, crustaceans and molluscs;
- 47.23 Retail sale of fish, crustaceans and molluscs in specialised stores;
- 13.94 Manufacture of cordage, rope, twine and netting;

Despite the increase in production costs, and the low profit margins, the fish processing industry is still viable, with an overall turnover of nearly EUR 28 billion. The main countries in terms of output are the United Kingdom, France, Spain, Italy and Germany.

In several of the countries with a strong processing sector, the industry outsources activities both inside and outside the EU. In most EU Member States, however, net investments are declining, even in countries such as Denmark and Poland, which still record positive net profits. Only Germany and Spain remain net investors.

Producer organizations (2015)

Fishermen and fish farmers may join forces through producer organizations to make their production sustainable and efficiently market their products. They do so through the establishment of production and marketing plans. These organizations are key actors in the fisheries and aquaculture sector. In 2015, there were 219 producer organizations across 17 EU Member States.

https://ec.europa.eu/fisheries/facts_figures_en?qt-facts_and_figures=4

1.4.5 Coastal Protection

Coastal Protection with NACE codes:

- 91.04 Botanical and zoological gardens and nature reserves activities.

Coastal zones are among the most productive areas in the world, offering a wide variety of valuable habitats and ecosystems services that have always attracted humans and human activities. The beauty and richness of coastal zones have made them popular settlement areas and tourist destinations, important business zones and transit points. Currently, more 200 million

European citizens live near coastlines, stretching from the North-East Atlantic and the Baltic to the Mediterranean and Black Sea.

http://ec.europa.eu/environment/iczm/index_en.htm

1.4.6 Desalination

Desalination with NACE codes:

- 08.93 Extraction of salt;
- 10.84 Manufacture of condiments and seasonings

Desalination is the process of removing salt from sea or brackish water to make it useable for a range of 'fit for use' purposes including drinking. It may thus contribute to adaptation to climate change in all those circumstances in which water scarcity problems may be exacerbated in the future. Desalination produces a by-product, brine (a concentrated salt solution) that must be disposed. Desalination techniques include:

Electrically driven technologies: Reverse osmosis is the most frequently used technique: it consists of filtering water with osmosis membranes that separate salt from water. Feed water is forced though the rolled up membrane with high pressure. Other techniques include Mechanical Vapor Compression (MVC) and Electrical Dialysis (EDR)

Thermally driven technologies: multistage flash distillation (MSF), multi effect distillation (MED), Thermal Vapor Compression (TVC) and Membrane Distillation (MD).

According to the UN World Water Development report 2014, 'there are currently more than 16,000 desalination plants worldwide, with a total global operating capacity of roughly 70 million m3/day, and the operating capacity could double by 2020'. Currently, desalination is largely used in the Middle East and North Africa (70% of global capacity), in the US, increasingly in Asia, but to a limited extent in Europe e (10% of global capacity). Several southern EU countries are however using desalination to cover freshwater needs. Spain is the biggest user of desalination with currently 700 desalination plants and a capacity of 1.6 million m3 a day, providing water for 8 million people every day. Other EU Mediterranean countries have much smaller capacities, with some 240 000 m^3/day in Italy, 100 000 m3/day in Cyprus and 30 000 m^3/day in Greece (EEA, 2012). Desalination is expected to double over the next 50 years in Spain. The United Kingdom has opened in 2010 its first desalination plant in east London, the Thames Water Desalination Plant.

https://climate-adapt.eea.europa.eu/metadata/adaptation-options/desalinisation

Securing adequate quantities of clean and safe water to meet the needs of a growing population is one of the greatest challenges and obstacle to development. Access to safe drinking water is particularly critical, with profound implications for economic growth, human rights, public health, and the environment. Meeting this demand for freshwater is expected to become increasingly difficult in the context of climate change, with many regions facing more variable precipitation patterns and decreased water availability. Water managers and planners are increasingly looking at desalination -the conversion of seawater or brackish groundwater to freshwater- as a technical, supply-side solution that can meet current water demands and buffer against the negative impacts of climate change on water resources. Despite its high energy cost, the Intergovernmental Panel on Climate Change lists desalination as an “adaptation option” that may be particularly important in arid and semiarid regions.

The past five years have seen a 57 percent increase in the capacity of desalination plants on-line, according to the latest data published by the International Desalination Association and Global Water Intelligence. This increase in production capacity reflects the fact that coastal communities are increasingly turning to the sea to meet their drinking-water needs, while inland there is a tendency for groundwater to become increasingly brackish over time. Around 60 percent of desalination capacity treats seawater, with the remainder treating brackish and less saline feed water. Desalination is now used in 150 countries, ranging from Australia to China and Japan, the United States, Spain and other European countries, the Middle East, and North Africa.

As desalination projects have multiplied, additional concerns have arisen with regards to cumulative impacts, including temperature pollution (the release into nearby coastal areas of much hotter water used in the process) and the gradual increases in salinity in areas where the brine that results from the process is released (World Bank 2017). These impacts are particularly acute in closed and semi-enclosed bodies of water, where the benefits of dilution through tides and current circulation are limited.

Some of these environmental impacts can be reduced or mitigated, for example through proper situating of sea-water intake and dilution of brine before its release in the marine environment. The high demand for energy in desalination has, in a few instances, been addressed through the development of renewable technologies (Ghaffour et al. 2015).

https://www.tralac.org/images/docs/11715/the-potential-of-the-blue-economy-world-bank-un-desa-june-2017.pdf

1.4.7 Marine mineral mining/Aggregates mining

Marine mineral mining/Aggregates mining with NACE codes:

- 24.5 Casting of metals;
- 24.4 Manufacture of basic precious and other non-ferrous metals;
- 35.21 Manufacture of gas

This class includes:

- 2441 Precious metals production
- 2442 Aluminum production
- 2444 Copper production
- 2445 Other non-ferrous metal production
- 2451 Casting of iron
- 2452 Casting of steel
- 2453 Casting of light metals

Within the EU-27's basic metals manufacturing sector the three largest subsectors in terms of employment were the manufacture of basic iron and steel and of ferro-alloys (Group 24.1), the casting of metals (Group 24.5) subsector, and the manufacture of basic precious and other non-ferrous metals (Group 24.4), occupying around one third, one quarter and one fifth respectively of the basic metals manufacturing workforce in 2010. In output terms, the ranking of the second and third largest subsectors was reversed, indicating relatively high apparent labor productivity for the manufacture of basic precious and other non-ferrous metals subsector and relatively low apparent labor productivity for the casting of metals.

In 2010, the only subsector within the basic metals manufacturing sector to record an apparent labor productivity figure below the non-financial business economy (EUR 44.8 thousand per person employed) and manufacturing (EUR 52.8 thousand per person employed) averages was the casting of metals, where value added per person employed averaged EUR 44.2 thousand across the EU-27. The highest level of apparent labor productivity was EUR 80.2 thousand recorded for the manufacture of basic precious and other non-ferrous metals.

At the NACE group level, personnel costs per employee peaked in 2010 at an average of EUR 48.2 thousand for the EU-27's manufacture of basic precious and other non-ferrous metals subsector. Average personnel costs per employee exceeded the non-financial business economy

average (EUR 30.9 thousand) for all basic metals manufacturing subsectors and also exceeded the manufacturing average (EUR 35.8 thousand) for all subsectors except for the casting of metals.

The wage-adjusted labor productivity ratio for three of the EU-27's manufacture of basic metals subsectors was below the non-financial business economy and manufacturing averages: these were the casting of metals, the manufacture of basic iron and steel and of ferro-alloys, and the manufacture of steel tubes, pipes, profiles and fittings (Group 24.2). The remaining subsectors reported wage-adjusted labor productivity ratios of 150.0 % for the manufacture of other products of first processing of steel (Group 24.3) and 166.3 % for manufacture of basic precious and other non-ferrous metals.

For all five of the basic metals manufacturing subsectors, EU-27 gross operating rates were below the non-financial business economy (10.1 %) and manufacturing (9.0 %) averages. This ratio ranged, in 2010, from 4.3 % for the manufacture of basic iron and steel and of ferro-alloys (the second lowest gross operating rate among all manufacturing NACE groups) to 7.6 % for the manufacture of steel tubes, pipes, profiles and fittings.

