OCEAN SATELLITE ACCOUNT 2016-2018:
METHODOLOGY AND DECISION-MAKING SUPPORT

Department of National Accounts
Unit for Satellite Accounts and Quality Assessment of the National Accounts
Statistics Portugal

Department of Strategy
Unit for Monitoring
Directorate-General for Maritime Policy

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Preface/Acknowledgments

The Ocean Satellite Account (OSA), for 2016-2018 is the second edition of the satellite account for Portugal, following a pilot project "Satellite Account for the Sea" described in a previous Methodological Report for 2010-2013.

The account is to be published every three years, according to national regulation (Resolution of the Council of Ministers No. 99/2017 of July 10).

This edition has two main innovations: a disaggregation at NUTS 1 level, with results for the Autonomous Regions (Azores and Madeira) and the evaluation of indirect effects of the ocean economy on the national economy, applying the Integrated System of Symmetric Input-Output Matrices of 2017.

The coordination was made by Statistics Portugal (INE)' Unit for Satellite Accounts and Quality Assessment of the National Accounts with a strong support of the Regional Directorate of Statistics of Madeira (DREM) and Statistics Azores (SREA) in articulation with Directorate General for Maritime Policy (DGPM):

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1 Introduction

The Ocean Satellite Account (OSA) is a second exercise for the Portuguese Economy, released in November 2020, following a first pilot-project that has been accomplished in May 2016. The first exercise followed a protocol signed by Statistics Portugal (INE) and the Directorate-General for Maritime Policy (DGPM), while the second one is already a statistical product integrating the Portuguese Official Statistics (OSA are to be released every three years, under a national regulation: Resolution of the Council of Ministers No. 99/2017 of July 10).

Satellite Accounts are extensions of the central system of accounts, with additional information. They intend to increase the capacity of observation of particular phenomena, constituting extensions in greater detail of National Accounts (NA), which are the economic overview statistics, par excellence.

In this context, the drawing up of an OSA was considered the most appropriate instrument to estimate the dimension and the importance of the ocean economy in the whole economy, as well as to provide information on the production structure of the economic activities related to the ocean. The spreading of the methodology would have the advantage of allowing the comparison among countries, within the international central system of accounts.

The OSA, in its compilation process, used:

- The principles underlying the NA, such as the activities, classifications, criterion of residence and accounting rules
- The experiences from other studies (national and international), that are considered good practices
- The experience of other satellite accounts in several areas (e.g., tourism, health, social economy, culture and sports satellite accounts, also produced by the Unit for Satellite Accounts and Quality Assessment of the National Accounts).

OSA' primary objectives are: i) to measure the relevance of the ocean economy; ii) to support decision making regarding the coordination of public policies for the ocean; iii) to monitor the National Ocean Strategy 2013-2020 (NOS 2013-2020) and National Ocean Strategy 2021-2030 (NOS 2021-2030) in its economic component, giving support to the Inter-Ministerial Commission for Maritime Affairs (ICMA). It will also provide reliable and adequate information for Portugal in the context of the Integrated Maritime Policy (IMP) and other processes where data for the Ocean economy is decisive.

This document constitutes a methodological report since it provides detailed information on the process of building the OSA, namely the concepts, the nomenclature, the description of the general methodology regarding data compilation, the data sources used and the assumptions made during that process. It also includes a description of the application of the OSA in several policies and decision-making support under the National Ocean Strategy.

The fundamental methodological references of OSA were the manual of the European System of Accounts (ESA 2010) and the first Portuguese Methodological Report on the Satellite Account for the Sea 2010-2013 (SAS 2010-2013).

The following ocean observation levels were defined:

1) Characteristic activities (those where an important part of operations is on the ocean or which products come or are intended to be used in the ocean or in the coastal boarders)
2) Crosscutting activities (support activities to the other activities assumed for the OSA, corresponding to maritime equipment and maritime services)
3) Activities favoured by the proximity of the ocean (coastal tourism).

In addition, 9 groups of activities were determined, following a value chain rationale. (Figure 1).

The main uses and resources of the ocean products were also analysed.

In this edition the regional disaggregation was detailed at NUTS 1 level, encompassing three regions: Mainland Portugal, Autonomous Region of Azores and Autonomous Region of Madeira (Figure 1).

Figure 1 – Regional disaggregation by NUTS 1

Source: Statistics Portugal

For years 2016 and 2017, an average of 52,589 KAU (kind of activity unit) have been selected for Portugal, classified according to the defined nine groups of activities, as well as institutional sectors (Portuguese National Accounts perspective) within each grouping. 3,586 KAU were in the Autonomous Region of Madeira and 3,285 KAU in the Autonomous Region of Azores.

A Supply and Use Table for the Ocean was built for the years 2016 to 2018, presenting results for the following variables at the national level, by groups and by institutional sector:

- Output
- Intermediate Consumption
- Gross Value Added
- Gross Operating Surplus
- Compensation of Employees
- Other Subsidies on Production
- Other Taxes on Production

- Gross Fixed Capital Formation
- Imports and Exports of Goods and Services
- Final consumption expenditure (Households, Non-Profit Institutions Serving Households and Public Administration)

Additionally, estimates were also made for Employment (full time equivalent).

The OSA 2016-2018 edition has been improved when compared with the first edition, SAS 2010-2013, with the inclusion of regional results for NUTS I regarding the Autonomous Regions (Azores and Madeira), as well as the calculation of indirect effects on the economy, applying the Integrated System of Symmetric Input-Output Matrices of 2017.

The main results were disclosed on November 16, 2020, and are available online:

1) Press Release

(https://www.ine.pt/xportal/xmain?xpid=INE&xpgid=ine_destaques&DESTAQUESdest_boui=459804030&DESTAQUESmodo=2)

2) Infographic:

(https://www.ine.pt/xportal/xmain?xpgid=ine_inst_infografia&INST=464161214&xpid=INE)

3) Tables

(https://www.ine.pt/xportal/xmain?xpid=INE&xpgid=ine_destaques&DESTAQUESdest_boui=459804030&DESTAQUESmodo=2)

Portugal - https://www.ine.pt/xportal/xmain?xpid=INE&xpgid=cn_quadros&boui=391708850

Autonomous Region of Azores - https://www.ine.pt/xportal/xmain?xpid=INE&xpgid=cn_quadros&boui=391709151

