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Marine Economy: A proposal for its definition in the European Union

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Abstract

In recent years, and within the context of the EU, policies relating to the sea and oceans are being looked at from a more inclusive perspective. Although the growing socio-economic importance of the sea is increasingly evident in Europe, serious difficulties still exist when it tries to quantify marine economics, making it more difficult to adopt the strategic decisions of the governments and agents involved. These difficulties are linked both to the diversity of definitions and statistical representations of marine sectors as well as to the scant availability and quality of the data. This paper set out a specific proposal for the definition and characterisation of marine sectors and economic activities within the EU. This definition proposal is compatible with the standard statistical classifications of economic activities and European regions. In the majority of cases, it enables to compare the quantifications that can be carried out, both over time as well as between the different activity sectors, countries and regions. Furthermore, it is a concrete, practical proposal, not particularly costly to the public statistics institutes and can be applied relatively easily.

Keywords

Definition Marine Economy, European Marine Sectors

1. Introduction

In recent years, the EU's marine and maritime policies have developed considerably. In spite of the fact that most of the EU member States have a maritime coastline (with more than 65,000 kilometres of coastline), up until only a few years ago, the different European policies that affected the marine environment (fishing, transport, energy, the environment, etc.) were somewhat compartmentalised. With the publication of the Green Paper on Marine Policy for the EU [1], a new vision for sea and ocean management in Europe was proposed. It involved incorporating an integral and holistic vision of maritime policy, with the promise of replacing compartmentalised resource management with an approach based on ecosystem management. This novel proposal was probably made possible both by growing evidence of the high impact human activity was having on marine ecosystems as well as the realisation of the socio-economic importance of seas and oceans on the European economy. Thus, for example, in a global study on the accumulated human impact on 20 different types of marine ecosystems [2], it was shown that all the marine areas studied were affected by human influence and an important proportion (41%) were significantly affected (North-western European seas were among the areas where human activity most impacted on marine ecosystems). For its part, in a study commissioned by the European Commission on employment and its trends in the marine sectors of EU member states [3], it was estimated that the 13 sectors analysed generated approximately 5 million jobs in 2004-05, an important part of them in Spain (37%), the UK (12%) and France (9.7%).

On the basis of the results reached in the Green Paper's consultation process, on 14 December 2007 the European Council approved what was known as the Blue Book on an Integrated Maritime Policy for European Union (IMP) [4]. As pointed out by Hynes and Farrelly [5], the IMP emphasises the need to establish a framework for the integral governance of maritime affairs in which horizontal planning instruments are necessary. In particular, it underlined the need to pay special attention to the following three tools: maritime surveillance (for safety in the use of the maritime environment); planning of the maritime environment (key to sustainable decision-making); and the existence of a comprehensive and accessible data and information source.

It seems clear that, in marine policy, the probability of success in strategic decision-making increases significantly when the availability and accessibility of information and statistical data on marine activity also increases. The abovementioned document [3] already underlined the lack of a systematic and permanent methodology for data collection in EU countries and the scant uniformity of definitions of the different maritime sectors. In spite of the nearly 15,000 million Euros from the EU budget funds aimed at financing projects relating to maritime activities for the period 2000-2008 [6], and the nearly 300 million Euros designated annually to marine data collection in only 5 coastal Member States (Spain, France, The Netherlands, Sweden and the UK)

[7], the data continues to be disperse and not homogenous. Aware of this failing, in the Green Paper on Maritime Policy the European Commission proposed a new European Marine Observation and Data Network (EMODNET) with the aim of improving the availability and quality of the data received in relation with the coast and the sea. The Blue Book and its action plan contained the proposal to develop an economic and social data base for maritime sectors and coastal regions (Action 6.5 of the Action Plan). The European Commission, via Eurostat, commissioned a study for the development of such a data base, a study that was coordinated by Ifremer [8]. The end report of the analysis continued to insist on the need to, on the one hand, overcome the deficiencies with regard to the diversity of definitions and statistical representations of maritime sectors and, on the other, to improve the availability and quality of the data in each Member State, especially at regional and local level.

In spite of the European Commission and Eurostat's commitment to collecting relevant data on marine and coastal socioeconomics in Europe [9], its Member States and Regions (NUTS levels 2 and 3), they have not yet managed to publish a high-quality data base in existing statistics portals. A recent study commissioned by the European Commission [10] analysed economics relating to marine activities (called Blue Economy) from a functional perspective. In this study, it was estimated that these activities currently contribute around 485,000 million Euros to the Gross Domestic Product (GDP) and employ 5.4 million people, figures that convey the growing importance of activities relating to the sea and its resources.

In this context, this study aims to provide concrete practical proposals within the existing debate on the definition and characterisation of the marine economy's activities and sectors. On the one hand, it aims to provide a specific proposal to define the marine economy in the European Union that is compatible with the standard statistical classifications of economic activities and European regions, allowing the comparison of the estimated results, both over time as well as among the different sectors of activity, countries and regions. On the other hand, the concrete proposal aims to be extremely practical, not costly for the public statistics institutes and relatively easy to apply. With these general aims, after this introduction, the second section will look briefly at the different delimitations and definitions that exist in international literature on the marine, the basic characteristics of a methodology that has been used in the renowned National Ocean Economic Program for the USA and some of the results achieved in the quantification of the marine economy from studies applied to EU countries will be shown. The third section will look at the concrete proposal for the definition of the marine economy in the EU. Lastly, a final section will sum up the conclusions.

2. The definition of the marine or ocean economy

2.1. Some international studies

In order to quantify the value of the marine sector and its contribution to the GDP of an economy, firstly it needs to define this sector of activity. Colgan [11] reminds us that the concept of "Ocean GDP" was already apparent in a report by Nathan Associates [12] for the Bureau of Economic Analysis (the agency responsible for the maintenance the US National Accounts) that aimed to identify the contribution of the ocean to US GDP based on the data of existing economic data for the year 1972. This study focussed on the analysis of the economic activities and industries that more clearly "utilized an ocean resource in a production process" or "produced a product or service that was demanded because of some quality attributable to the ocean". Using a similar approach, Pontecorvo et al. [13] and Pontecorvo [14] estimated the contribution of the ocean sector to the US economy for the years 1977 and 1987. Luger [15], for the year 1985, made some estimates for the Gross National Product (GNP) originating from US coastal zones.

With regard to the USA, in 1999 the National Ocean Economics Program (NOEP) was established, its web site offering a wide range of socioeconomic information on oceanic industries and activities along the entire US coastline [16]. Now, the NOEP forms a part of the new Centre for the Blue Economy in the Monterey Institute of International Studies [17]. Within the NOEP [18, 19], they differentiate between oceanic economics and coastal economics. Both are closely related, but respond to different concepts. While coastal economics refers to all economic activities that take place in coastal zones or regions, the ocean economy is restricted to the economic activities which directly or indirectly use the ocean (or the Great Lakes) as an input.

As Kildow and McIlgorm [20] point out, in studies by other countries, different definitions or delimitations appear in which it is understood to be ocean activity or industry. The Canadian Department of Fisheries and Oceans (DFO) [21, 22] defines ocean industries as those that are established in Canadian maritime zones and the coastal communities adjoining these zones, or those that are dependent on these areas for their income (industries pertaining to interior waters are excluded, such as fishing or sailing in the Great Lakes, canals and river systems of Canada).

Allen Consulting [23], in order to estimate the economic contribution of the marine industry in Australia, considered different marine industry categories according to the type of relationship economic activities have with the marine environment. As such, a distinction is made between activities that use sea resources (such as commercial fishing or the deep-sea extraction of oil and gas), those that are linked to the provision of services relating to maritime transport (such as the shipping industry and port activities) and others that benefit from the positive attributes of the marine environment (such as marine tourism). Another study carried out by the New Zealand Statistical Association [24] estimated the contribution of the marine economy to its GDP for the period 1997-2002. On this occasion, they took into account the overall economic activities used or that take place in the marine environment, or produce the goods and services necessary

for such activities and make a direct contribution towards the national economy (they thus exclude activities that are indirectly linked to marine sectors).

These studies have given rise to different estimations as to the contribution of marine or ocean sectors to the overall GDP of respective economies. In **Table 1**, this information is set out for some of the countries mentioned [25]. As can be seen, the relative importance of the marine economy ranges from between 1.2% of the USA's total GDP and the maximum 3.6% estimated for Australia. However, the different definition assumed in studies for determining the marine economy makes any comparison between countries quite inconsistent.