Large enterprises (employing 250 or more persons) contributed 68.2 % of the EU-27's basic metals manufacturing value added in 2010, which was above the non-financial business economy (42.3 %) and manufacturing (55.5 %) averages. In a similar vein, large enterprises employed 65.1 % of the EU-27's basic metals manufacturing workforce, which was even further above the share of large enterprises in the non-financial business economy (32.5 %) and manufacturing (40.0 %) workforces. The employment shares of micro enterprises (employing fewer than 10 persons) and small enterprises (employing 10 to 49 persons) were particularly low for the basic metals manufacturing sector, employing 4.5 % and 8.3 % of the workforce respectively, less than half the manufacturing average (14.3 %).

In the vast majority of EU Member States, as well as in Croatia and Switzerland, large enterprises were responsible for more than half of the value added generated in the basic metals manufacturing sector in 2010, with the share exceeding four fifths in Finland, Austria and Bulgaria, and peaking at 90.9 % in Slovakia. In Italy, Portugal and Denmark the contribution of large enterprises to total value added was less than half, but the relative importance of large enterprises remained more than for any of the three other size classes shown in Table 6b. In Estonia and Cyprus there were no large enterprises in the basic metals manufacturing sector in 2010 and value added was concentrated among medium-sized enterprises (employing 50 to 249 persons) and small enterprises.

http://ec.europa.eu/eurostat/statistics-

explained/index.php/Archive:Manufacture_of_basic_metals_statistics_-_NACE_Rev._2

1.4.8 Utilities

Utilities with NACE codes:

- 42.2 Construction of utility projects;
- 42.9 Construction of other civil engineering projects;
- 36 Water collection, treatment and supply;
- 37 Sewerage;
- 52.10 Warehousing and storage;
- 82.92 Packaging activities

Utilities (water, energy, transport and postal services) are essential services that play a vital role in economic and social development.

This class includes:

- 3600 Water collection, treatment and supply
- 3700 Sewerage
- 4221 Construction of utility projects for fluids
- 4222 Construction of utility projects for electricity and telecommunications
- 4299 Construction of other civil engineering projects n.e.c.
- 5210 Warehousing and storage
- 8292 Packaging activities

There were 75.7 thousand enterprises classified within the EU-28's water supply, sewerage, waste management and remediation activities sector (Section E) in 2014; together they employed 1.5 million persons and generated EUR 102.0 billion of value added.

Enterprises in the water supply, sewerage, waste management and remediation activities sector were, on average, relatively large, as they contributed only 0.3 % of the total number of enterprises in the EU-28's non-financial business economy (Sections B to J and L to N and Division 95) in 2014, but accounted for 1.1 % of its workforce and 1.5 % of its added value. Compared with the other NACE sections within the non-financial business economy, the water supply, sewerage,

waste management and remediation activities sector was the second smallest in terms of its number of enterprises (0.3 %), the third smallest in terms of its value added (1.6 %) and the fourth smallest in terms of its persons employed (1.1 %) in 2014.

Average personnel costs within the EU-28's water supply, sewerage, waste management and remediation activities sector were EUR 35.0 thousand per employee in 2014, slightly above the EUR 33.3 thousand per employee average in the non-financial business economy. Apparent labor productivity in the water supply, sewerage, waste management and remediation activities sector was EUR 69.0 thousand per person employed, more than 40 % above the non-financial business economy average (EUR 48.5 thousand per person employed). The wage-adjusted labor productivity ratio gives an idea of the extent to which apparent labor productivity relates to average personnel costs. For the EU-28's water supply, sewerage, waste management and remediation activities sector in 2014 this ratio was 199.0 % showing that the average value of output generated by each person employed was twice as high as the average cost of personnel input per employee; this was well above the non-financial business economy average (146.0 %).

In employment terms, waste collection, treatment and disposal activities and materials recovery (Division 38, hereafter referred to as waste and materials recovery) was the largest subsector in the EU-28, occupying three fifths (61.8 %) of the workforce within the water supply, sewerage, waste management and remediation activities sector in 2014 — see Figure 1. This relatively high share was principally due to the size of the workforce in waste collection (Group 38.1) which alone accounted for approximately one third of the water supply, sewerage, waste management and remediation activities workforce. Water supply (Division 36) employed more than one quarter (25.9 %) of the workforce, followed by sewerage activities (Division 37). This ranking was repeated in value added terms with 23.4 % if the value added for waste collection, treatment and disposal activities and materials recovery (Division 38, hereafter referred to as waste and materials recovery), the water supply (Division 36) generated more than one third (33.9 %) of the value added, followed by sewerage activities (Division 37) (15.6 %).

For the two subsectors for which data are available for all four indicators shown in Table 2b, the values of all four indicators were above the non-financial business economy averages in 2014.

The apparent labor productivity of the three subsectors available varied considerably, from EUR 52.0 thousand per person employed for remediation activities and other waste management services to double this level (EUR 105.0 thousand per person employed) for the sewerage subsector.

By contrast, there was far less variability in terms of EU-28 average personnel costs recorded for

the subsector available in 2014; which reported average personnel costs that were close to the non-financial business economy average of EUR 33.3 thousand per employee.

As a result of the relatively narrow range of average personnel costs per employee, the wage-adjusted labor productivity ratios of each subsector available broadly reflected their respective levels of apparent labor productivity. The gross operating rate displayed the greatest variety among the four indicators, ranging from 37.0 % for sewerage to 9.1 % for remediation activities and other waste management services; the latter was the only subsector where the gross operating rate was below the non-financial business economy average (10.1 %).

http://ec.europa.eu/eurostat/statistics-explained/index.php?title=Water_supply,_sewerage,_waste_management_and_remediation_statistics_-_NACE_Rev._2

2. THE BLUE GROWTH AND BLUE ECONOMY IN THE B_B PROJECT PARTNERS

This section has a double aim: the first is to analyse the BE-BG sectors in the project partners (PPs) regions and the second is to illustrate the reasons of the choices and the characteristics of the regional sectors chosen by PPs to be targeted within the project.

2.1 BE-BG SECTORS: CONSISTENCY AND CHARACTERISTICS

The project areas are quite different in terms of absolute size, the structure of economic activities and the consistency of BE-BG sectors.

Table 4 - Blue Economy and Blue Growth sectors size by PPs (number of employees)

	Zadar county (1)	Marche (2)	Central Macedonia (3)	Apulia (4)	Western Greece	Friuli Venezia Giulia	Albania	**Total by Sector**	as a share (%) of total
Biotechnology	8	n.a.	2.649	981	n.a.	730	n.a.	4.368	**1,51%**
Renewable Energy	4	583	1.865	395	n.a.	159	n.a.	3.006	**1,04%**
Coastal and Maritime Tourism+Tourism/Leisure	5.924	31.998	72.062	72.584	9.246	20.102	n.a.	211.916	**73,45%**
Aquaculture	637	91	257	384	730	159	400	2.658	**0,92%**
Mineral Resources	68	565	37	1.265	n.a.	376	n.a.	2.311	**0,80%**

Offshore oil and gas	17	650	32	246	n.a.	9	n.a.	954	**0,33%**
Shipbuilding and Ship Repair	146	2.735	87	1.040	71	10.045	n.a.	14.124	**4,90%**
Sea shipping/Transport	717	800	724	495	242	736	n.a.	3.714	**1,29%**
Fisheries	638	3.600	4.368	8.074	1.374	971	2.250	21.275	**7,37%**
Coastal Protection	n.a.	n.a	73	73	30	60	n.a.	236	**0,08%**
Desalination	22	1.058	272	209	73	21	n.a.	1.655	**0,57%**
Marine acquatic products	n.a.	1.387	n.a.	n.a.	n.a.	219	n.a.	1.606	**0,56%**
Marine mineral mining	886	2.741	384	509	n.a.	2.216	n.a.	6.736	**2,33%**
Utilities	747	5.278	3.738	782	626	2.778	n.a.	13.949	**4,83%**
Total by PPs	**9.814**	**51.486**	**86.548**	**87.037**	**12.392**	**38.581**	**2.650**	**288.508**	
as a share (%) of total	3,40%	17,85%	30,00%	30,17%	4,30%	13,37%	0,92%		100,00%

Source: own elaborations on PPs data

n.a. not available

(1) 2016 data. measured on number of hours worked

(2)2011 data Census and 2012 data CCIAA

(3) 2015 data

(4) 2015 data

In terms of employees, the most important sector is **Tourism:** its weight exceeds 70% of the total if we consider also other touristic and leisure activities; however, some of them are not strictly related to coastal areas. When considering tourism and leisure we must also take into account that the number of employees overstates the importance of these sectors because most of the employees are hired on a seasonal base and the value added per employee is below the average.