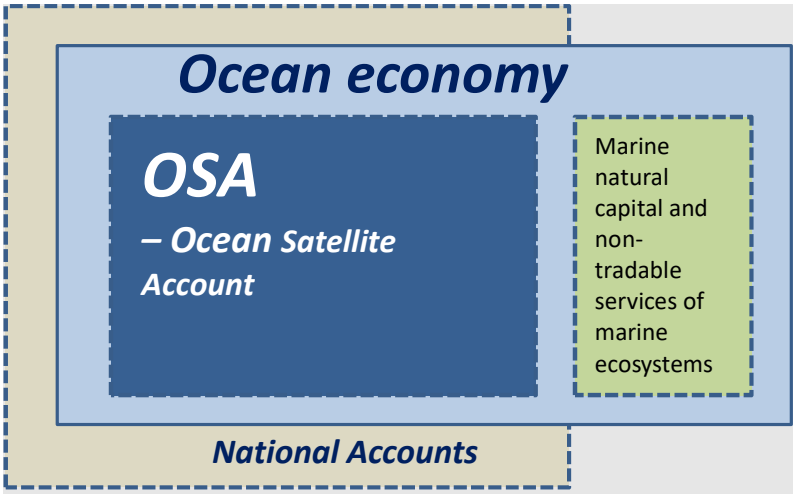
Autonomous Region of Madeira - https://www.ine.pt/xportal/xmain?xpid=INE&xpgid=cn_quadros&boui=391709437

2 Definitions and scope

2.1 Ocean conceptual definition

The following conceptual definition of ocean economy was adopted: "*Economic activities that take place at the ocean and others that are not taking place at the ocean but depend on it, including marine natural capital and non-tradable services of marine ecosystems*". However, marine natural capital and non-tradable services of marine ecosystems were not considered in the OSA, since they are not included in the production boundary of NA as defined in ESA 2010 (Figure 2).

Figure 2 - The ocean economy conceptual definition



Source: Statistics Portugal and Directorate General for Maritime Policy

The economic activities that take place at the ocean are, for example, maritime transport, fisheries and marine aquaculture, bioprospecting, research and exploration of non-living marine resources, marine tourism, marine equipment operation - namely Technologies communication and information Electronics (ICTE) maritime and submarine equipment - and services, such as marine information and communication services.

Among the economic activities that depend on the ocean, but do not take place at the ocean, the following groups are distinguished:

- The activities that directly depend on the enjoyment of goods and services of marine ecosystems (e.g., coastal tourism)
- The activities that provide goods and/or specific services to the activities that take place at the ocean (e.g., ports and logistics, construction, maintenance and ship repair, ship

dismantling, construction and marine equipment maintenance and maritime services on land)

- The activities belonging to certain functional chain values, which can hardly be separated, and that influence, directly, the activities that take place at the ocean. In this situation are the value chain centered on fish (e.g., aquaculture in inland waters, as it uses the same fish distribution channels), the shipping value chain focused on water vessel (e.g., transport on inland waterways, river cruises, where there is no differentiation in the production of vessels), and nautical tourism value chain (covering namely the maritime tourism companies operating in water).

The remaining activities, which do not operate or not depend on the ocean, represent the rest of the economy.

The definition of the ocean economy considers the economic activities that use the ocean, directly or indirectly, focusing on the value chain in which they operate, covering both activities that are located in the maritime area, as others located in coastal areas and also in remote areas of the coast, if related to the ocean. In this context, the economic value of production and consumption of "maritime" goods and services will depend on the set of productive activities defined in the scope of this account, as activities related directly or indirectly to the ocean. Activities that cannot be "measured" under the Portuguese System of National Accounts aggregates were not considered in the OSA context.

The activities or goods and services (products) related to the ocean economy are fundamentally identified as those who meet, simultaneously, the following conditions:

- Activities and/or goods and services that, in the absence of the ocean, would cease to exist in significant quantities, or their consumption would be significantly reduced
- Existence of statistical information available, or which can be obtained.

It is worth mentioning, once more, that the OSA construction is made within the Portuguese National Accounts (PNA) framework, where the main concepts involved in building a satellite account have their origin, in general, in the ESA 2010. Thus, the ocean economy does not integrate the non-tradable services of marine ecosystems, as these are not included in the production boundary defined by ESA 2010.

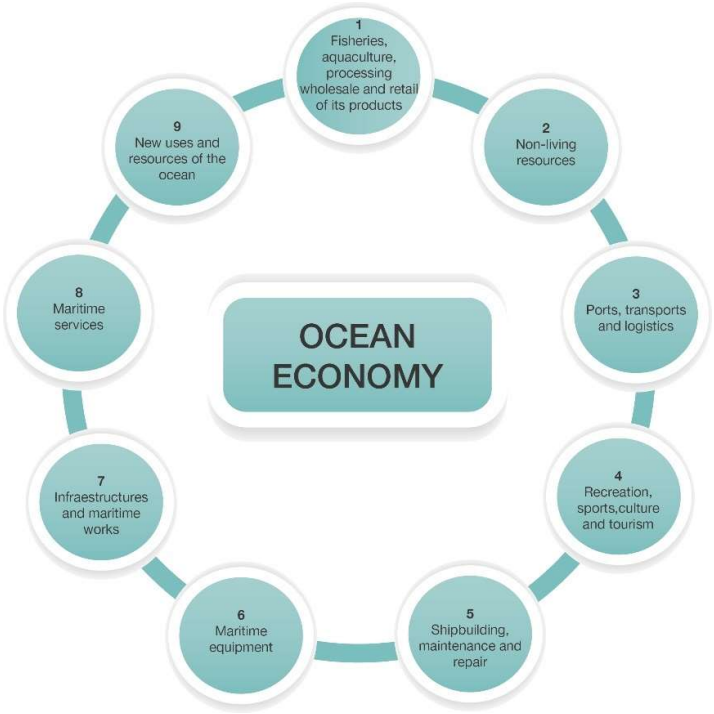
The compilation of OSA started with the transposition of the maritime economy definition for statistical language, specifically the identification of activities and ocean products in the official classifications in use. The delimitation and characterization of the reference population of the OSA, inventorying the KAU and proceeding to their classification, was conducted by Economic activity (Portuguese Classification of Economic Activities - CAE Rev. 3, equivalent to NACE

Rev.2) and by groups of activities, according to a specific classification designed by Statistics Portugal and DGPM, for the first exercise.

2.1.1 Scope by group

The scope of the ocean economy, considered in the OSA, aggregates activities in two main areas: "Established Activities" and "Emerging activities" which, in turn, are divided into groups. There were considered nine groups, eight of which correspond to established activities (groups 1 to 8) and the last group 9 - New uses and resources of the ocean, which congregates emerging activities (Figure 3). The adopted criterion for the classification of economic activities as established or emerging obeyed the international logic of maturity level of the markets, namely what was followed in the EU, in the study "Blue Growth", for the purpose of international comparisons.