Table 1

2.2. NOEP methodology

The scant comparability of the different results obtained makes it necessary to adopt approaches aimed at establishing common methodologies to define and estimate the marine economy. One of the most notable attempts has been developed in the USA from within the NOEP. In his studies, Colgan [11, 18] affirms that the estimation of economic activity linked to the ocean is inherently limited due to the lack of data availability, conceptual difficulties and the need to make some subjective choices concerning what to include and what to exclude. The choices that are made in measuring the economic activity associated with the ocean must be explicit and compatible with the objectives established for the overall system. In this way, the methodology established in the NOEP pursues the following objectives:

- *Comparability across industries and space.* The data should be consistent from national to local levels and across all States. The measure of employment in one location should be the same as all other locations.
- *Comparability across time.* The data should be sufficiently consistent over time so that changes can be observed and measured with the same data at all points.
- *Theoretical and accounting consistency.* The data should reflect standard economic theory describing the measurement of economic activity. It should not permit double counting of economic activity, meaning all measures can be summed across industries and geographies.
- *Replicability.* The assembly of the data should be done using a methodology that can be replicated by other researchers and that can form the basis for the continued generation of data series in the future in order to establish long term-time series measures of the Ocean Economy.

The statistical data is compiled from official US statistical surveys and sources, where economic activities are usually identified both by the codes that correspond to the SIC (Standard Industrial Classification System) as well as to the NAICS (North American Industrial Classification System). The SIC dates back to the 1930s, while the NAICS was developed in the 1990s as a part of the North American Free Trade Agreement (NAFTA), with the aim of establishing a common base

between the USA, Canada and Mexico to measure their economic activity. In the former system, each establishment is classified in terms of the company's main line of business, whereas the NAICS classifies each establishment according to the activity it actually carries out. That is, under this criteria, a company's establishments or plants can be classified under a code, while the same company's other establishments can be classified with a different code, according to the specific activity carried out (for example, the administrative and management activity carried out in the head offices of a company can be classified in a different sector to that carried out in the industrial plants or establishments it manages). The NAICS divides up the different economic activities into smaller groups than the SIC, which makes it possible to identify the marine economy's activities more precisely and obtain more detailed information about them. Adaptation of statistics to the NAICS has progressed, in such a way that currently NOEP uses this classification system exclusively to quantify contribution to employment and to the GDP of the ocean economy [19].

The NOEP methodology defines that the Ocean Economy is made up of 9 main sectors, although only data for 6 of these categories is available: Construction, Living Resources, Minerals-Offshore, Ship & Boat Building, Tourism & Recreation and Transportation. For its part, the statistical data on governments' marine activities (at federal, state or local level), as well as the data for the real estate sector and education and research sector (the three other ocean economy sectors) are not easy to obtain from the usual statistical information sources, and therefore need to be compiled using different methods. The selection of the six private industrial sectors is conditioned by the overall existing official data that is publicly accessible. In this way, only the activities on which there is sufficiently consistent information to allow estimations to be obtained for industrial ocean activities separately from those that are not are considered.

In spite of the significant level of disaggregation of the statistical information organised by the NAICS, to define the ocean economy, a combination of industrial and geographical perspectives is required. The economic activities carried out by some industries form an unequivocal part of the ocean economy (industrial criteria), as do all that belong to the sector of Living Resources, all Boat Building and Repair industries and the majority of the industries belonging to the Maritime Transport sector. However, the Marine Construction, Minerals-Offshore, Tourism and Recreation and Warehousing sector industries will only be considered a part of the ocean economy if their establishments are located in a place near or adjoining the coast (geographical criteria). Industrial marine activities that require the application of geographical criteria have been marked with a (g) in **Table 2**.

Table 2

2.3. The quantification of the marine economy in European Union countries

In recent years, these types of studies have been carried out in different EU countries, where marine sectors are also defined in different ways.

Pugh [26] considers up to 18 different sectors related to marine activities in the **United Kingdom**. Among such activities, he includes those that involve working in or on the sea, and also those relating to the production of goods or provision of services that directly contribute to activities carried out in or on the sea. In his study, Pugh uses official statistics (from the Government or the Office for National Statistics) as his main data sources. Only when these primary sources are not available does he use alternative techniques that must be explicit. The official data is usually ordered in accordance with the UK Standard Industrial Classification of Economic Activities index (SIC 2007). In this way, **Table 3** relates the 18 sectors contemplated in the study and the corresponding SIC 2007 code is pointed out. It is important to underline that in some cases the overall industrial activities integrated in these codes are totally related to the marine economy. For example, the activities classified under code 03.11 correspond to marine fishing, thus the figures (for production, value added or employment) that the official statistics might offer under this heading correspond entirely to the marine economy activities. In other cases, only some of the activities classified under these codes can be counted as relating to the marine economy, as in these, activities with no relationship or only a slight relationship with the sea are also classified. For example, the extraction of gravel and sand contemplated under code 08.12 also includes extraction from river beds or inland ground.

Table 3

For the case of **France**, Kalaydjian et al. [27] differentiate between the commercial sectors (industrial sector) and those activities linked to the non-commercial public sector. In the former case, they consider up to 9 commercial sectors while for the latter they consider 4 types of public activities. Within the activities that belong to the seafood sector, they distinguish 5 sub-sectors, under Shipbuilding, another 5 sub-sectors, and in Maritime and river transport, 6 sub-sectors. In these studies, they preferably use official data sources from different French Government ministries or other public institutions or institutes. For the cases where there is no detailed data in official statistics, they also look to information provided by different business or professional organisations. As can be seen in **Table 4**, the classification of the different marine sector activities follow the Nomenclature d'Activités Française 2003 (NAF 2003), where, as in the case of the United Kingdom, sector codes entirely linked to the marine economy (mainly in the Seafood, Shipbuilding and Marine Transport industrial sectors), coexist with others that partially comprise these types of activities (the remaining sectors).

Table 4

On the basis of the methodology defined by NEOP, for **Ireland**, Morrissey et al. [25] quantified the commercial value of the marine sector in 2007. These authors considered industries that directly use marine resources (such as seafood, transport and energy industries) and others that create value through the provision of products and services indirectly associated with the marine

environment (such as seafood processing or marine tourism). Marine industries were categorised in three wide-ranging sectors: marine services, marine resources and marine manufacturing. Within each of these sectors, 16 industries were revealed without identifying them directly with a classification of economic activities system (see **Table 5**). Of these, six belong to services, 6 to resources and 4 to manufacturing, although the information on the manufacturing industries sector was not estimated in a disaggregated manner. As in the cases above, the priority data sources came from official institutions. Some activity sectors with a clear connection to the sea are perfectly identifiable in the official statistics, and their economic data can be accessed (cases of Sea fisheries and Aquaculture). For other activity sectors, official data exists but is not directly available, thus it is necessary to consult the more detailed data bases (by sector and/or geographically) not always available due to confidentiality difficulties (cases of the shipping and maritime transport, marine tourism, seafood processing or oil and gas production sectors). In some cases, it is not easy to recognise in the official statistics exactly what part of the activity has a maritime base, thus it is necessary to turn to sectoral reports, by professional organisations, to studies carried out by researchers and surveys carried out via questionnaires (cases of the High-tech services, Marine commerce, Seaweed and biotechnology and Renewable energy sectors).

Table 5

For the case of **Spain**, Innovamar [28] defines the marine sector as an group of economic activities that do not have an official definition, but is made up of companies whose activities have a direct relationship with the sea (such as the companies involved in fishing, aquaculture or naval construction and repair), and others with a close relationship with the sea (such as maritime transport sector companies, those involved in port services, those which trade with sea products and other service companies). In this case, 11 sectors of the marine economy were identified. Some of them comprise activities that can be directly identified with the sectors established in the Statistical Classification of Economic Activities in the European Community (Known by its acronym NACE) at the 4-digit level (NACE Rev.1 codes), such as in the cases of Fishing, Shipbuilding and Maritime Transport (see **Table 6**). But the majority of maritime activities lie in sectors which combine activities linked to the sea with others which have no relationship with marine affairs. To estimate the economic contribution of the sectors directly related to the sea and easily identifiable by their NACE Rev.1 codes, data sources from official statistics were used. For the remaining sectors, both official data sources, such as different sectoral studies carried out by business and professional organisations within the sectors involved, as well as other applied studies carried out by academic researchers were used. Given the lack of prior studies for 4 of the 11 marine sectors (Ports, Trade and distribution, Insurance and Banking and Other activities), in this study by Innovamar, only preliminary estimations offering global and overall figures for these four sectors were carried out.