The second most important area is **Fisheries** (including all the commercial and processing activities connected to fisheries). It accounts for over 7% of total employees.

Aquaculture sector represents about 1% of total employees, but it is considered a growing sector in all the regions.

The third area in terms of employees is **Ship building and Ship repair**, that account for about 5% of total employees.

Table 5 - Blue Economy and Blue Growth sectors size by PPs (number of enterprises)

	Zadar county	Marche (1)	Central Macedonia (2)	Apulia (3)	Western Greece	Friuli Venezia Giulia	Albania	**Total by Sector**	as a share (%) of total
Biotechnology	3	n.a.	804	399	n.a.	54	n.a.	1.260	**1,70%**
Renewable Energy	18	n.a.	1.250	n.a.	n.a.	157	n.a.	1.425	**1,92%**

Coastal and Maritime Tourism+Tourism/Leisure	1.320	3.905	24.026	21.536	3.157	8.956	n.a.	62.900	**84,92%**
Aquaculture	22	18	131	94	41	81	n.a.	387	**0,52%**
Mineral Resources	2	n.a.	22	186	n.a.	74	n.a.	284	**0,38%**
Offshore oil and gas	2	n.a.	10	n.a.	n.a.	1	n.a.	13	**0,02%**
Shipbuilding and Ship Repair	36	363	48	245	33	387	n.a.	1.112	**1,50%**
Sea shipping/Transport	70	68	124	n.a.	73	28	n.a.	363	**0,49%**
Fisheries	56	115	1.784	2.041	638	369	n.a.	5.003	**6,75%**
Coastal Protection	n.a.	n.a.	7	n.a.	4	11	n.a.	22	**0,03%**
Desalination	1	n.a.	35	n.a.	5	4	n.a.	45	**0,06%**
Marine acquatic products	n.a.	n.a.	0	n.a.	n.a.	7	n.a.	7	**0,01%**
Marine mineral mining	1	n.a.	44	n.a.	n.a.	33	n.a.	78	**0,11%**
Utilities	46	n.a.	869	n.a.	128	128	n.a.	1.171	**1,58%**
Total by PPs	**1.577**	**4.469**	**29.154**	**24.501**	**4.079**	**10.290**	**0**	**74.070**	
as a share (%) of total	2,13%	6,03%	39,36%	33,08%	5,51%	13,89%	0,00%		100,00%

Source: own elaborations on PPs data

n.a. not available

(1)2011 data Census and 2012 data CCIAA

(2) 2015 data

(3) 2015 data

It is likely that the consistency of sectors reported in Tables 4 and 5 depends on the availability of data rather than the actual importance of them. In some cases, this consistency may be overestimated because they comprise activities which are not strictly in the Blue Economy (for example tourism activities which are not related to the sea); in other cases, it is underestimated because of the absence of relevant data.

Also, other specific reasons for the discrepancy among available data and actual state of art are:

1) In the case of LP located in Zadar County, it worth to be mentioned that Zadar area is a relatively small territory and some of the Blue Growth/Economy sectors do not have businesses operating in Zadar or have just one or few companies operating in particular sectors. This may cause discrepancies in the trend of data that does not represent the true picture of the sector since perhaps one of the few companies active in that sector did not submitted the annual financial lease for that year on time. Therefore, some data are not in the database of Croatian Chamber of Commerce and thus nor in the calculation of the data provided in their FLAs report;
2) In the case of Marche region, available data concerning Blue Biotechnology cover the whole biotechnology sector (211 of employed persons) and thus it is not possible to deduce the

specific number of employees in the Blue Biotechnology sector. Nevertheless, the presence of no. 177 companies operating in the Biotech sector and the presence of no. 24 R&D in blue biotechnology organizations implies that it is likely the presence of enterprises operating in such sector;

3) Based on 2016 EU report, Albania has some level of preparation and can be considered as moderately prepared in statistics, but further efforts are needed to improve the quality of data and ensure the alignment of agriculture, tourism, transport and social statistics. Due to such reasons, available and reported data regarding Coastal and Maritime Tourism in Albania represent the aggregate data regarding number of enterprises (not employees) from all the counties (including coastal counties) and are based on the Census of non-Agriculture Economic Enterprise (2010) related to the economic activities which are directly linked to the Coastal Tourism where are included the Hotels, Coffee, Restaurants, Transport and Communications and other services (apartment renting, vehicle renting, etc.).

2.2.THE SELECTED SECTORS

The selection of the sectors by PPs has been made taking into account the characteristics and importance of BE-BG in each region and PPs' prior knowledge about their local economy. Specifically, PPs have taken into account the following criteria:

- **relevance** of sectors within the BE-BG of the region (i.e., importance in terms of people employed, value added, number of enterprises, etc.);
- **presence of micro, small and medium-sized firms** (given that these firms are the target of the project);
- **innovation potential** for the aims of the project (capability of firms to introduce innovations);

PPs decided to choose **a maximum of three sectors** to concentrate the financial, human and timing resources foreseen by the project. In doing so, they followed the latest strategies of EU innovation policy that stress the concentration of resources in a few promising sectors (Smart Specialization Strategy).

Table 6 - Project Partners' choices of BE-BG sectors

Aquaculture	Fisheries	Coastal and Maritime Tourism	Shipbuilding and Ship Repair	Sea Shipping /Transport	Coastal protection
Zadar county		Zadar county	Zadar county		
Marche	Marche	Marche			
Central Macedonia	Central Macedonia	Central Macedonia			
Apulia	Apulia	Apulia			
Western Greece	Western Greece	Western Greece			
			Friuli Venezia Giulia	Friuli Venezia Giulia	Friuli Venezia Giulia
Albania	Albania	Albania			

Source: own elaborations on PPs data

Figure 10 – Number of B_B Project Partners by sector

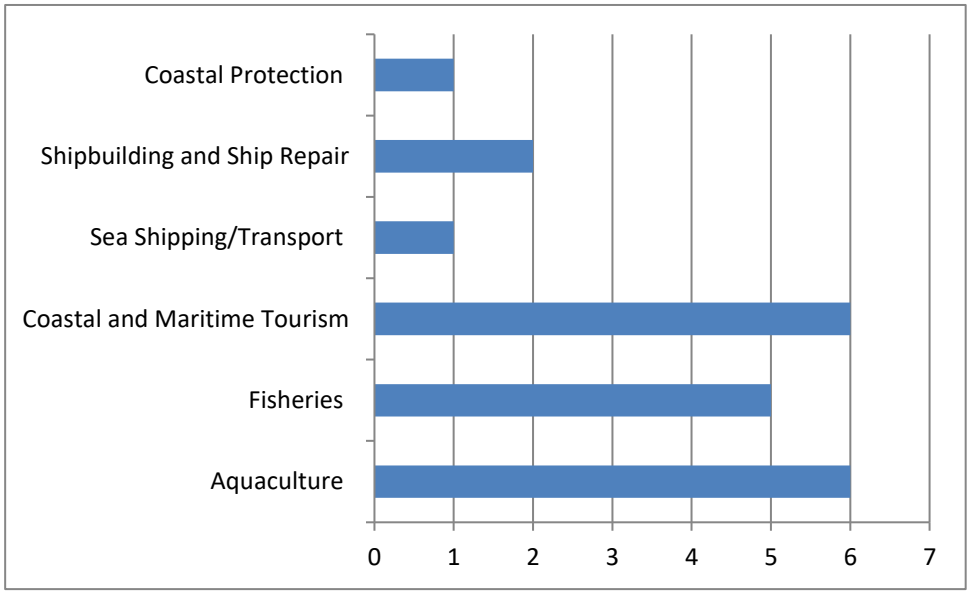


Table 6 shows the Projects Partners' choices while Figure 10 shows the number of PPs per sector: **the most targetd sectors are Aquaculture, Fisheries and Coasatal and Maritime Tourism.**