Figure 3 - Groups considered in OSA



Source: Statistics Portugal and Directorate General for Maritime Policy

It was adopted a value chain logic, considering, inter alia, the level of industry disaggregation permitted by the National Statistical System (NSS). Given this restriction, the methodological option was to consider Maritime and Marine Equipment Services as independent groups, containing cross economic activities to other groups (Table 1).

Table 1 - Groups of economic activities for the ocean economy in OSA

Groups	Activities	
	That operate on the Ocean	That do not operate at the ocean but depend on it*
ESTABLISHED ACTIVITIES		
1. Fisheries, aquaculture, processing, wholesale and retail of its products	Sea fishing	Inland fishing
	Marine aquaculture	Inland aquaculture
	Aquaculture in inland waters	
	Processing industry	
	Processing of fishery and aquaculture products	
		Marketing of fishery and aquaculture products
2. Non-living marine resources	Research marine mineral resources	Sea salt extraction and refining
	Research of conventional energy resources (oil and gas)	
	Exploitation of marine mineral resources	
	Operation of conventional energy resources	
	Capture and water desalination	
3. Ports, transports and logistics	Maritime freight transport	Inland freight transport
	Transport of passengers by ferry	
	Cruises	
	Ports and logistics	
4. Recreation, sports, culture and tourism	Boating (recreational and sport)	
	Cultural activities (eg heritage, shows, events related to the sea)	
		Coastal tourism (ex .: sun / beach)
		Imputed rents (second homes)
5. Shipbuilding, maintenance and repair	Shipbuilding	
	Naval maintenance and repair	
		Naval dismantling
6. Maritime equipment**		Machinery and marine equipment
	Submarine cables and pipelines	
	Ocean Information Technology, Communication and Electronics (ICTE)	
	Maritime robotics	
	Other equipment (e.g. textiles, clothing, packaging, etc.)	
7. Infrastructures and maritime works	Coastal defense works	
	Port infrastructure	
8. Maritime services**	Education and R & D	
	Governance	
	Maritime information and communication services	
		Consulting and services to companies in the areas of the sea
		Financing and marine insurance
	Other services	
EMERGING ACTIVITIES		
9. New uses and resources of the ocean	Marine biotechnology	
	Unconventional energy resources (gas hydrates)	
	Marine renewables	
	Gas storage	
	Earth observation services	

Note: * Or another aquatic environment.
** Encompass transversal uses and activities to other groups.

Legend: Areas of Intervention
- Living resources
- Non-living resources
- Infrastructure, uses and industrial activities
- Infrastructure, uses and services activities
- Governance activities

Source: Statistics Portugal and Directorate General for Maritime Policy

Groups:

1 - **Fisheries, aquaculture, processing, wholesale and retail of its products** - includes activities related to the value chain of fishery and aquaculture products. The core activities include Fisheries and Aquaculture, with connections upstream to the food industries for animals, such as aquaculture, and downstream with the transformation industry, such as processing and preserving of fish, crustaceans and mollusks. It also includes the production of ice, cold storage and trade, wholesale and retail trade, of fishery and aquaculture products.

2 - **Non-living marine resources** - includes activities related to the research and exploitation of conventional energy resources (oil and gas), to the research and exploitation of marine minerals and with the extraction and refining of salt and production of condiments derived from it. It also includes the desalination of ocean water.

3 - **Ports, transports and logistics** - includes activities related to the water transportation value chain, whose main activity is the shipping of goods and passengers. Downstream includes port services and rental of maritime and inland waterway transports and the river transport of goods and passengers.

4 - **Recreation, sports, culture and tourism** - includes the maritime activity of recreation and sport, the maritime dimension of culture and maritime and coastal tourism, including maritime touristic activities operating in water. This group includes the activities related to boating, which are considered recreational boating and nautical sports. Coastal tourism includes housing, imputed rents of second homes, real state promotion of tourist accommodation, restaurants, travel agencies and associated recreational activities and leisure, including the related cultural activities, like the activities considered in the Tourism Satellite Account (but only the ones taking place in coastal areas).

5 - **Shipbuilding, maintenance and repai**r - comprises construction activities of ships and floating platforms, including pleasure and sport boats, as well as the repair and maintenance activities of boats and their dismantling of end-of-life vessels.

6 - **Maritime equipment** - comprises diverse manufacturing activities such as, for example, the ones allowing equipping a vessel or a floating platform. It is a heterogeneous group, dedicated primarily to building and repair of relevant equipment for the other activities of the ocean economy. It was decided, therefore, to bring together in one group all the activities identified in the manufacturing industry with the production/repair of marine equipment of support for most of the activities of the other groups.

7 - **Infrastructure and maritime works** - includes activities related to construction works and expansion of port terminals in order to develop maritime and land accessibility conditions, namely land corridors for the transport of goods by rail (associated with shipping, by connecting the rail

to the main interchanges of intermodal transport). It also includes the construction and repair of ports, marinas, as well as dredging, protection and coastal defense, etc.

8 - **Maritime services** - includes, as the name indicates, the service activities related to the ocean. Includes education, training and R&D in areas related to the ocean, governance activities, such as defense and maritime security and maritime spatial planning, and a large subgroup of other service activities encompassing maritime information and communication services, consulting and business services in the ocean areas, maritime finance and insurance, trade and distribution activities related to the ocean and others.

9 - **New uses and resources of the ocean** - this group was established in order to quantify a set of emerging activities, yet with little economic importance, which would, otherwise, be "diluted" in other activities. The relevance of this isolated group was evaluated during the work. Includes the marine biotechnology; marine renewable energies; gases storage; research and exploitation of unconventional energy resources (gas hydrates) and the services of earth observation.

2.1.2 Underlying value chain rationale

The proposed concept/definition for the OSA' ocean economy was based on desk research made at several levels:

- Statistics Portugal: Metadata; Transport Statistics, Fisheries Statistics, Tourism Satellite Account (TSA), NA, etc.
- International statistics institutions (Organization for Economic Cooperation and Development (OECD), EUROSTAT, EC/DGMARE)
- DGPM: NOS 2013-2020 and NOS 2021-2030
- Other international institutions: several studies on the ocean economy in several countries.

In this context, the ocean economy aims to study the production and consumption of goods and services related to economic activities that use, directly and/or indirectly, the ocean.

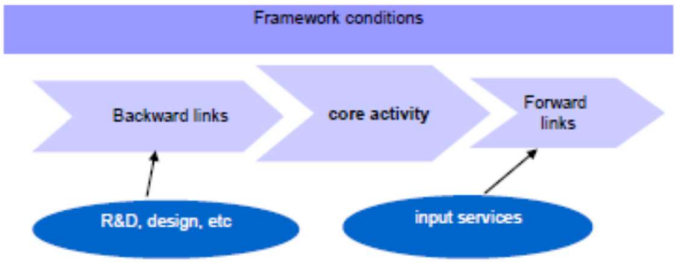
The European public policies for the ocean were also considered, notably Blue Growth[1]. These policies generally adopt a value chain rationale, at the expense of a sectorial logic, analyzing, in an integrated manner, the potential of a smart, sustainable and inclusive development.