Table 6

A recent study carried out by Ecorys, Deltares and Oceanic [10] for the European Commission's DG MARE and applied to the **European Union** overall tackled the analysis of the marine economy from a functional perspective. In this analysis, they define the marine economy as that which comprises all sectoral and inter-sectoral economic activities relating to the oceans, seas and coastal regions. This definition also includes the group of activities that serve as direct and indirect support for the functioning of maritime economic sectors, thus, apart from coastal zones, these activities can also be found in countries without a coastline. This study defined 6 global marine functions (see **Table 7**) and a total of 27 sub-functions or maritime economic activities. In order to determine the size and development of the different maritime functions, it is necessary to define what the main sectors of activity classification NACE Rev.2 that contribute to each function actually are. In some cases, the identification between function and activity is simple (the cases of maritime transport or fishing and aquaculture), but in other cases it is much more complex, as the activities of a particular sector can carry out different functions (the case, for example, of the building of ships and repair sectors). Furthermore, many sectors can simultaneously serve main activities with their base on land. For those activity sectors that cannot be assigned directly to a maritime function, geographical criteria can be used, assuming that if the activities of a certain sector (for example, those relating to tourism) are carried out in a coastal region, they would be considered activities with maritime functions. The priority data sources are those provided by Eurostat's data bases or previous studies by DG MARE, resorting to their own estimations if necessary (especially in cases where marine land-based activities cannot be defined in the official statistics).

Table 7

These studies applied to different European Union economies have given rise to different estimations on the contribution of marine or ocean sectors to the overall GDP. The **Table 8** sums up this information for the studies mentioned above. As can be seen, the relative weight of the marine economy oscillates between 0.8% of Ireland's total GDP and the maximum 4.2% estimated for the case of the United Kingdom. Again, the different definitions used for the marine economy and the different methodologies used for the estimations in the different studies means that the results of comparisons between countries and zones are somewhat inconsistent.

Table 8

3. A proposal for defining the marine economy in the EU

The lack of a single methodology to define, delimit and quantify the economy's marine sectors within the EU causes a number of problems. Firstly, for the industry itself involved, which sees how the lack of homogeneous information for the EU as a whole makes it impossible to adopt certain business decisions with the necessary rigour (such as the design of business plans, forecasts for the evolution of the markets, trends in the different countries and regions, etc.) or decision-making on technological development or investment to be made with the future in mind [29, 30, 31]. Secondly, for countries' governments and the EU administration itself, with wide-ranging powers to regulate activities in the sea (fishing, extraction of oil and gas, maritime transport, etc.) or in coastal areas (port activities, shipbuilding, aquaculture plants, etc.), and which see their decision-making made more difficult with relation to both the ecological and economic sustainability of marine resources as well as a fair distribution of resources and opportunities among present and future generations [32, 33]. And, thirdly, for the citizenry overall, this lack of homogeneous and comparable information impedes them having an accurate vision of the importance of the different activities relating to the sea, which can distort their social and political choices (for example, with respect to possible alternative uses of the sea and coastal areas) and distort the safety and quality of life of the inhabitants of coastal areas [34].

In order to resolve this problem, it would be necessary to adopt a common methodology that, while maintaining the rigour of socio-economic estimations, is compatible with the availability of the information drawn up by the EU countries' official statistics sources as well as with the territorial, social and political organisation of the EU.

The methodology developed by the NOEP could be a good place to start, but it requires certain adaptations to the reality of the EU. Thus, it could assume that an economic activity forms a part of the marine economy when the ocean and its resources directly or indirectly constitute an input of goods and/or services necessary to develop such an activity. The estimation of the economic activity related to the sea will be limited by the statistical data available, which makes it necessary to adopt subjective choices. In any case, these choices must be explicit and coherent with the methodological objectives of the system:

- 1) spatial and inter-industry comparability,
- 2) temporal comparability,
- 3) theoretical and accounting consistency,
- 4) replicability.

On the basis of the NOEP's classification of the ocean's economy's sectors and industries, **Table 9** shows the proposal for the classification of these activities for the EU's Marine Economy. In this proposal, 9 main marine sectors and a total of 34 marine industries are identified: 6 for the

Living Resources sector, 7 for the non-Living Resources sector, 5 for Shipbuilding, 3 for Construction, 4 for Transport, 2 for Tourism and Recreation, 3 for the Public Administration, 2 for Education and R+D and another 3 for Others. The table also sets out the marine activities that each of the industries and sectors differentiated must contain. It should be pointed out that the ninth sector (Others) includes an industrial sector necessarily open to different activities that have not been contemplated in the previous section (Industry 9.3 of Others not previously classified). This inclusion aims to contemplate certain flexibility to be able to add other marine activities that, while minority activities in most cases, may be of a certain relevance in concrete study cases.

Table 9

Furthermore, the estimation methodology proposed must be practical and applicable in the short term to the context of the EU. Insofar as is possible, the data on the marine economy should be obtained via the already-existing official statistics. Additional efforts to make the estimations must focus on those activities about which there is no specific or only incomplete information.

In the year 2006, the European Union drew up a Regulation establishing the statistical nomenclature of economic activities NACE Rev. 2 [35]. The aim of this Regulation was to create common statistical standards which would allow for the production of harmonised data, better suited to the economic reality and which would improve comparability between the different national and international nomenclatures and statistics. After 1 January 2008, the EU Member States had to collate the statistics referring to the economic activities carried out using this system or a national nomenclature derived from it (including a table of equivalence with NACE Rev.2). Eurostat publishes the statistical information according to the branches of activity of each Member State using this nomenclature.

The structure of NACE comprises 4 levels [36]:

- i. a first level consisting of headings identified by an alphabetical code (sections),
- ii. a second level consisting of headings identified by a two-digit numerical code (divisions),
- iii. a third level consisting of headings identified by a three-digit numerical code (groups),
- iv. a fourth level consisting of headings identified by a four-digit numerical code (classes).

When it operates on the fourth level (with a four-digit numerical code), the different economic activities are identified with a greater degree of detail.

On this basis, according to the activities and information that contain the industries classified with the NACE Rev.2 four-digit numerical code, it will be possible to define 3 groups of marine activities (see **Figure 1**):

- Group 1. Completely marine.
- Group 2. Mainly marine.

- Group 3. Partially marine.

Figure 1

Group 1. Completely marine activities: This group will be made up of the activities grouped together in an industrial sector differentiated from official statistics (with its own statistical code) and which contains unequivocally and exclusively activities that can be considered marine (the ocean and its resources directly or indirectly constitute an input of goods and/or services necessary to carry out this activity). In this way, the data obtained by means of these sources will simultaneously comply with the 4 methodological objectives relating to comparability, consistency and replicability.

The economic activities contemplated at a NACE four-digit numerical code level that can be identified as completely marine are contained in **Table 10**. The data contemplated in the official statistics on the value of production, value added or the employment generated will be fully considered as part of the marine economy, regardless of whether or not the activity is carried out more or less near the sea (for example, the retail sale of fish might take place far from coastal zones but unequivocally form a part of the marine economy).

Table 10

Group 2. Mainly marine activities: Made up of the activities (marine or otherwise) grouped together in an industrial sector of the official statistics where mainly marine activities are present. Given the circumstances of these industries, it can be assumed that they are marine economy activities if the businesses and installations are located or carry out their work at sea, in coastal regions or near the sea. That is, it has to incorporate geographical criteria to define it. Now, spatial comparability (between different countries, regions, etc.) and replicability will depend on the degree of homogeneity of the geographical divisions contemplated in each case.