Table 7- Selected sectors by growth potential

	Blue Economy	Blue Growth
Zadar county	– Shipbuilding and Ship Repair	– Aquaculture – Coastal and Maritime Tourism
Marche	– Fisheries	– Aquaculture – Coastal and Maritime Tourism
Central Macedonia	– Fisheries	– Aquaculture – Coastal and Maritime Tourism
Apulia	– Fisheries	– Aquaculture – Coastal and Maritime Tourism
Western Greece	– Fisheries	– Aquaculture – Coastal and Maritime Tourism
Friuli Venezia Giulia	– Shipbuilding and Ship Repair – Sea Shipping /Transport – Coastal protection	
Albania	– Fisheries	– Aquaculture – Coastal and Maritime Tourism

All the sectors chosen by PPs can be classified as **low tech or medium tech sectors**, characterized by the presence of **small firms** and which are **relevant in terms of No. firms/No. of employees**.

This choice is consistent with the criteria of sectors selection already crystallized within the BLUE_BOOST project aiming at stimulating, guiding and financially supporting the innovation capacities of micro, small or medium enterprises belonging to the blue traditional and emerging sectors of the seven Adriatic-Ionian partner territories.

At this stage, it is worth to give a brief overview of some motivations which guided the B_B Project Partners in the choice of the three sectors:

Zadar County:

1) Aquaculture
2) Coastal and Maritime Tourism
3) Shipbuilding and Ship Repair

Zadar Marine Aquaculture (farming fish, including tuna and shellfish) has a long tradition (the first fish cannery factories were founded in Zadar County in the last century) and is one of the most important activities of the County accounting for about 60% of the total production of aquaculture of the Republic of Croatia. Due to particular importance of this industry in the Zadar County, and the needs of a range of scientific research and innovation results to contribute to the introduction of new species into cultivation, and continuous improvement of production technology, it is the sector where the B_B activities would mostly and better fit and impact.

Coastal and Maritime Tourism is also a significant and rapidly growing sector within the Zadar county's economy (in 2016, more than 150.000 beds/places in camps) and in the next few years even further new public and private investments are estimated for facilities, infrastructure and amenities. It is considered a growing sector as it is expected an easy-going mobilization and vivid participation of the its local private and public stakeholders. For such reasons, it fully deserves to be involved in B_B action.

Shipbuilding and Ship Repair is a traditional sector present in Zadar County since the mid of 19th Century. At regional and national level it is considered a central sector whose competitiveness is reinforced through the recent constitution of the National Maritime Industry Cluster (MarC). Specifically, improvements in high-tech manufacturing are expected. Scientific- technical alliances in this sense have been in the recent years established with the Friuli Venezia Giulia regional cluster Mare TC FVG, which is a relevant stakeholder of the regional ecosystem participating in B_B project. On these basis, Zadar County considers this third sector a promising ground where to build and/or consolidate transnational innovation/competitiveness partnership throughout the B_B activities.

Marche:

1) Aquaculture
2) Fisheries
3) Coastal and Maritime Tourism

In the Italian System, the Marche Region, for its central position within the Adriatic Sea can play a leading role and represent a pilot region in many areas, anticipating an optimal sea management approach and seizing the opportunities that the sea offers and will continue to offer for years to come (VI Report on Italian Blue Economy-2017).

The development of Aquaculture took place a little later in Marche than in the other regions of the central-northern Adriatic, also due to the environmental characteristics of the Marche coast, but in recent years the farmers have allocated a small part of their plants to the breeding of the concave oyster (Crassostrea gigas) and occasionally experimental tests have been carried out for the breeding of the native flat oyster (Ostrea edulis). Probably this production is destined to take more and more field, thanks to the remarkable economic return guaranteed by these species. The rapid development of mollusc farming along the Marche coastline has been favoured mainly by the optimal characteristics of the water, which together with good sanitary conditions, offers a high concentration of food (such as phytoplankton and zooplankton) essential for the growth of the filtering molluscs. Indeed, Marche Aquaculture sector can be properly defined as a piloting area for its significant but still unexplored economic, scientific and employment perspectives.

The Marche production of fish represents one tenth of all Italian production and the third by gross tonnage of boats. Nevertheless, in last decades Marche Fisheries sector has been in the middle of important challenges due both to the EU and national level legislation aimed at reducing overfishing and to the change in the business model from an artisanal family model to a more and more entrepreneurial activity with increasing connections with the development of aquaculture and conservation and processing of fish. This framework offers innovation scenarios –both in the fishing and fish commercialization side- for improvements of environmental friendly preservation of fish stocks, diversification –even by use of ICT and/or creative and cultural industries - of marketing and sales techniques, etc. For such reason, Marche Fisheries sector has been selected as a deserving sector to be supported throughout the B_B activities cycle.

Also, Coastal and Maritime Tourism sector has a long tradition in Marche and a significant offer in terms hospitality (552 Hotels along the 180 Kms with 26 seaside locations), 11 green and 16 blue flags beaches, marinas (9 for a total capacity of about 5,000 berths), many opportunities to play sport (cycling, golf, scuba diving, windsurfing, kite surfing and sailing, 20 scuba diving centers, 7 windsurfing and kite-surfing centres, etc) and many linkages with fishing: fishing tourism enterprises, festivals and fêtes connected with fishing and the sea, etc. Although, Marche Blue Tourism takes to be interconnected with the cross-border and transnational Adriatic-Ionian regions which all are facing an increasing demand and –at the same time- facing significant challenges linked to high intensity of tourists: marine litter, deterioration of water quality, physical alterations of coastlines and landscapes, loss of biodiversity, etc. B_B activities could offer an opportunities of innovation among the 7 regional touristic ecosystems and stakeholders.

Central Macedonia

4) Aquaculture
5) Fisheries
6) Coastal and Maritime Tourism.

Aquaculture is one of the key productive Blue Growth sectors where Central Macedonia (and Greece in general) possesses competitive advantages and dynamic potential for economic growth in the framework of RIS3 national and regional strategies: favorable environment and climatic conditions, availability of adequate sea, long-lasting experience and scientific know-how, infrastructures and human resources. Thus, B_B activities can contribute to support regional aquaculture firms fully matching the regional smart specialization strategies on agro-food sector.

Also, Fisheries and industry of processing and preserving fish/crustaceans products and wholesales related activities play a significant role in the regional economy, even facing challenges of balancing the sustainability of stocks and that of the income fishermen deserving to be strongly supported in strengthening competitiveness, innovation introduction development of production diversification. On the other hand, the great collaboration between local B_B partner and the 2 Fishery Local Action Groups (whose the Development Agency of Thessaloniki is also a B_B associated PP) operating in the region represents an advantage element for the involvement of the entrepreneurs and workers of the sector in B_B project activities.

Coastal and Maritime Tourism is by far the most developed sector of Blue Growth in the Region of Central Macedonia comprising 20.092 enterprises which had in 2015 a turnover of about 1,7 billion€ and employed 66.750 people (the 77% of the total employment in blue growth and blue economy, 97% in blue growth only). Moreover, costal maritime tourism holds the majority of enterprises with 13.360 enterprises in 2014 and 20.092 enterprises in 2015 representing over 50% of all activities. Finally, Coastal and Maritime Tourism has increasing importance in the regional economy, according to number of arrivals at local accommodations during 2013 – 2016 (Eurostat). The nights spent at tourist accommodation in coastal areas represent 99% of the total RCM number.