This value chain rationale has advantages, as focusing on selected functions (food/nutrition, energy, materials, transportation, health and well-being, safety, etc.), allows the evaluation of these functions across sectors that are part of the value chain and identifies where synergies and

[1] ECORYS *et al* (2012), Blue Growth Study - Scenarios and drivers for Sustainable Growth from the Oceans, Seas and Coasts, August 2012 (Client: DGMARE)

risks can occur. The generic example of a value chain analysis is presented in the Blue Growth[1]. The analysis also considers the framework conditions that provide the context for the development of maritime activities and can be influenced by public policies (Figure 4).

Figure 4 - The value chain analysis in Blue Growth



Source: ECORYS *et al* (2012), Blue Growth Study - Scenarios and drivers for Sustainable Growth from the Oceans, Seas and Coasts, August 2012 (Client: DG MARE), page 14

In the context of the OSA, the value chain rationale is a concept that was taken into consideration, since it allows to articulate the central activity (core) of the ocean economy with the upstream activities (backward links) as well as with the downstream (forward links), detecting the synergies and risks and the influence of the framework or surrounding conditions through public policy proposals.

In a previous SAS 2010-2013 value chains by group were analyzed. The number and the designation of the functions considered are synthetized in Table 2. They follow the criteria of the basic needs for the human-beings satisfaction and for the planet earth preservation.

Table 2 - Functions considered in OSA

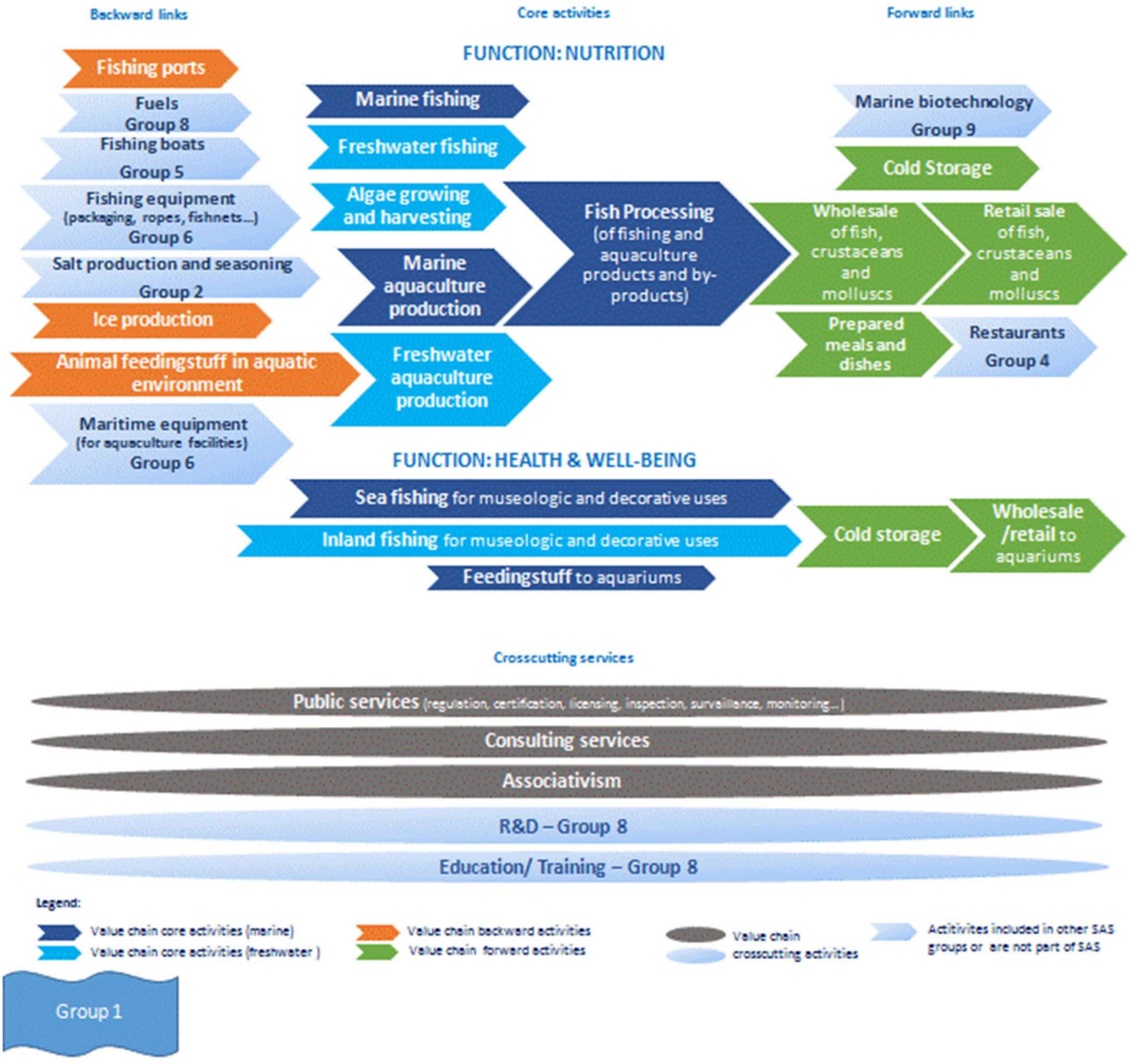
Function	Group
Energy	2, 9
Environment	7, 8, 9
Health & well-being	1, 4, 9
Knowledge	8, 9
Materials & artefacts	2, 5, 6, 9
Nutrition	1, 2, 9
Regulation	8
Safety	6, 7, 8, 9
Services supply	3, 8
Transportation	3, 4, 7
Water	2

The value chains considered for the Groups 1 to 9 are detailed ahead.

2.1.2.1 Fisheries, aquaculture, processing, wholesale and retail of its products

The approach to the value chain concept covers the activities integrated in the value chain of fishery and aquaculture products, from the resource catching or production to their wholesale and retail. These are important activities to fulfill human race nutrition and health & well-being functions (Figure 5).