Normally, under the NACE Rev.2 four-digit codes, marine activities are mixed with others that are not. Within this group, it can distinguish industries where, in the event they are located in a coastal zone or region, there exists a high probability that they form a part of the marine economy. The choice of these mainly marine industries requires a detailed analysis of the activities contemplated under each NACE four-digit rubric. As it has mentioned above, to estimate and quantify the economic contribution (production, value added and employment) of these industries, it is also necessary to establish geographical criteria, which involves various options or possibilities. The definition of coastal regions or zones is not unique or exempt from controversy [5]. In general, the delimitation of coastal zones may be subject to a series of criteria which can be put into three main categories [37]: geometrical-linear criteria, legal-administrative criteria and ecological-natural system criteria. Depending on the aim of each study, preferences for one or other criteria exist [38]. However, the nature and scope of this

proposal makes advisable to adopt practical criteria, enabling to have easy access to the statistics available. In this way, it can assume the definition that Eurostat establishes for EU coastal regions: standard statistical regions (corresponding to the Nomenclature of Territorial Units for Statistics, at NUTS 3 level), which have at least half of their population within 50 km of the coast [39].

Therefore, it will assume that the group of activities contemplated in Group 2 industries (mainly marine), will form a part of the EU marine economy when they are carried out in a coastal region defined in accordance with Eurostat criteria. According to these criteria, **Table 11** set out the industries and activities which belong to this group, 2, that is, mainly marine activities.

Table 11

Group 3. Partially marine activities: it will be made up of the activities grouped together in an industrial sector of the official statistics where marine activities normally have a fairly insignificant presence. The fact that these activities are carried out in coastal zones is not a guarantee that they are necessarily related to the sea. Therefore, in order to define how they belong to the marine economy, the other criteria derived from previous studies and from the existence of specialist information with a greater level of data should be added to the geographical criteria. In these cases, the comparability and replicability would be somewhat diminished.

There are many marine economy activities that are registered dispersedly within other NACE 4-digit code registers. On this occasion, they are minority activities within their industrial code. Furthermore, location in coastal regions increases the probability that they belong to the marine economy, but it is also a guarantee that they actually depend on the sea in order to exist. For example, it is probable that a significant part of the activity of a hotel in a coastal city is related to maritime tourism, but the majority of its turnover probably depends on the habitual activity of an urban hotel, regardless of whether or not the city is located in a coastal region. They are, therefore, industries related to the marine economy that need to be understood to a better degree and require prior studies if they are to be correctly quantified economically. Only on the basis of this prior knowledge, it will be possible to obtain an approximation as to the part of the business that depends directly on the nearby presence of the sea and its resources. In the absence of such knowledge, in order to obtain an estimation of the contribution of these activities to the economy, it would be necessary to carry out field work.

Within this group, it can pick out a high number of activities classified with the NACE Rev.2 four-digit code. Tables A.1 to A.9 in the **Appendix** include the most relevant industries and activities within each one of the 9 differentiated sectors of the Marine Economy. Among such sectors, it ought to underline that all of the marine activities of the sectors relating to Tourism, Public Administrations, Education and R+D and Others (sectors 6, 7, 8 y 9, respectively) are classified within this group 3.

Based on these premises and on the official statistical information that exists, it could quantify the contributions of marine activities to the total value added of a country's economy, differentiating between the three groups.

The quantifications carried out for Group 1 activities (Completely marine) would be perfectly consistent, replicable and comparable, both spatially (between different countries) as well as between different sectors and time periods. The only requisite for quantifying the Marine Economy of Group 1 would be to have the statistical data accessible by countries organised on the basis of the official classification of economic activities (NACE Rev.2). Given that the member States must collate the statistics referring to the economic activities carried out using this system or a national nomenclature derived from it, the quantification of this group of activities' marine economy will be simple, direct and not costly to obtain.

Furthermore, the quantification of the economic contribution of the activities in Group 2 (Mainly marine) requires the availability of regionalised statistical data, at European region NUTS 3 level. Here, different statistical problems appear [8]. In quite a lot of EU countries, important failings continue to exist in this information disaggregated by activities (at NACE four-digit level) and coastal regions (NUTS 3 level). On occasions, this information exists at European region NUTS 2 level, but on a considerable number of occasions the statistical information on economic activities is only available at country level (NUTS 0). This situation limits the possibility of quantifying the ocean economy of Group 2 activities, but for the economies where calculation is possible, the 4 methodological objectives relating to the comparability, consistency and replicability of the quantitative results obtained could be met simultaneously.

The economic quantification of Group 3 activities (Partially marine) requires the incorporation of other criteria for their definition. These criteria must derive from prior studies and from the existence of specialist information with a greater level of detail. It will be difficult for these criteria to be homogenous in all the maritime countries and regions considered, as their structural economic characteristics could differ immensely. Some economic activities located in a maritime region could be considered as belonging to the marine economy (such as the example of hotels mentioned above). In these cases, the estimation and definition criteria introduced by analysts are especially relevant for quantification, the reason why the comparability and replicability of the results obtained will be limited.

Lastly, the criteria used for quantification of the sectors in Groups 2 and 3 (Mainly and Partially marine) may lead to overestimate or underestimate the valuation of marine activity. Often, for these sectors (where marine activities are mixed with others that are not), data is not available in the public domain [25], so researchers have to rely on surveys to quantify such data. Whatever the source used for the collection of information, data consistency must be maintained across each economic parameter for the three groups of marine activities.

4. Conclusions

Economic activities related to the sea and the oceans are developing significantly in Europe. Recently-published studies estimate that marine activities currently contribute around 4% of the European Union's total GDP [10]. Furthermore, in recent years European institutions have incorporated a holistic and integral vision of maritime policy, with the promise of replacing the compartmentalised management of resources (fishing, energy, transport, the environment, etc.) with an approach based on integral management of the marine ecosystem and coasts. This integral governance of maritime affairs requires horizontal planning instruments and, in particular, the existence of a complete and accessible information and data source with regard to all marine activities. However, up to now it is clear that there is a significant lack of a systematic and permanent methodology for data collection in EU countries, and scant uniformity in the definitions of the different maritime sectors. The lack of consistent and comparable statistical data on the different activities of the EU's marine economy makes it difficult for both governments as well as the agents involved in the marine economy to adopt strategic and operational decisions.

As can be seen by reviewing the literature that exists both internationally and within the EU, this is no new situation. Studies carried out to quantify the marine or ocean economy in different countries and areas use different definitions, delimitations and methodologies. Perhaps the most notable effort made to establish a homogenous methodology in order to measure the marine economy is that established more than a decade ago by the USA's National Ocean Economic Program (NOEP). With regard to the European Union, several studies have been carried out, enabling to obtain an overall view of marine activities in different countries (UK, France, Ireland and Spain, for example). However, they offer estimated figures, making it difficult to establish spatial and temporal comparisons.

Within this context of methodological diversity in the definitions and characterisation of the marine economy's sectors and activities, this study aims to provide a concrete and practical proposal that will help simplify the debate that exists in the EU. The proposal set out herein takes the methodology established by the NOEP as a starting point, but adapts it to the needs and realities of the EU. Thus, it assumes that an economic activity forms a part of the marine economy when the ocean and its resources constitute either directly or indirectly an input of the goods and/or services necessary to develop that activity. The quantification of marine economy activity makes it necessary to adopt subjective definition decisions which should be explicit and coherent with the methodological objectives of the system overall: spatial and inter-industry comparability, theoretical and accounting consistency and replicability.

On the basis of these principles, the proposal is for a classification of the EU marine economy's activities where 9 major marine sectors can be distinguished (Living Resources, non-Living Resources, Shipbuilding, Construction, Transport, Tourism and Recreation, Public

Administration, Education and R+D and Others), which cover a total of 34 marine industries. Each one of these industries can be identified with one or more economic activities from the statistical nomenclature of NACE Rev.2 economic activities. Within this classification of activities on a four-digit level, it can identify codes that unequivocally and exclusively contain activities it can consider marine. These belong to Group 1 activities, defined as Completely Marine. In other cases, codes that are made up for the most part of marine activities are identified (Group 2), although they include some that are not. Given the characteristics of these Group 2 activities, it can be assumed that they form a part of the marine economy if they are located in a European coastal region in accordance with the definition established by Eurostat. It can also distinguish NACE codes for activities where normally there is a reasonably insignificant presence of marine activities. These are included in Group 3, Partially Marine, activities, whose definition and quantification requires the use of other criteria derived from previous studies and from the existence of specialist and more detailed information.