Apulia

1) Aquaculture
2) Fisheries

3) Coastal and Maritime Tourism

The ISTAT 2016 data on the production and revenues of sea fishing in the Mediterranean place Apulia region –with respectively 25,276 tons of fish and 138 million Euros, the second place in Italy after Sicily. Such huge data of production have to go hand in hand to increase the quality of "Made in Apulia" fish and win the competitiveness in the Mediterranean. B_B project framework can satisfy such innovation demand of such sector's firms, especially of those innovative startups in Aquaculture sector which are rapidly raising in the region.

Regarding Fisheries, although part of the regional fleet has been abandoned due to the EU policies of resource management, the sector shows a renewed vitality and represents almost 15% of the entire national fleet both in terms of numbers and tonnage. The regional development strategies include and support fisheries with some pilot initiatives such as the foundation of the thematic district of Apulian fisheries aquaculture and the Living Lab "How is the sea?", whose stakeholders and actors can be successfully involved in the B-B activities.

Significant in Apulia also the Coastal and Maritime Tourism sector and its intersectoral linkages with other economic sectors such as sports, hospitality (from hotel, to touristic villages to family B6B), food, cultural and creative industry (e.g. religious festivals), tourism fishing, and also boating sector, etc.

Western Greece:

1) Aquaculture
2) Fisheries
3) Coastal and Maritime Tourism

Western Greece region owns 25% of marine fish farms in Greece, more than 1.300 professional vessels of coastal, medium and inland fishing are administratively supported. There are also large-scale fish-breeding stations, freshwater, fish fattening units and fish processing units. These characteristics, together with the fact that Region of Western Greece is a major centre for fish trade and export to third countries, makes one of the most important regions in the fisheries, aquaculture, processing and marketing sectors in Greece. Also, the largest fishing centre is in Patras, while significant number of professional fishing boats are distributed in the coastal fishing areas. The Port of Patras owns a prominent position in the region due to its strategic location and being Greece's Western Gate to Adriatic and Western Europe.

The Costal and Maritime Tourism sector has been identified as an area with special potential to foster a smart sustainable economy. Indeed, Coastal and maritime tourism is one of the most economically significant activities in Greece. The Region of Western Greece occupies the northern part of the Peloponnese and the western edge of Central Greece, occupying a strategic position as the Western Gate of Greece to the Adriatic and Western Europe. It includes the Prefectures of Aitoloakarnania, Achaia and Ilia with a total area of 11,350 km2, covering about 8.6% of the total area of the country. It has extensive beaches in all three Regional Units, bordering the Ionian Sea and the neighboring Amvrakikos, Patraikos and Corinthos.The coastal and maritime tourism sector has been identified as an area with special potential to foster a smart, sustainable and inclusive Europe.

Friuli Venezia Giulia:

1) Coastal protection
2) Shipbuilding and boatbuilding
3) Transport

In the B_B project context, these three sectors have been considered the most relevant for FVG in consideration of the development trajectories identified by the national cluster BIG-Blue Italian Growth as well as the priorities identified by the regional RIS3. For such reasons, they would deserve to be fully involved in B-B activities and it is expected an easy-going mobilization and vivid participation of their local private and public stakeholders.

Albania:

1) Aquaculture
2) Fisheries
3) Coastal and Maritime Tourism

It takes to confirm that some locations have been selected as Albanian B_B pilot areas: Durres, Vlora, Saranda and Shengjin coastal areas.

Region of Vlora own the 85% of marine fish farms in Albania, while the remaining fish farms are located in Saranda and Shengjin region. In Vlora and Saranda regions there are present fish fattening units of marine fish species, while the mussel farming activity is exclusively localized in Saranda and Shengjin regions, respectively. There are some fish/mussels processing units in

Shengjin, Saranda, Vlore and Elbasan. Also, it is important to note that Saranda, Shengjin and Vlore fish processing units are doing the processing of fish and/or mussels coming from the Albanian territorial waters. All these characteristics makes these regions the most important regions in aquaculture, local fisheries products processing and marketing in Albania.

Durres port has the highest number of fishing vessels, followed by Vlora and Shengjin. Vlora region interest is focused on the smaller scale/artisan fishing and the chain of restaurants and coastal tourism, while in Durres and Shengjin regions are focused on commercial professional fishing. Durres and Shengjin areas have a bigger concentration of fish processing activities than Vlora and Saranda regions.

The Coastal and Maritime Tourism sector has been identified –at central level- as an area with special potential to foster a smart and sustainable economy. The arrival of foreigners in the time period 2013-2017 increased with an average of 12,0 %, while the expenditures coming from the foreigners (no residents) in Albania increased with an average of 8,5 % for the same time period. In the time period 2013-2017, the number of visitors, who visited the historical sites and other cultural monuments was 621.061 persons, which increased with an average of 51,5 %.

The arrivals of tourists from Europe represent the most frequent arrivals of foreigners with an averaged percentage of 92,4 % and they increased with an average of 12,3 % during 2013-2017. Most of the foreigners come from Kosovo (34 %), FYROM (13 %), Greece (10 %), Montenegro and Italy (7 % each of them).

3. THE REGIONAL INNOVATION ECOSYSTEMS FOR BG-BE OF THE B_B PARTNERS

In this section we provide data and analyses about the characteristics of the research, technology transfer, innovation ecosystem in the PPs' regions. The section provides some information about the innovation ecosystem for the Blue Economy as emerging from the data and information provided by Partners and a possible scenario of **KNOWLEDGE PROVIDERS (research, development and innovation bodies; skilled enterprises and open source-knowledge sharing and community based new innovation agents)** potentially available and interested to register to the B_B KP Database for possible matching with regional blue MSMEs willing to apply to the B_B transnational innovation voucher scheme (B_B pilot action).

3.1 THE REGIONAL INNOVATION ECOSYSTEMS IN PPs REGIONS

According to the latest regional innovation scoreboard, published by the European Commission, all the regions involved in the project are classified as **Moderate Innovator** (within the four classes of Modest, Moderate, Strong and Leader). It is likely that also Albania would be included in this class. Within this class the EU scoreboard distinguishes between three additional sub-level: Moderate+, Moderate, Moderate- (see Table). The only region in the first sub-class (Moderate+) is Friuli Venezia Giulia. Marche, Central Macedonia and Western Greece are included in the second sub-class (Moderate). Croatia (Zadar county) and Apulia are classified within the Moderate- (also Albania is likely to belong to this sub-class).

Adriatic Croatia is the only region that improved its score compared to its relative position in 2011. All the other regions experience a worsening of their relative position within the EU (see Table 8).

Table 8 – Regional innovation performance

	"2011" - score relative to EU 2011	"2017" - score relative to EU 2011	"2017" - score relative to EU 2017	Performance group
Zadar county (Adriatic Croatia)	51.0	52.9	51.5	**Moderate -**
Marche	71.0	71.2	69.4	**Moderate**
Central Macedonia	67.2	67.3	65.6	**Moderate**
Apulia	56.8	60.1	58.5	**Moderate -**

Western Greece	65.3	64.8	63.1	**Moderate**
Friuli Venezia Giulia	94.2	90.2	87.8	**Moderate +**
Albania	-	-	-	**-**
EU 28	**101.5**	**102.6**	**100.0**	

The regional innovation scoreboard measures the overall potential for innovation in the region, taking into account a large number of indicators referring to framework conditions for innovation (human capital, research infrastructure, etc.), the amount of investment in R&D and innovation, the innovative activities of firms (patents, level of collaboration, etc.).

Overall, the Moderate level of innovation that characterize the regions is the result of two main features: the large presence of SMEs operating in low or medium-tech industries; the weakness of the research infrastructure; the low level of investment in R&D. These features characterize also the BE-BG sectors that are relevant in the project regions.

Friuli Venezia Giulia is the region with the most advanced research infrastructure and innovative ecosystem. Besides the research centres specifically dedicated to BE-BG sectors, within the region there is a large number of public and private institutions involved in research and innovation: universities, national and international research centres, technology and innovation parks, business incubators and co-working / fab-labs. It is also worthwhile mentioning that Friuli Venezia Giulia has indicated “Economy of the sea” as one of the specialization domains within the Smart Specialization Strategy (S3). Specifically, within this broad technological domain the attention is focused on shipbuilding.