Figure 5 - OSA value chain for group 1 – Fisheries, aquaculture, processing, wholesale and retail of its products

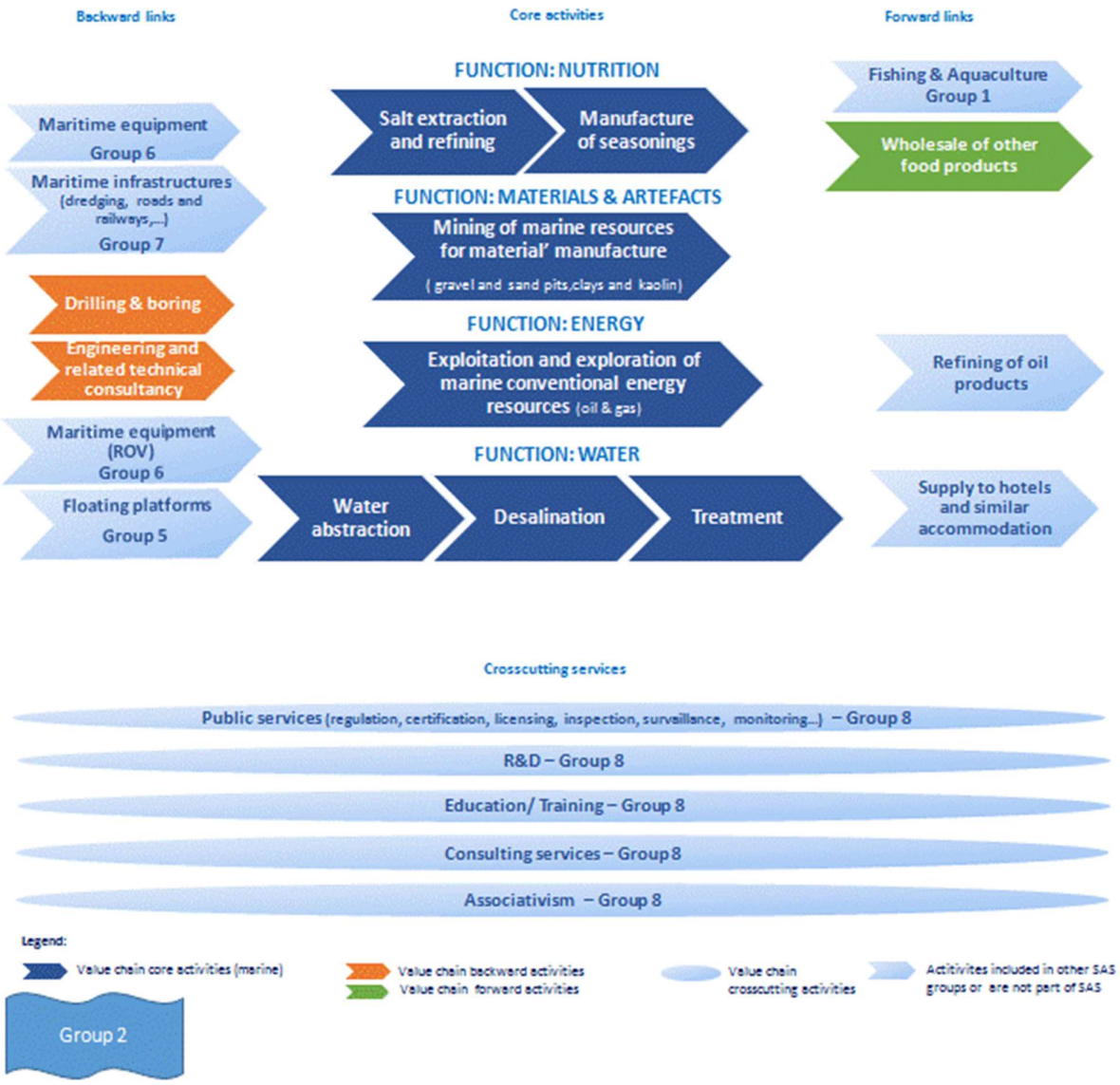


Source: Statistics Portugal and Directorate General for Maritime Policy

2.1.2.2 Non-living marine resources

The value chain for this group includes activities related to the prospecting, exploration, development and production of conventional energy resources (oil and gas), mining of marine minerals and extraction and refining of salt and condiments/seasonings production thereof. It also includes the desalination of seawater. This group's activities contribute to several functions: nutrition, energy, water and materials & artifacts (Figure 6).