The quantification of the contribution of Group 1 marine economy activities towards the European GDP would be simple, direct and not too costly to obtain. The results reached (in terms of value added, for example) would be perfectly consistent, replicable and comparable, both spatially and temporally.

In order to quantify the economic contribution of Group 2 activities are needed disaggregated information by activities (at a NACE Rev.2 four-digit code level) and European Coastal Regions. But this complete statistical information for some countries is not available. For countries where this information is indeed available, it is possible to obtain quantifications of Group 2 marine economy activities, which would also comply with the four methodological objectives relating to the comparability, consistency and replicability of the results.

The quantification of the economic contribution made by the activities classified in Group 3 (Partially marine) is much more complex and requires the introduction of criteria by which they can be defined with a significant degree of subjectivity by analysts. When these criteria are explicit, the estimations carried out will offer a valuable vision of the importance of the sea and the oceans for a relevant part of European economies, but any temporal, sectoral or spatial comparison (between different countries or regions) should be taken cautiously.

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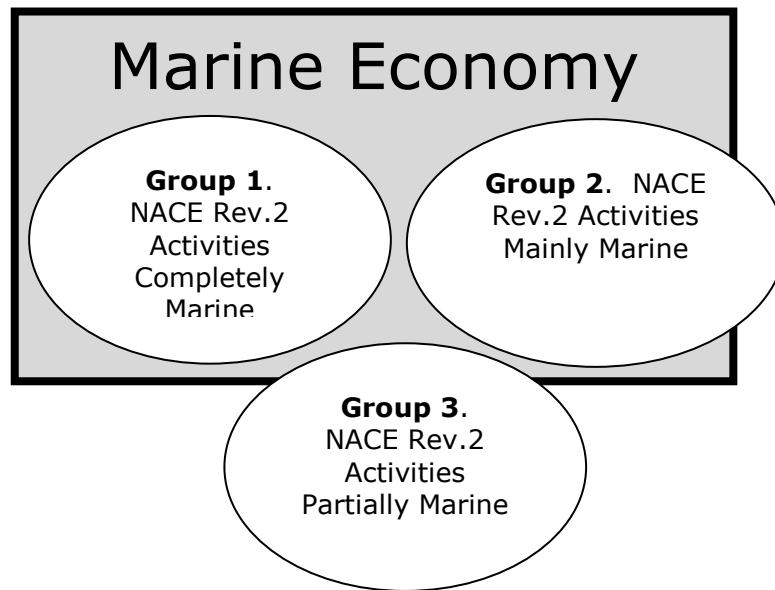
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Figure

Fig. 1. Groups of activities of the Marine Economy and NACE Rev.2 classification.



Tables

Table 1

Estimates of the ocean economy from some studies.

| Country | Author and year of publication | Date of data in study | % of GDP |
|-------------|--------------------------------|-----------------------|----------|
| Canada | RASCL (2004) | 1988-2000 | 1.5% |
| Australia | Allen (2004) | 1996-2003 | 3.6% |
| New Zealand | NZ Statistics (2006) | 1997-2002 | 2.9% |
| USA | Kildow et al. (2009) | 2004 | 1.2% |

Source: Morrissey et al. [25].

Table 2

NOAP. Ocean Economy Sectors and Industries by NAICS and SIC Codes.

| Sector | Industry | NAICS Codes | SIC Codes |
|----------------------|--|--------------------------------|------------------------------------|
| Construction | Marine Related Construction (g) | 237120, 237990 | 1629 |
| Living Resources | Fishing | 114111, 114112 | 0912, 0913 |
| | Fish Hatcheries and Aquaculture | 112511, 112512 | 0273, 0921 |
| | Seafood Processing | 311711, 311712 | |
| | Seafood Markets | 445220 | |
| Minerals-Offshore | Limestone, Sand, & Gravel (g) | 212321 | 1422 |
| | Oil and Gas Exploration and Production (g) | 211111, 213111, 213112, 541360 | 1446, 1311, 1321, 1381, 1382, 1389 |
| Ship & Boat Building | Boat Building and Repair | 336612 | 3732 |
| | Ship Building and Repair | 336611 | 3731 |
| Tourism & Recreation | Boat Dealers (g) | 441222 | 5551 |
| | Eating & Drinking Places (g) | 722110, 722111, 722112, 722113 | 5812 |
| | Hotels & Lodging Places (g) | 721110, 721191 | 7011 |
| | Marinas (g) | 713930 | 4493 |
| | Recreational Vehicle Parks & Campsites (g) | 721211 | 7033 |
| | Scenic Water Tours (g) | 487210 | |
| | Sporting Goods (g) | 339920 | 3949 |
| | Amusement & Recreation Services (g) | 487990, 611620, 532292, 713990 | 7999 |
| | Zoos, Aquaria (g) | 712130, 712190 | 8422 |
| Transportation | Deep Sea Freight | 483111, 483113 | 4412, 4424, 4449 |
| | Marine Passenger Transportation | 483112, 483114 | 4481, 4482, 4489 |
| | Marine Transportation Services | 488310, 488320, 488330, 488390 | 4491, 4492, 4499 |
| | Search and Navigation Equipment | 334511 | 3812 |
| | Warehousing (g) | 493110, 493120, 493130 | 4221, 4222, 4225 |

(g) Activity that requires the application of geographical criteria.
Source: Colgan [11, 18].

Table 3

Pugh's classification marine sectors for the United Kingdom.

| Marine sectors | SIC 2007 Codes* |
|---------------------------|--|
| 1 Fish | 03.11, 03.12, 10.20 |
| 2 Oil and gas | 06.10, 06.20, 09.10 |
| 3 Aggregates | (08.12) |
| 4 Ship and boat building | 30.11, 30.12, 33.15 |
| 5 Equipment | (13.92, 25.99, 26.51, 27.40, 28.11, 29.10, 43.3) |
| 6 Renewable energy | (35.11) |
| 7 Construction | (42.91) |
| 8 Shipping operations | 50.10, 50.20 |
| 9 Ports | Part of 52.22, 52.24/1 |
| 10 Navigation and safety | Part of 52.22, (84.24) |
| 11 Cables | (35.12, 61.10) |
| 12 Business services | (64, 65, 69) |
| 13 Licence an rental | (68.2) |
| 14 R and D | (72) |
| 15 Environment | (74.90) |
| 16 Defence | (84.22) |
| 17 Leisure and recreation | 50.10, 77.34/1, (77.21, 79.11, 79.12, 93.29) |
| 18 Education | (85.4) |

* In brackets, the SIC codes that partially correspond to the marine economy.

Table 4

Kalaydjian et al's classification of marine sectors for France.

| Industrial sector | NAF 2003 codes* |
|--|--------------------------------------|
| 1 Coastal tourism | (highly diverse range of activities) |
| 2 Seafood sector | |
| Marine fisheries | 05.0A |
| Mariculture | 05.0C |
| Seaweed harvesting and processing | (24.5C) |
| Wholesale trade (1) | 51.3S |
| Processing | 15.2Z |
| 3 Shipbuilding | |
| Merchant vessels | 35.1B |
| Navy vessels | 35.1A |
| Marine equipment | (diverse range of activities) |
| Ship repair | 35.1C |
| Boat building | 35.1E |
| 4 Maritime and river transport | |
| Sea and coastal waterborne transport | 61.1A, 61.1B |
| Inland navigation | 61.2Z |
| Maritime insurance | (66) |
| Sea and river port services (2) | 63.2C |
| Port handling and stevedoring | 63.1A |
| Other harbour businesses | (diverse range of activities) |
| 5 Marine aggregate extraction (3) | (14.2A) |
| 6 Electricity generation | (40.1) |
| 7 Maritime civil engineering | (45.2R) |
| 8 Submarine cables | (31.3Z, 45.2F) |
| 9 Oil and gas offshore services | (45.2R, 11.2Z, 74.2C) |
| Non-commercial public sector | NAF 2003 codes |
| 10 Navy | (75.2C) |
| 11 Public intervention | (75) |
| 12 Coastal and marine environmental protection | (75) |
| 13 Civilian marine research | (75, 80.3) |

* In brackets, the SIC codes that partially correspond to the marine economy.

(1) Including fish auctions.

(2) Including port authorities and shipping agents.

(3) Extraction only: not including processing.