Other PPs’ regions have included in their S3 technological domains that may be of interest for BE-BG sectors. Specifically, Central Macedonia indicated Tourism, Transport and Logistics. Western Greece (Western Greece) indicated Eco-tourism, Tourism and ICT, Agrifood and Aquaculture and also Apulia Region elaborated the guidelines and priorities for intervention in the regional planning for the Blue Growth, identified as regional strategic sector, within the Regional RIS3. Regarding Marche, in its S3 there is the funds management priority “Health - Food Quality issues” that have been implemented also in good practices for regional aquaculture development. In addition, the NOP for Marine Affairs and Fisheries of Croatia for 2014-2020 focuses on enhancing the competitiveness of the fisheries and aquaculture and in the recent years the Government of Republic of Croatia has established the National Maritime cluster “MarC” devoted to the maritime industry, especially shipbuilding.

The coincidence between most of the BE-BG sectors chosen by EU PPs and those indicated in

their S3/National strategy is very important for the smooth running and successful participation of local stakeholders and target groups to the B_B project activities and for the sustainability of the innovation micro-projects that would result specifically from the B-B transnational innovation voucher scheme.

3.2 REGIONAL INNOVATION ECOSYSTEM FOR THE BE-BG

This section is based on the information about the regional innovation ecosystems provided by PPs: Some of the data and information provided refer to the overall innovation ecosystem and were used to complement the analysis developed in the previous section. This section analyses the data and information referring to the research and knowledge infrastructure specifically relevant for the BE-BG sectors.

The main public research and innovation structures, closely or potentially connected with BE-BG sectors within the PPs regions, are summarized in Table 19. This picture of the public research infrastructure for BE-BG sectors underestimate the actual presence of research facilities (researchers, laboratories, competences, etc.) that may be relevant for the BE-BG sectors.

Indeed, this list is destined to be increased/reduced after that the B_B Project Partners and LICs will have detected the specific needs (during B_B coaching modules) and then crystallized some BLUE_BOOST “innovation challenges” related to the selected blue sectors to be guided during scenario workshops, financially supported by the B_B voucher scheme and sustained in international, European, national and interregional networking.

We also remind that the project specifically indicated that the stimulation, guidance and support offered by the B_B activities to blue enterprises potentially include all the stage of the innovation cycle: from technical to organizational and to marketing level and from conception and prototyping, transfer, to patenting, commercialization, etc.

Indeed, the increasing role of transversal technologies makes it difficult to define ex-ante which knowledge providers may be of interest for the BE-BG sectors. For example, a department of information technology may be developing software applications that are relevant for fishing or logistics; a department of physics may be developing nano-technolgoy applications that are relevant for ship building or innovation needs of fisheries about on-board safety could match relevant relations with RD&I entities operating in the construction of fishing boats or in ICT for the development of control and communication devices.

However, it is to underline that most of the public research centres in the PPs regions deals with technologies that are relevant for Aquaculture, Fisheries and Food processing. this means that -on theory- there ARE wide margins for inter-regional collaborations which is one of the long-term main expected result of BLUE_BOOST: to stimulate transboundary networking and collaboration attitude of Blue Adriatic-Ionian MSMEs which -on the contrary- often tend to choose the RD&I partners on the basis of the geographical proximity rather than on the basis of the relevance and convenience of services offered by other transnational RD&I providers.

Table 1 – Public research infrastructures for BE-BG sectors

	UNIVERSITIES	HIGHER EDUCATION/ & RESEARCH INSTITUTES	INNOVATION AND TECHNOLOGICAL PARKS	INSTITUTIONALIZED CLUSTERS	OTHERS
Zadar county (Adriatic Croatia)	• University of Zadar (Dep. of Ecology, Agronomy and Aquaculture and Dep. of Tourism and Comm. Studies, etc.) • University of Dubrovnik (Inst. For marine and coastal research)	• Institute of Oceanography and Fisheries in Split (Physical Oceanography Lab.; Lab.of Chemical Oceanography and Sedimentology of the Sea; Lab. of Plankton and Shellfish toxicity; Lab. of Marine Microbiology; Lab. for Benthos; Lab.of Ichtyology and Coastal Fishery; Lab. of Fisheries Science and Management of Pelagic and Demersal Resources; Lab. for Aquaculture		• MarC: Croatian Maritime Industry Competitiveness Cluster in Zagreb	
Marche	• University of Camerino (Laboratory of Molecular Biology and Microbial Biotechnology, Biosciences and Medicine Veterinary School, Pharmacy School) • Polytechnic University of Marche (Marine Biology and Ecology Laboratory, Dep. of Management and Dep. of Construction, Civil Engineering and Architecture) • University of Macerata (Department of Education, Cultural Heritage and Tourism)	• ISMAR (Institute of Marine Science of National Research Council) in Ancona; • Institute of Marine Biology of Fano (part of the University of Bologna)		• BIG: The Blue Italian Growth Cluster (just started to work in 2018)	
Central Macedonia	• University of Thessaloniki (School of Biology) • Aristotle University of Thessaloniki (Dep. of Food Science and Technology; School of Biology)	• Centre for Research and Technology Hellas; • IBO-CERTH: Inst. of Bio-Economy and Agri-Technology (Inst. of Applied Biosciences; Information technology Institute, etc) • Alexanderian Technological Educational Institute of Thessaloniki (Dep. of Fisheries and Aquaculture Technology)			

Apulia	• University of Salento; •Polytechnic University of Bari; • University of Bari; •University of Foggia;	• IAMC (Inst. for the Coastal Marine Environment) • ISPA (Inst. of Science of Food Production) • ISMAR (Inst. of Marine Science of National Research Council) • CIHEAM –Mediterranean Agronomic Institute of Bari		○ Yachting district	
Western Greece	• University of Patras (Dep. of Biology; Laboratory of Marine Geology and Physical Oceanography); • Western Greece University of Applied Sciences (Dep. of Fisheries and Aquaculture technology; Applied Ecology of aquatic ecosystems Laboratory; Aquaculture Laboratory; Ichtyology and Fsh Patholofy; Fish quality and Processing Laboratory, etc.)	• Institute of Chemical Engineering Sciences in Patras	• Patras Science Park		• NAVIPE- Naval and Industrial Area in Patras
Friuli Venezia Giulia	• University of Trieste (Dep. of Life Science; Dep. of Engineering and Architecture) • University of Udine	• ISMAR -Inst. of Marine Science of National Research Council) • OGS National Institute of Oceanography and Experimental Geophysics • Institute of marine Science of National Research Council UOS in Trieste	• Area Science Park • Friuli Innovazione in Udine • Consorzio Innova FVG • Technological Pole in Pordenone	• Maritime Technology Cluster FVG-mareTC FVG	
Albania	• Agricultural University of Tirana (Dep. Of Aquaculture and Fisheries; Laboratory of Fisheries and Aquaculture in Durres) • University of Vlora “Ismail Qemali” (Dep. of Marine Engineering and Technology; Dep. of Marine Science)				• Fisheries and Aquaculture Services Directorate (Ministry of Agriculture and Rural Development) in Tirana

Besides public research institutions, there is a large number of private subjects that may provide knowledge and innovation services to firms belonging to BE-BG sectors. Indeed, open-innovation can be based on a series of approaches such as co-creation, open-source knowledge and crowd-sourcing processes. Using these open and participative processes, industry can involve skilled and enthusiastic stakeholders, entrepreneurs, start uppers and developers when mounting projects. Engaging in open-innovation environments can enable a bottom-up development of technologies, services and applications that address the real needs of consumers. These environments include: fablabs, hackerspaces, makerspace, co-working spaces, living labs, creative and innovation hubs, etc.[3] that in the B_B project have been called NEW INNOVATION AGENTS.