Figure 6 - OSA value chain for group 2 - Non-living resources

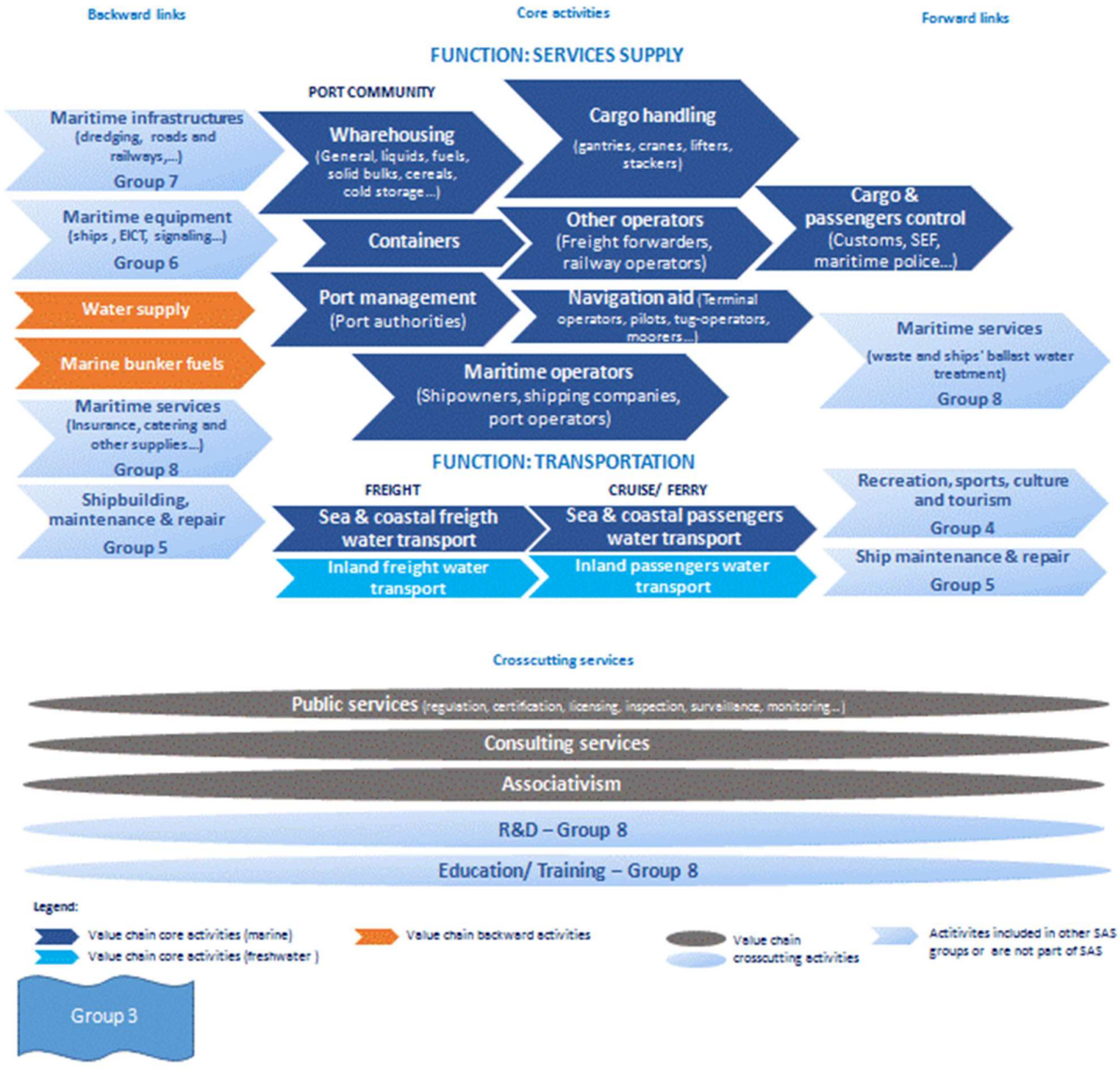


Source: Statistics Portugal and Directorate General for Maritime Policy

2.1.2.3 Ports, transports and logistics

Group 3 includes activities related to the transportation value chain by water, whose main activity is the shipping of goods and passengers. It comprises all the operations done by the port community and contributes to transportation and services supply functions (Figure 7).

Figure 7 - OSA value chain for group 3 - Ports, transports and logistics

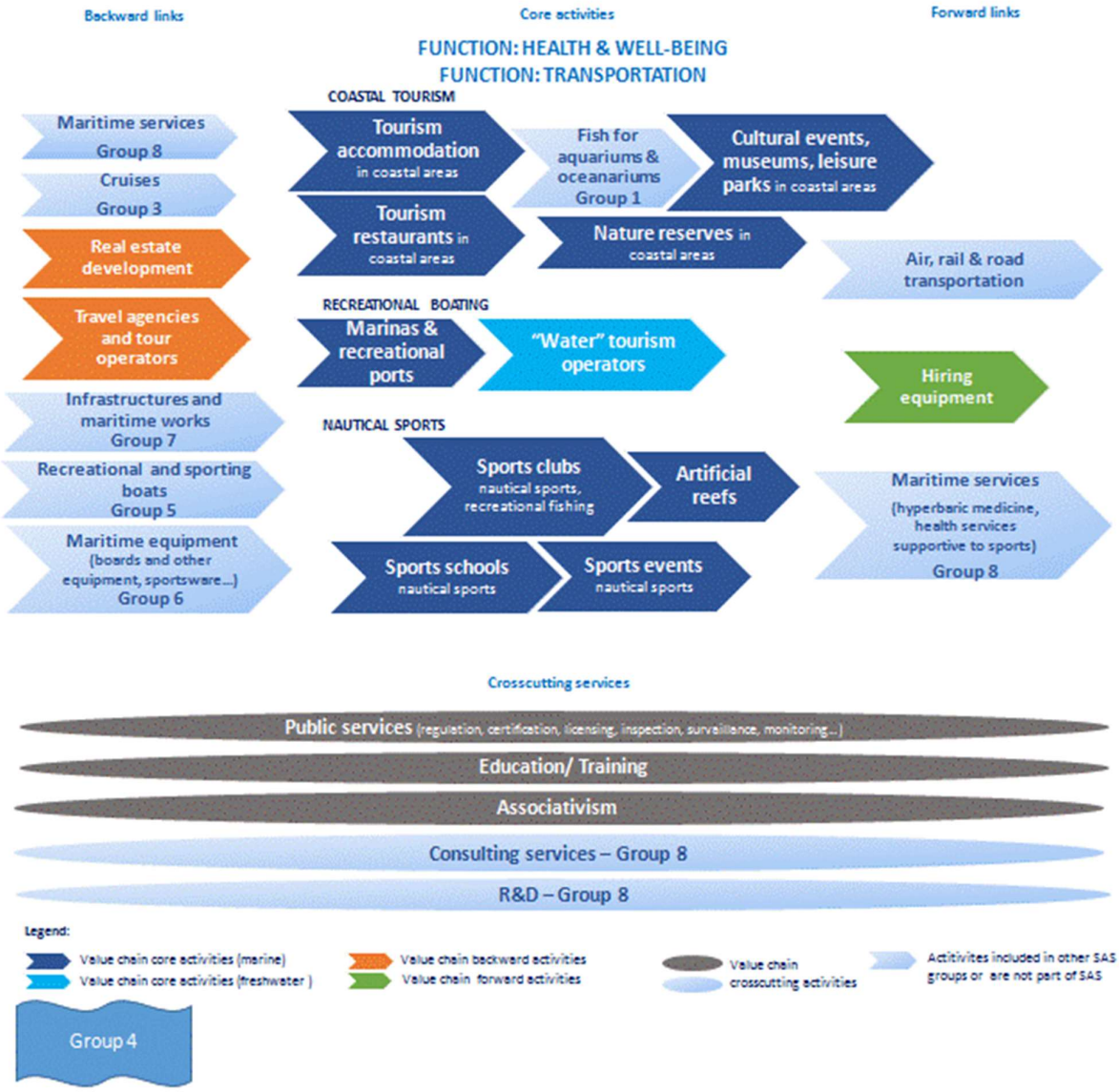


Source: Statistics Portugal and Directorate General for Maritime Policy

2.1.2.4 Recreation, sports, culture and tourism

This group's value chain comprises the activities to boating, which are considered recreational boating and nautical sports, maritime culture and maritime and coastal tourism, including "water" touristic operators. Coastal tourism includes housing, property development of tourist accommodation, catering activities, travel agencies and recreational activities and leisure associates, including the related cultural activities, like the activities considered in the Tourism Satellite Account, only in coastal areas. The nautical sports schools and other entities that provide water sports training are included. These activities contribute to health & well-being, as well as to transportation functions (Figure 8).