Table 5

The industries within the Irish marine sector in Morrissey et al.

| Marine services | Marine resources | Marine manufacturing |
|---------------------------------|---------------------------|-----------------------------|
| Shipping and maritime transport | Sea-fisheries | Boat Building |
| Water based tourism | Aquaculture | Marine construction |
| International Cruise | Seafood processing | Marine engineering |
| High-tech services | Seaweed and biotechnology | Other marine manufacturing |
| Marine commerce | Oil and gas | |
| Other marine services | Renewable energy | |

Table 6

Marine sectors in Spain according to Innovamar.

| Sectors | NACE Rev.1 Codes |
|--------------------------|--|
| 1 Fishing | 0501, 0502, 1520 |
| 2 Shipbuilding | 3511, 3512 |
| 3 Maritime Transport | 6110 |
| 4 Recreational sailing | 9262, (7122, 7140, 5114, 8041) |
| 5 Ports | (6311, 6312, 6322, 6340) |
| 6 Auxiliary Industry | (1752, 2430, 2710, 2811, 2911, 3162, 4524) |
| 7 Trade and Distribution | 5138, 5123, (5114) |
| 8 Insurance and Banking | (6603) |
| 9 Marine Research | (7310, 7320) |
| 10 Maritime Tourism | (6311, 6312, 6322, 6330, 6340) |
| 11 Other Activities | (7420, 7460, and others) |

* In brackets, the NACE Rev.1 codes that partially correspond to the marine economy.

Table 7

Maritime functions and core NACE Rev.2 sectors in ECORYS et al.

| Maritime function | Principal NACE Rev.2 sectors | NACE Rev.2 Code |
|--|---|------------------------|
| 1. Maritime trade and transport | Sea and coastal passenger water transport | 50.10 |
| | Sea and coastal freight water transport | 50.20 |
| | Inland passenger water transport | 50.30 |
| | Inland freight water transport | 50.40 |
| 2. Food, nutrition, health and eco-system services | Marine fishing | 03.11 |
| | Marine aquaculture | 03.21 |
| | Processing and preserving of fish, crustaceans and molluscs | 10.20 |
| | Retail sale of fish, crustaceans and molluscs in specialised stores | 47.23 |
| 3. Energy and Raw materials | Mining sectors | 06, 07, 08, 09 |
| | Energy production | 35 |
| 4. Leisure, working and living | Building of pleasure and sporting boats | 30.12 |
| | Hotel/accommodation sectors | 55 |
| 5. Coastal protection and nature development | None | |
| 6. Maritime monitoring and surveillance | None | |

| Contributes to functions | NACE sectors contributing to multiple functions (examples) | NACE Rev.2 Code |
|---------------------------------|---|------------------------|
| 1, 2, 3, 5 | Building of ships and floating structures | 30.11 |
| 1, 2, 3, 4, 5 | Repair and maintenance of ships and boats | 33.15 |
| 1, 2, 3, 4, 5 | Construction of water projects (partly non-maritime) | 42.91 |
| 1, 2, 3, 4, 5 | Renting and leasing of water transport equipment | 77.34 |

Table 8
Estimates of the marine economy in EU countries from some studies.

| Country, Zone | Author and year of publication | Date of data in study | % of GDP |
|----------------|--------------------------------|-----------------------|----------|
| United Kingdom | Pugh (2008) | 2004-2006 | 4.2% |
| France | Kalaydjian et al. (2010) | 2007 | 1.5%* |
| Ireland | Morrissey et al. (2011) | 2007 | 0.8%* |
| Spain | Innovamar (2011) | 2009 | 2.9% |
| EU | ECORYS et al. (2012) | 2008-2011 | 4.0%* |

* Approximate data calculated from the results of the studies indicated and from Eurostat information on the GDP at current prices on France and Ireland for the year 2007 and for the EU-25 for the year 2010.

Table 9
Classification of marine economy sectors and industries.

| Marine sector | Marine Industry | Marine activities |
|--------------------------|---|---|
| 1. Living Resources | 1.1. Fishing | Marine fishing |
| | 1.2. Aquaculture | Marine aquaculture |
| | 1.3. Seafood Processing | Processing and preserving of fish, crustaceans and molluscs. |
| | 1.4. Seafood Markets | Wholesale and Retail sale of fish, crustaceans and molluscs. |
| | 1.5. Animal production | Land-based catching of sea mammals |
| | 1.6. Other food products | From fish and marine mammals: Processing of meat, manufacture of oils and fats, prepared dishes and others. |
| 2. Non-Living Resources | 2.1. Oil & Gas Exploration and Production | Offshore extraction of crude petroleum, gas and support activities. |
| | 2.2. Mining of metal ores | Mining of metal ores from seabed and support activities. |
| | 2.3. Extraction of gravel and sand | Extraction and dredging from sea of industrial sand and gravel. |
| | 2.4. Extraction of salt | Salt production by evaporation of sea water. |
| | 2.5. Renewable energy | Production of electricity from renewable marine sources. |
| | 2.6. Water collection | Desalting of sea water to produce water. |
| | 2.7. Waste and decontamination | Collection of waste from ships and remediation activities in oceans and coastal areas. |
| 3. Ship & boat building | 3.1. Ship Building | Building of commercial vessels, warships, fishing boats, hovercraft, drilling platforms and floating structures. |
| | 3.2. Boat Building | Building of pleasure and sporting boats. |
| | 3.3. Repair and maintenance | Repair and maintenance of ships and boats. |
| | 3.4. Manufactures to shipbuilding | Sails, ropes, nets, containers, paints, varnishes, rubber and plastic products, glass fibres, iron and steel, tubes, pipes, metal products, tanks, communication equipment, instruments for navigation, lighting equipment, engines, etc. |
| | 3.5. Other manufactures and services | Sailboards, cork life preserves, repair and maintenance of machinery and equipments, sale of ships and boats, etc. |
| 4. Construction | 4.1. Marine construction | Construction of harbours, ports, waterways, locks, etc. |
| | 4.2. Marine related construction | Other marine constructions and support activities for marine constructions. |
| 5. Transportation | 5.1. Marine Passenger transportation | Transport of passengers over seas and coastal waters. |
| | 5.2. Marine Freight transportation | Transport of freight over seas and coastal waters. |
| | 5.3. Service activities to transportation | Terminal facilities, pilotage and berthing, lighterage, salvage and lighthouse activities, etc. |
| | 5.4. Other support activities to transportation | Warehousing in port areas, stevedoring, forwarders, marine transport insurance, patrol services in ports, cleaning of sea tankers, etc. |
| 6. Tourism & recreation | 6.1. Accommodation | Hotels, resort hotels, motels, camping grounds, etc. |
| | 6.2. Other tourism and recreational services | Food and beverage service, renting of pleasure boats, travel agencies, tour operators, marine sport clubs, water rides, etc. |
| 7. Public Administration | 7.1. Administration of the State | Customs at ports, marine-related programs, regulations of marine sectors, etc. |
| | 7.2. Provision of services | Marine foreign affairs, Navy, port police, coastguards, assistance in civic disasters, etc. |
| | 7.3. Social security | Compulsory social security programmes for marine activities. |
| 8. Education and R & D | 8.1. Education | Marine related technical education, higher education, sport instruction, etc. |
| | 8.2. Research & Development | Marine-related research and experimental development on natural, engineering, humanities and social sciences. |
| 9. Others | 9.1. Office support activities | Office support activities for marine enterprises, organization of marine events, etc. |
| | 9.2. Membership organisations | Marine-related chambers of commerce, professional associations, trade unions, ecological movements, etc. |
| | 9.3. Others n.e.c. | Other activities not elsewhere classified (n.e.c.). |

Table 10
Group 1 activities: Completely marine.