Indeed, the origin of the B_B project idea to involve new innovation agents as potential knowledge providers derives from the observation that in the past few years in Western Europe –but in some cases also in some ADRION territories- have being arose such spontaneous, self-organized and innovation-driven phenomena which have found their place in the gap among the 4 helixes, especially between end-user/business, end-user/research, end-user/institutions, etc. These new innovation agents usually operate as associated entities of universities, municipalities and businesses and have a strong transnational attitude since they are part of an international community based on the use of ICT and "open source/knowledge sharing" approach. They can act as innovation catalysts, boosting Quadruple Helix approach, and then allowing local maritime communities to access tools and expertise to tap into Blue growth opportunities in a cross-sectoral and cross-boundary dimension.

Even FARNET[1] invites its members to "discover" the potentialities of partnership with such "Blue Growth Pioneers": "*Even the maritime economy is witnessing the birth of its first Maritime FABLABs: on land (@navlab) or at sea (@lab-rev), these could soon influence Blue growth innovation and its local ownership, and this is something FLAGs should be part of. When designing local partnerships for the next programming period, FABLABs could be local stakeholders to count on. These could hold key elements to help local economies innovate and bring tailor made answers to Blue Growth challenges. This is why FARNET is encouraging them to meet with your nearest FABLAB*"[2].

However, the only way to assess the potential of the detected new innovation agents as B_B knowledge providers for the Blue Boost project is to involve them in the project's activities and let them auto-select on the basis on their interest in providing innovation service to firms in the BE-BG sectors.

[1] FARNET is the community of people implementing Community-Led Local Development (CLLD) under the European Maritime and Fisheries Fund (EMFF). This network brings together Fisheries Local Action Groups (FLAGs), managing authorities, citizens and experts from across the EU to work on the sustainable development of fisheries and coastal areas.

[2] http://www.c2p3.it/Rassegna-Stampa/PgrID/653/PageID/2/PID/653/evl/0/CategoryID/85/CategoryName/Farnet-Governance-and-management

Table (No 10) shows the potential NEW INNOVATIONS AGENTS detected by each B_B project partner in their regions:

	Fab-labs	Coworking spaces	Incubators	Innovation/Creative hubs	Others
Zadar county					
Marche	•Creaticity FabLab, • Rinoteca, •FabLab Pesaro, •FabLab Falconara, •Sibillini 3D Lab,	• Warehouse Coworking Factory, • Coworking Ancona, Osimo, Pesaro, Urbino, Gabicce Mare, • Navitas coworking, • Parkwork • Coho!	• The Hive, • Hub 21, • Jcube, • PB CUBE	• Digital Innovation Hub - Confartigianato	• Contamination Lab-UNIVPM
Central Macedonia			• Ok! Thess – Business Pre-Incubator • Technopolis – Business incubator • i4G - Business incubator • Thessaloniki Technology Park Business incubator	• Make – Creative space • Thessmart - InnoHub • Robotixlab – Innovation lab	• Thessaloniki Lever for Open Innovation – Living Lab • Thessaloniki GNU-Linux Lab Hackerspace
Apulia	• Balab – (Bari) - Uniba • Cubolab (Taranto) • The Cube (Lecce)		• Puglia Start Up (Massafra -TA)	• The HUB (Fiera del Levante – Bari)	• PugliaSviluppo (Modugno - Ba) – Regione Puglia • Tecnopolis (Valenzano) - Uniba
Western Greece		•Pos4work, •Orange Grove Patras •Mindspace	• Orange Grove Patras	• Corallia	• TEDxPatras, • Open Coffee Patras XXIX • ESYNEDE
Friuli Venezia Giulia	• ICTP Scientific FabLab • LoudLab (Sacile-Pordenone) for architecture and design				• TILT (Teorema Incubation Lab Trieste
Albania					• Alb-Adriatico 2013 shpk (Vlore) • Qendra shpk (Ksamil, Sarande) • Mare Adriatik sh.p.k. (Shengjin/Vau Dejes) • Koral shpk (Durres) • Rozafa shpk (Shengjin)

CONCLUSIONS

The Adriatic-Ionian BG-BE sectors chosen by PPs are low-tech (Fisheries, Coastal Tourism) or medium-high tech (Aquaculture, Ship Building and Ship repair, Costal protection).

In terms of innovation activities these sectors in Adriatic-ionian area are characterized by a low level of investment in RD&I, little capacity for autonomous innovations and lack of absorptive capacity for collaboration with research centres.

Overall, they may be considered as 'supplier dominated', because the innovative activity is highly dependent from knowledge and information supplied by external sources.

Specifically, in 'supplier dominated' sectors, the main external sources for innovation are interactions with customers and suppliers within the production chain. This is by far the main mechanism for innovation in the more traditional sectors, such as Fisheries and Tourism. This innovation model mainly produces incremental innovations, i.e. the continuous improvements in existing products and services. In the literature on innovation this is referred to as the DUI mode, i.e. Learning by Doing, Using and Interacting. It is a 'closed' model of innovation within each sector and its production chain.

Following the recent trends, the aim of the Blue Boost Project is that of boosting the innovation performance of Blue MSMEs by stimulating the adoption of other innovation models:

a) collaboration with research centres (technology/knowledge transfer);
b) collaboration with skilled firms belonging to other sectors (technology/knowledge transfer)
c) collaboration with new innovation agents (start-ups, fab-labs, etc.).

Technology transfer from public research centres and providers of RD&I services is the most important source of innovation in high-tech sectors. In the BE-BG this source of innovation is mainly used by firms operating in Biotechnology, Aquaculture and Shipbuilding. In the literature on innovation this second mechanism is referred to as the STI mode, i.e. Science, Technology and Innovation. The adoption of this model requires sufficient *absorptive capacity* by involved firms. The absorptive capacity depends on the presence of people with a high education level involved in R&D activity and a well-structured organization. For this reason, it is very difficult to adopt this model in small firms unless they show a high innovative propensity.

Technology transfer mechanisms, based on the interaction between firms, public research centres and local government are at the basis of the so-called triple helix model. This model is generally

applied in high-tech sectors. The challenge within this project is to extend it to low and medium tech sectors and to involve all the main stakeholders in the logic of the quadruple helix model. The second mechanism is based on the interactions between firms belonging to different sectors, besides those within the same production chain. This mechanism is gaining importance because of the increasing relevance of so-called transversal technologies, i.e. a technology developed within a specific sector but that have a wide range of applications in other sectors. The most important of these technologies is ICT (Information and Communication Technology) because of the wide range of applications (almost all sectors or the economy) and the high potential for innovation. Not only technological innovation but also for innovations in the business model. The importance of ICT as a transversal technology has increased in the last decade as a result of the digitalization revolution which is dramatically changing production models and consumption patterns (so-called Industry 4.0). However, ICT is not the only transversal technology with a high potential impact. A recent study by the European Commission has selected eight technologies because of their potential to provide the basis for innovation in a wide range of products across all industrial sectors. These technologies (such as photonics, biotechnology, micro and nano-electronics, new materials, etc.) were called Key Enabling Technologies (KETs) because of their potential for innovation in a wide range of sectors.

It is rather difficult to determine ex-ante which of these transversal technologies may be relevant for BE-BG sectors. One of the main aims of the Blue Boost activities is to bringing out the specific innovation needs of blue firms in the chosen sectors, detect some common innovation challenges and favour matching with those knowledge providers which are able to address those needs. It is likely that in most cases these knowledge providers are within the BE-BG sectors; in other cases, it will be necessary to implement collaborations with firms outside the BE-BG sectors.

Besides the role played by transversal technologies, the place of innovation has rapidly increased in recent years thanks to the diffusion of **open innovation models**. Open innovation may be defined as the use of inflows and outflows of knowledge to accelerate internal innovation and expand the markets for external use of innovation. The idea is that firms can no longer afford to be internally focused, and be reliant on just own ideas and resources to innovate and compete. In a world of widely distributed knowledge and ideas, firms are better off crossing their boundaries when innovating and when they open up of the innovation process. As such, the open innovation model represent a paradigm shift, as it is typically contrasted to the traditional closed innovation model, in which firms initiate, develop, commercialize, support and finance innovations on their own and do not search for alternative paths to market. The principles of open innovation were initially recognized in high-tech industries such as software, electronics, telecom, biotech and

pharmaceuticals; however, in recent time this model has been increasingly adopted also in medium- and low-tech industries. In the case of small firms operating in low and medium tech industries, open innovation refers to the inflow of knowledge from external sources, which are mainly represented by new knowledge and innovation agents/providers, such as innovative start-ups, fablabs, creative/innovation hubs, etc. and new collaboration mechanisms, such as open innovation contexts and hackathons. In these latter mechanisms firms with an innovation need are able to leverage on new knowledge and ideas provided by a large number of different actors (start-ups, free lances, expert teams, etc.).