Figure 8 - OSA value chain for group 4 – Recreation, sports, culture and tourism

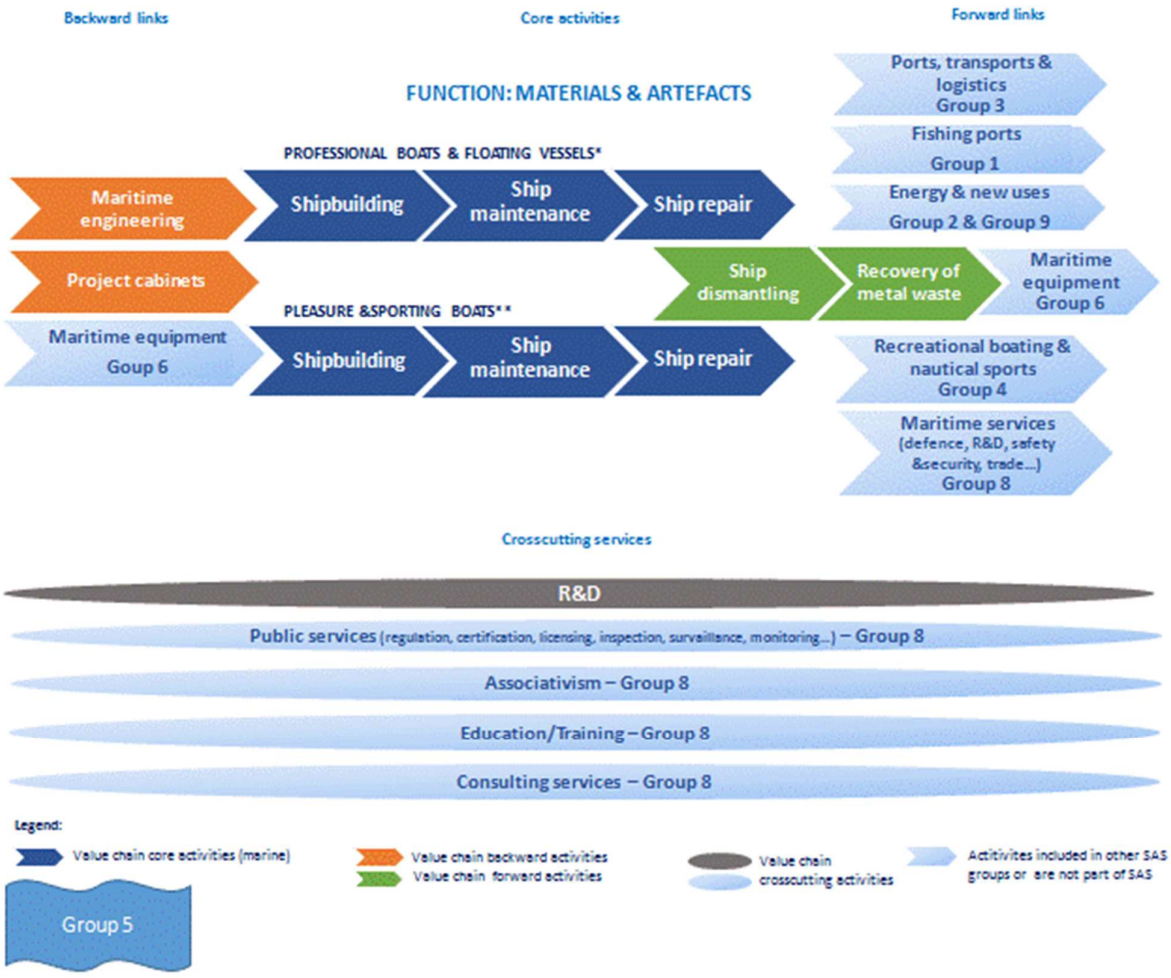


Source: Statistics Portugal and Directorate General for Maritime Policy

2.1.2.5 Shipbuilding, maintenance and repair

Group 5 comprises shipbuilding and related activities to manufacture ships and floating platforms, including pleasure and sporting boats, as well as the repair and maintenance activities of vessels and their dismantling at the end of their life. It contributes to materials & artifacts function (Figure 9).

Figure 9 - OSA value chain for group 5 - Shipbuilding, maintenance and repair



Notes: * Oil tankers, warships, bulk carriers, reefers, fishing, hovercrafts, ferries, dredgers, tugs, wooden boats, fiberglass or other non-metallic materials for commercial or industrial use, light-vessels, pilot boats, floating docks, pontoons, floating cranes, buoys , drilling rigs, etc ...

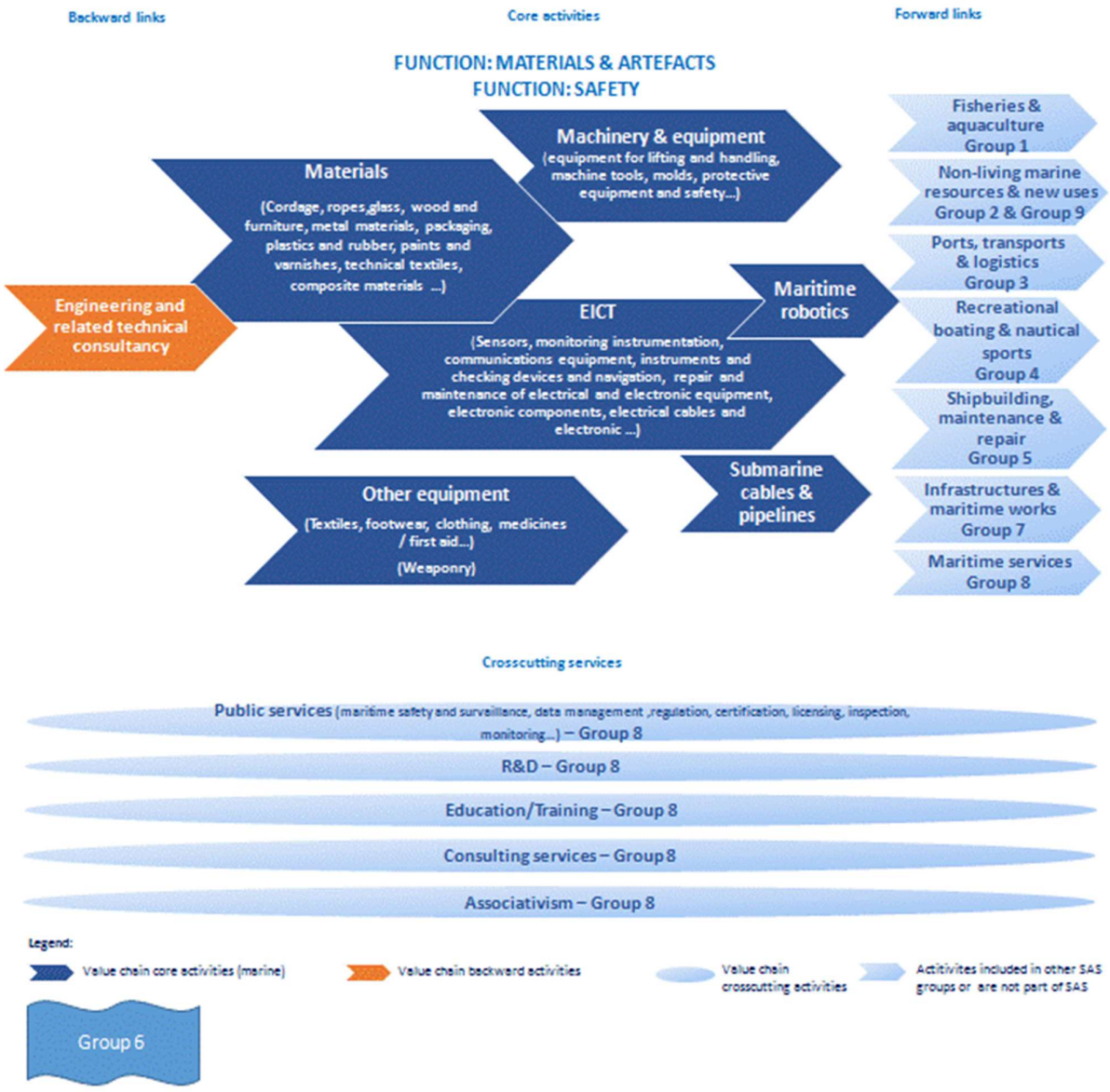
** Yachts and other pleasure and sporting boats, including fishing, made in any material, driven by motors, sails or oars (canoes, kayaks, water bikes, rafts and inflatable boats).