| Marine sector | Marine Industry | Marine activities in NACE Rev.2 | NACE Rev.2 Code |
|-------------------------|--------------------------------------|---|------------------------|
| 1. Living Resources | 1.1. Fishing | Marine fishing: Fishing and taking of marine fish, crustaceans, molluscs and other aquatic animals (whales, turtles, sea squirts, tunicates, sea urchins etc.), organisms and materials (natural pearls, sponges, coral and algae). | 03.11 |
| | 1.2. Aquaculture | Marine aquaculture: Culture or farming of aquatic organisms (fish, molluscs, crustaceans) in sea water, growing of laver and other edible seaweeds, and other activities in brackish waters, in tanks and reservoirs, fish hatcheries, etc. | 03.21 |
| | 1.3. Seafood Processing | Processing and preserving of fish, crustaceans and molluscs: Preparation and preservation of fish, crustaceans and molluscs (freezing, deep-freezing, drying, cooking, smoking, salting, immersing in brine, canning etc.), production of fish fillets, roes, caviar, caviar substitutes, fishmeal for human consumption or animal feed, processing of seaweed. | 10.20 |
| | 1.4. Seafood Markets | Wholesale of other food, including fish, crustaceans and molluscs: Wholesale of fish, crustaceans and molluscs for human consumption and feed for pet animals. Retail sale of fish, crustaceans and molluscs in specialised stores: Retail sale of fish, crustaceans and molluscs, other seafood and products thereof in specialised stores. | 46.38 47.23 |
| 3. Ship & Boat Building | 3.1. Ship Building | Building of ships and floating structures: Building of commercial vessels (passenger vessels, ferry boats, cargo ships, tankers, tugs etc.), warships, fishing boats, hovercraft, construction of drilling platforms (floating or submersible) and floating structures. | 30.11 |
| | 3.2. Boat Building | Building of pleasure and sporting boats: Manufacture of inflatable boats and rafts, building of sailboats, motor boats, recreation-type hovercraft, manufacture of other pleasure and sporting boats (canoes, kayaks, rowing boats, skiffs). | 30.12 |
| | 3.3. Repair and maintenance | Repair and maintenance of ships and boats: Repair and routine maintenance of ships (the rebuilding or overhaul of ships is classified in division 30) and repair and maintenance of pleasure boats. | 33.15 |
| 5. Transportation | 5.1. Marine Passenger transportation | Sea and coastal passenger water transport: Transport of passengers over seas and coastal waters (excursion, cruise or sightseeing boats, ferries, water taxis etc.) and renting of pleasure boats with crew. | 50.10 |
| | 5.2. Marine Freight transportation | Sea and coastal freight water transport: Transport of freight over seas and coastal waters (Included great lakes etc. when similar types of vessels are used), transport by towing or pushing of barges, oil rigs etc., and renting of vessels with crew. | 50.20 |

Table 11
Group 2 activities: Mainly marine.

| Marine Sector | Marine Industry | Marine Activities within NACE Rev.2 code | NACE Rev.2 Code |
|-------------------------|---|---|------------------------|
| 2. Non-Living Resources | 2.1. Oil & Gas Exploration and Production | Extraction of crude petroleum: Offshore extraction of crude petroleum oils, bituminous or oil shale and tar sand. | 06.10 |
| | | Extraction of natural gas: From marine resources, production of crude gaseous hydrocarbon (natural gas), extraction of condensates, draining and separation of liquid hydrocarbon fractions, gas desulphurisation. | 06.20 |
| | 2.3. Extraction of gravel and sand | Support activities for petroleum and natural gas extraction: Oil and gas extraction service activities provided on a fee or contract basis (exploration services, liquefaction and regasification of natural gas for purpose of transport, draining and pumping services, oil and gas field fire fighting services, etc). | 09.10 |
| | 2.4. Extraction of salt | Operation of gravel and sand pits; mining of clays and kaolin: Extraction and dredging from sea of industrial sand and gravel and crushing of gravel. | 08.12 |
| 4. Construction | 4.1. Marine Construction | Extraction of salt: Salt production by evaporation of sea water, crushing, purification and refining of salt by the producer. | 08.93 |
| 5. Transportation | 5.3. Service activities to transportation | Construction of water projects: Construction of waterways, harbour works, pleasure ports (marinas), locks, etc. | 42.91 |
| | | Service activities incidental to water transportation: Activities related to water transport of passengers, animals or freight (operation of terminal facilities such as harbours and piers, navigation, pilotage and berthing activities, lighterage, salvage activities, lighthouse activities). | 52.22 |
| | | Renting and leasing of water transport equipment: Renting and operational leasing of water-transport equipment without operator. | 77.34 |

Appendix

Table A.1

Group 3 activities (Partially Marine): Sector 1 Living resources.

| Marine Sector | Marine Industry | Marine Activities within NACE Rev.2 code | NACE Rev.2 Code |
|----------------------|--------------------------|---|------------------------|
| 1. Living Resources | 1.5. Animal production | Hunting, trapping and related service activities: Land-based catching of sea mammals such as walrus and seal. | 01.70 |
| | | Processing and preserving of meat: Slaughtering and processing of whales on land or on specialised vessels. | 10.11 |
| | 1.6. Other Food products | Manufacture of oils and fats: Extraction of fish and marine mammal oils. | 10.41 |
| | | Manufacture of prepared meals and dishes: Manufacture of fish dishes, including fish and chips | 10.85 |
| | | Manufacture of other food products n.e.c.: Manufacture of extracts and juices of fish, crustaceans or molluscs. | 10.89 |

Table A.2

Group 3 activities (Partially Marine): Sector 2 Non-Living resources.

| Marine Sector | Marine Industry | Marine Activities within NACE Rev.2 code | NACE Rev.2 Code | |
|--|---------------------------|--|---|-------|
| 1. Non-Living Resources | 2.2. Mining of metal ores | Mining of iron ores: Mining of iron ores from seabed and operations of crushing, grinding, washing and drying. | 07.10 | |
| | | Mining of uranium and thorium ores: Mining of uranium and thorium ores from seabed, concentration of such ores, and manufacture of yellowcake. | 07.21 | |
| | | Mining of other non-ferrous metal ores: Mining of other non-ferrous metal ores from seabed. | 07.29 | |
| | 2.5. Renewable energy | Support activities for other mining and quarrying: Support services on a fee or contract basis (exploration services, draining and pumping services, test drilling and test hole boring, etc). | 09.90 | |
| | | Production of electricity: Operation of generation facilities that produce electric energy from renewable marine sources. | 35.11 | |
| | | 2.6. Water collection | Water collection, treatment and supply: Desalting of sea water to produce water as the principal product of interest. | 36.00 |
| | | 2.7. Waste and decontamination | Collection of hazardous waste: Collection of waste from ships (used oil). | 38.12 |
| Remediation activities and other waste management services: Cleaning up oil spills and other pollutions on land, in surface water, in ocean and seas, including coastal areas. | 39.00 | | | |

Table A.3
Group 3 activities (Partially Marine): Sector 3 Ship & Boat Building.

| Marine Sector | Marine Industry | Marine Activities within NACE Rev.2 code | NACE Rev.2 Code |
|--|--|---|------------------------|
| 3. Ship & Boat Building | 3.4. Manufactures for shipbuilding | Manufacture of made-up textile articles, except apparel: Sails. | 13.92 |
| | | Manufacture of cordage, rope, twine and netting: Ropes, fishing nets, ships' fenders. | 13.94 |
| | | Manufacture of wood and of products of wood and cork: Plywood, veneers, wood containers, wood trusses, etc. | 16 |
| | | Manufacture of paints, varnishes and similar coatings, printing ink and mastics: Paints and varnishes, enamels or lacquers, caulking compounds, etc. | 20.30 |
| | | Manufacture of rubber and plastic products: Rubber products (wet suits and diving suits) and plastic products (tubes, pipes, bags, sacks, containers, boxes, tanks, reservoirs, etc). | 22 |
| | | Manufacture of glass fibres: Glass fibres, including glass wool and non-woven products thereof. | 23.14 |
| | | Manufacture of basic metals: Manufacture of basic iron and steel and of ferro-alloys, manufacture of tubes, pipes, hollow profiles and related fittings, etc. | 24 |
| | | Manufacture of fabricated metal products, except machinery and equipment: Structural metal products, tanks, central heating, etc. | 25 |
| | | Manufacture of communication equipment: Radio broadcast, wireless communications equipment. | 26.30 |
| | | Manufacture of instruments and appliances for measuring, testing and navigation: Manufacturing of search, detection, navigation, guidance, nautical systems and instruments. | 26.51 |
| | Manufacture of electric lighting equipment: Lighting equipment for boats. | 27.40 | |
| | Manufacture of engines and turbines, except aircraft, vehicle and cycle engines: Marine engines. | 28.11 | |
| | 3.5. Other manufactures and services | Manufacture of sports goods: Sailboards, surfboards and requisites for sport fishing. | 32.30 |
| | | Other manufacturing n.e.c.: Cork life preservers. | 32.99 |
| | | Repair of fabricated metal products: Repair and maintenance of parts for marine or power boilers. | 33.11 |
| | | Repair of machinery: Repair and maintenance of industrial machinery and equipment. | 33.12 |
| | | Repair of electrical equipment: Repair and maintenance of transformers, electric motors, generators, motor generator sets, etc. | 33.14 |
| Repair of other equipment: Repair of fishing nets, including mending. | | 33.19 | |
| Installation of industrial machinery and equipment: Specialised installation of machinery. | | 33.20 | |
| Dismantling of wrecks: Dismantling of wrecks of ships for materials recovery. | 38.31 | | |
| Agents involved in the sale of machinery, industrial equipment, ships and aircraft: Agents involved in the sale of ships and aircraft. | 46.14 | | |