Open innovation approaches and "mind-set" must be sustained during all the project cycle, showing that cross-pollination of business ideas are results of team work rather than individuals and external sourcing of ideas or external facilitators for in house idea generation are needed.

In the case of micro/small blue firms, the application of these open mechanisms it is highly appropriate and it is further recommended the active presence and support of subjects (such as B_B LICs) with specific expertise who are able to collect the innovation needs of firms and organize in an effective way the open innovation contexts (B_B coaching modules and hackathons), favour matching with most suitable Knowledge Providers (B_B match-making/brokerage events and cross-field visits) and effectively participate to selection/monitoring and final evaluation throughout the B_B innovation voucher scheme pilot action.

Specifically, analysing the six BG_BE sectors chosen by B_B partners (aquaculture, coastal and maritime tourism, fisheries, ship-building and ship repair, sea shipping/transport, costal protection), we can conclude that:

- despite the smaller size of this sector, AQUACULTURE was chosen by all partners (except Friuli Venezia Giulia). This reflects the fact that Aquaculture is within the Blue Growth sectors, i.e. those sectors which are expected to drive the growth of the Blue economy in the future. Also for this reason, firms in this sector are expected and recommended to increase their investment in innovation, The current challenges in aquaculture innovation include improving the nutrition and development of specific species diets, health management, the sustainability of fish feed production in fish farming and measures to reduce the impact of aquaculture on the environment (reduction of inputs: water, energy, and reduction of waste outputs). In this case, there has been an increase in the exploration of genetic selection, biotechnology, research on

tackling diseases, pharmaceutical and cosmetics sectors, breeding programs, diversification, etc. Therefore innovation challenges could be detected within potential sectors to be crossed and fertilized such as bio economy[3], bio security (e.g. sustainable live feed) and circular economy (e.g. waste to 3D printers, or to produce feed) too. In conclusion, this sector definitely deserves dedicated and transnational level projects, supporting local micro-small firms to match Knowledge Providers in a wider Adriatic-Ionian perspective;

- COASTAL AND MARITIME TOURISM also was chosen by all partners (except Friuli Venezia Giulia). It is noted that Tourism sector in the Adriatic Ionian macroregion is among the most active sectors in Europe as it attracts around 12% of the total tourists visiting a European destination. Specifically, Italy and Croatia host most of the tourists targeting this region being 71% (>40 mil.) and 18% (> 10 mil.) of the total tourist arrivals to the AIE region[4]. However, it includes different patterns of coastal and maritime tourism development and we can find different approaches, experiences and specific need of competitiveness all along the project partnership which can produce interesting innovation challenges to be detected during coaching-preparatory activities and then exploited through the Innovation Voucher scheme. We can mention testing projects of innovative connections among tourism and seafood supply chains and tourist boards, exploitation of connections with recreational fishing demand and sailing, introduction of new kinds of tourism products such as: medical tourism, wine tourism, religious tourism, etc). At the same time, innovation challenges in this growing sector can be detected within the tackling of negative environmental pressures caused by the high intensity of tourists: water and noise pollution, increasing solid wastes and litter, waste water from food catering, etc. Indeed, the activities supporting sustainable tourism in the Marine Protected Areas represent a source of opportunity for innovative entrepreneurial initiative, especially for the youth sector, given the labor-intensive character of the new services, promoting the creation of new forms of employment in the tourism sector.

- FISHERIES was also chosen by almost all regions (with the exception of Zadar county and Friuli Venezia Giulia) though this traditional maritime sector presents criticalities in the Adriatic area in terms of employees, vessels and production as a result of EU and national level

[3] Blue bio-economy is the main driver of growth for established and emerging blue sectors with almost 30% increase since 2008 (Investment in Blue Economy, Claus Schultze, EU Commmission, 2018)
[4] Adritic Ionian Ecoregion, Coastal and Maritime Tourism, MED Maritime Integrated project Med-IAMER, 2015

legislation aimed at reducing overfishing. Indeed, there are poor state of fish stocks in the Adriatic as a result of pollution, climate change and extensive overfishing and EU fishery management plans to limit catch and preserve the environment. On the other side, there are innovation challenges which can be faced only with a more innovative “just forward looking” vision of the sector, firstly by collaborating of external expertise, like B_B Knowledge Providers. We can mention: e.g. the implementation of catching techniques that are more environmental friendly for the preservation of fish stocks, the development of new foods products with lesser-known species, innovative sale and marketing techniques with the ICT support, the development of traceability tools which help better understand stocks and secure certification of origin could help open new higher-value markets, connection with agriculture value chain (e.g. communication and co-branding initiatives) and with coastal and maritime tourism, which deserve dedicated and transnational level interventions like those ones offered by BLUE_BOOST project.

- SHIP-BUILDING AND SHIP REPAIR sector (chosen by 2 regions only, Zadar county and Friuli Venezia Giulia) is facing a long stagnation period and tremendous global competition, though the EU’s maritime industry is characterized by high value added, rapid innovation and a leading position on green technology. Indeed, the green tech sector seems to match the most innovation perspectives as environmental impact of shipping and shipbuilding industry has becoming more and more visible. Therefore the most challenging innovation for this sector is to reduce the environmental footprint meeting the new requirements resulting from tightening of the law. We can mention also that retrofitting options and environmental upgrades of existing vessels are expected to form an increasingly significant component of additional work within ship repair sector, thus repair market is really optimistic. Although, to meet the future needs of the shipbuilding industry the ship repair sector must be prepared to carry out a new range of eco-innovations: from processes to materials, equipment and modules in the repair and conversion and retrofit of ships, etc. Also, there are high expectation of significant progress in application of ICT in the shipbuilding and ship repair sector enabling innovative method to analyze and optimize retrofit process, material and equipment to be used in repair shipyards with respects to environmental pollution and availability and –also- development of innovative software/frameworks. We can conclude that a wide range of innovation challenges can be detected in this traditional sectors: it is worth to be involved in B_B project cycle of activities, but it takes to well calibrate the specific objectives and results in consideration of the “micro-funding” allocation foreseen by the B_B project that can sustain only a very small component of

more ambitious operations.

- SEA SHIPPING/TRANSPORT (chosen by Friuli Venezia Giulia only). The analysis of global trend to 2030 clearly indicates an increasing demand for shipping of all types from coastal food and water carriers, through vessels for supplying the growing megacities to large and sophisticated cruise ships to provide leisure activities for the new middle classes. That creates significant opportunities for the Adriatic-Ionian maritime industry, its expensive supply chain and the infrastructure which support it. A wide range of innovation challenges can be detected also in this traditional sectors: it is worth to be involved in B_B project cycle of activities, tough it takes to well calibrate the specific objectives and results in consideration of the “micro-funding” allocation foreseen by the B_B project that can sustain only a very small component of more ambitious operations.

- COASTAL PROTECTION (chosen by Friuli Venezia Giulia only) needs innovative solutions to reduce financial and environmental costs of the massive use of coasts. To reach such goal every kind of projects needs to be agreed and accepted by local communities and relevant institutions. Also, it is to be considered that this sector has important connections with other blue sector, first of all Coastal and Maritime Tourism, as the defence of the coasts and the beach nourishment have important impact on the touristic flows trend. On the basis of such considerations it is suggested to both cross possible coastal protection B_B innovation challenges/projects with other sectors and then to well calibrate the specific objectives and results in consideration of the “micro-funding” allocation foreseen by the B_B that can sustain only a very small component of more ambitious operations.

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