Table A.4
Group 3 activities (Partially Marine): Sector 4 Construction.

| Marine Sector | Marine Industry | Marine Activities within NACE Rev.2 code | NACE Rev.2 Code |
|----------------------|----------------------------------|---|------------------------|
| 4. Construction | 4.2. Marine Related Construction | Construction of utility projects for fluids: Long-distance pipelines (oil and gas) at sea and related structures. | 42.21 |
| | | Site preparation: Earth moving for harbour construction. | 43.12 |
| | | Test drilling and boring: Test drilling, test boring and core sampling for harbour construction. | 43.13 |
| | | Electrical installation: Installation of electrical systems and port lighting. | 43.21 |
| | | Joinery installation: Joinery installation at ships. | 43.32 |
| | | Other specialised construction activities n.e.c.: Pile driving, water proofing works, subsurface work, etc. | 43.99 |
| | | Engineering activities and related technical consultancy: Engineering design and consulting activities for hydraulic engineering, geodetic surveying activities, etc. | 71.12 |

Table A.5

Group 3 activities (Partially Marine): Sector 5 Transport.

| Marine Sector | Marine Industry | Marine Activities within NACE Rev.2 code | NACE Rev.2 Code |
|----------------------|--|---|------------------------|
| 5. Transportation | 5.4. Support activities for transportation | Warehousing and storage: Operation of storage and warehouse facilities in port areas. | 52.10 |
| | | Cargo handling: Loading and unloading of goods or passengers' luggage, stevedoring. | 52.24 |
| | | Other transportation support activities: Arranging or organising of transport operations by sea, activities of sea-freight forwarders, etc. | 52.29 |
| | | Non-life insurance: Ship insurance, marine transport insurance. | 65.12 |
| | | Reinsurance: Activities of assuming all or part of the risk associated with existing insurance policies (Ship and marine transport). | 65.20 |
| | | Private security activities: Guard and patrol services in port areas and marinas. | 80.10 |
| | | Security systems service activities: Electronic security alarm systems in port areas. | 80.20 |
| | | Other building and industrial cleaning activities: Activities of exterior cleaning of port buildings. | 81.22 |
| | | Other cleaning activities: Cleaning of the inside of sea tankers. | 81.29 |
| | | Landscape service activities: Parks and gardens for ports. | 81.30 |

Table A.6

Group 3 Group 3 activities (Partially Marine): Sector 6 Tourism and Recreation.

| Marine Sector | Marine Industry | Marine Activities within NACE Rev.2 code | NACE Rev.2 Code |
|-------------------------|--|---|------------------------|
| 6. Tourism & Recreation | 6.1. Accommodation | Hotels and similar accommodation: Accommodation provided by hotels, resort hotels, apartment hotels and motels. | 55.10 |
| | | Holiday and other short-stay accommodation: Accommodation provided for children and other holiday homes, bungalows, youth hostels, etc. | 55.20 |
| | | Camping grounds, recreational vehicle parks and trailer parks: Accommodation in campgrounds, trailer parks, recreational camps and fishing camps for short stay visitors. | 55.30 |
| | | Other accommodation: In single or shared rooms or dormitories for students, migrant (seasonal) workers and other individuals. | 55.90 |
| | | Food and beverage service activities: providing complete meals or drinks fit for immediate consumption. | 56 |
| | 6.2. Other tourism and recreational services | Renting and leasing of recreational and sports goods: Renting of pleasure boats, canoes, sailboats, beach chairs and umbrellas. | 77.21 |
| | | Travel agency activities: Activities of agencies, primarily engaged in selling travel, tour, transportation and accommodation services. | 79.11 |
| | | Tour operator activities: Arranging and assembling tours. | 79.12 |
| | | Other reservation service and related activities. | 79.90 |
| | | Museums activities: Operation of museums of marine issues. | 91.02 |
| | | Botanical and zoological gardens and nature reserves activities: Operation of marine reserves, including wildlife preservation. | 91.04 |
| | | Activities of sport clubs: Operation of marine sports clubs. | 93.12 |
| | | Other sports activities: Support activities for sport or recreational fishing. | 93.19 |
| | | Activities of amusement parks and theme parks: Water rides. | 93.21 |
| | | Other amusement and recreation activities: Marinas, activities of beaches, including renting of facilities such as bathhouses, lockers, chairs etc. | 93.29 |

Table A.7

Group 3 activities (Partially Marine): Sector 7 Public Administration.

| Marine Sector | Marine Industry | Marine Activities within NACE Rev.2 code | NACE Rev.2 Code |
|--------------------------|----------------------------------|---|--|
| 7. Public Administration | 7.1. Administration of the State | General public administration activities: Customs administration at ports. | 84.11 |
| | | Regulation of the activities of providing health care, education, cultural services and other social services, excluding social security: Public administration of marine-related programmes aimed to increase personal well-being. | 84.12 |
| | | Regulation of and contribution to more efficient operation of businesses: Public administration and regulation of marine sectors. | 84.13 |
| | 7.2. Provision of services | Foreign affairs: Administration and operation of marine foreign affairs. | 84.21 |
| | | Defence activities: Navy. | 84.22 |
| | | Public order and safety activities: Auxiliary police forces of port, border, coastguards. | 84.24 |
| | | Fire service activities: Assistance in civic disasters. | 84.25 |
| | | 7.3. Social security | Compulsory social security activities: Funding and administration of government-provided social security programmes. |

Table A.8

Group 3 activities (Partially Marine): Sector 8 Education and R+D.

| Marine Sector | Marine Industry | Marine Activities within NACE Rev.2 code | NACE Rev.2 Code |
|------------------------|-----------------------------|---|-----------------|
| 8. Education and R & D | 8.1. Education | Technical and vocational secondary education: Education below the level of higher education (for fishermen, crew, etc). | 85.32 |
| | | Tertiary education: Higher education in marine issues. | 85.42 |
| | | Sports and recreation education: Sports instruction (rowing, canoeing, fishing, etc.). | 85.51 |
| | | Driving school activities: Sailing, shipping schools not issuing commercial certificates and permits. | 85.53 |
| | 8.2. Research & Development | Other research and experimental development on natural sciences and engineering: Marine related activities. | 72.19 |
| | | Research and experimental development on social sciences and humanities: Marine related activities. | 72.20 |

Table A.9

Group 3 activities (Partially Marine): Sector 9 Others.

| Marine Sector | Marine Industry | Marine Activities within NACE Rev.2 code | NACE Rev.2 Code | |
|---------------|--------------------------------|---|---|--|
| 9. Others | 9.1. Office support activities | Combined office administrative service activities: Provision of a combination of day-to-day office administrative services for marine enterprises. | 82.11 | |
| | | Organisation of conventions and trade shows: Organisation, promotion and/or management of marine events. | 82.30 | |
| | 9.2. Membership organisations | Activities of business and employers membership organisations: Activities of organisations (business organizations related to marine activities), activities of chambers of commerce, guilds and similar organisations. | 94.11 | |
| | | Activities of professional membership organisations: Professional associations of merchant seamen, of graduates in marine science, marine biologists, etc. | 94.12 | |
| | | Activities of trade unions: Related with marine sectors. | 94.20 | |
| | | Activities of other membership organisations: Environmental and ecological movements, cultural associations, etc. | 94.99 | |
| | | 9.3. Others n.e.c. | Other activities not elsewhere classified (n.e.c.). | |