Source: Statistics Portugal and Directorate General for Maritime Policy

2.1.2.6 Maritime equipment

Marine equipment gathered, in one group, all activities identified in manufacturing (NACE Rev.2 /CAE Rev. 3 section C), such as the manufacture and repair of marine equipment, that support most of other OSA groups' activities. It also comprises some "Construction" activities (NACE Rev. 2/CAE Rev. 3 section F) identified as pursuing a maritime component, machinery and equipment trading activities, as well as specific engineering and training activities, associated with marine equipment domain. This group's activities contribute to materials & artifacts and safety functions (Figure 10).

Figure 10 - OSA value chain for group 6 - Maritime equipment

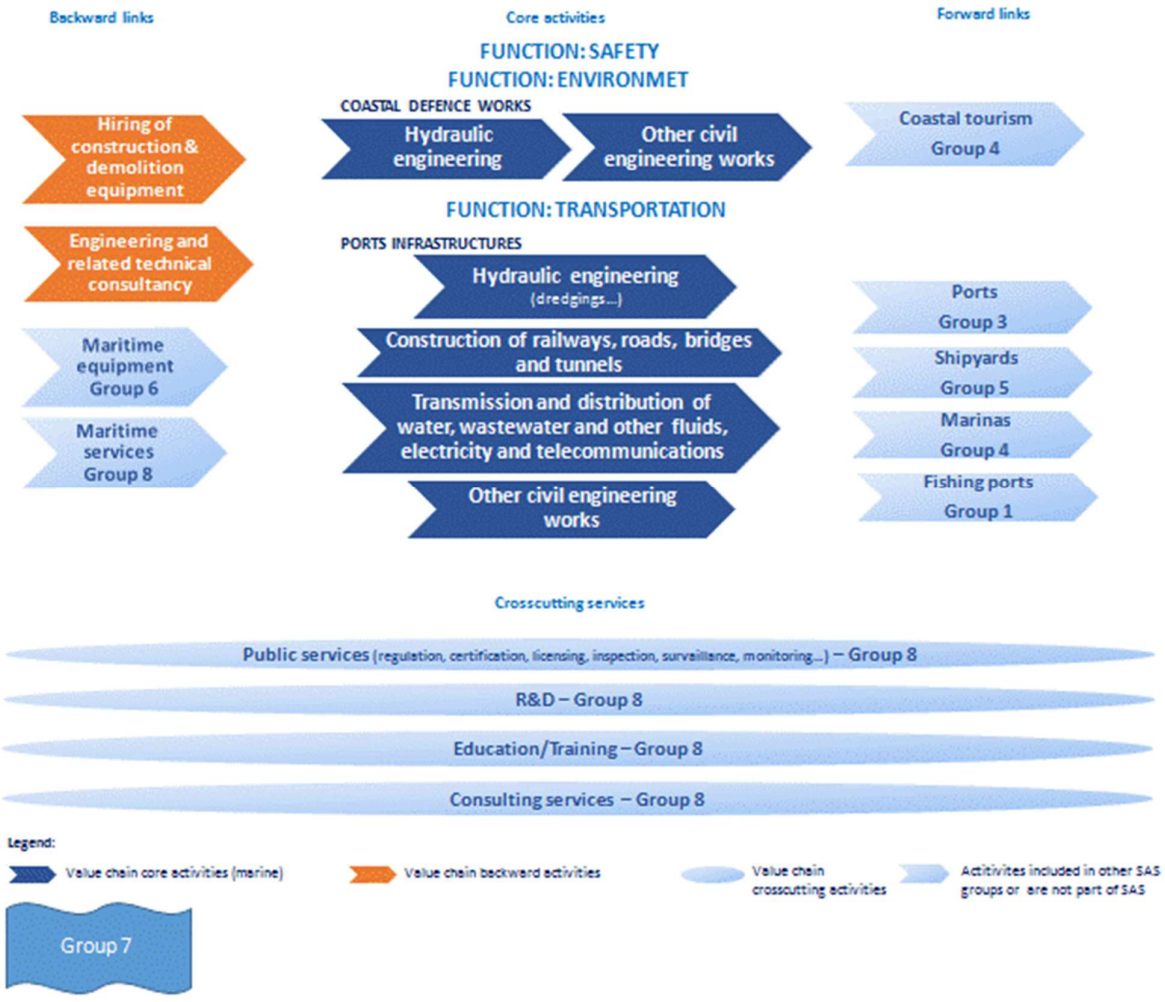


Source: Statistics Portugal and Directorate General for Maritime Policy

2.1.2.7 Infrastructure and maritime works

Group 7 includes activities related to construction and expansion of port terminals, in order to develop maritime accessibility conditions, as well as terrestrial, including land corridors for the transport of goods, by rail, iron (associated with shipping, by connecting the road-rail to the main intermodal transport nodes) and infrastructure suitable for receiving cruise ships and recreational boating. It also includes the construction and repair of ports, marinas, as well as dredging, protection and defense of the coastal zone and other maritime and port works, for example, infrastructure related to security systems. These activities are relevant to fulfill transportation, safety and environment functions (Figure 11).

Figure 11 - OSA value chain for group 7 - Infrastructures and maritime works

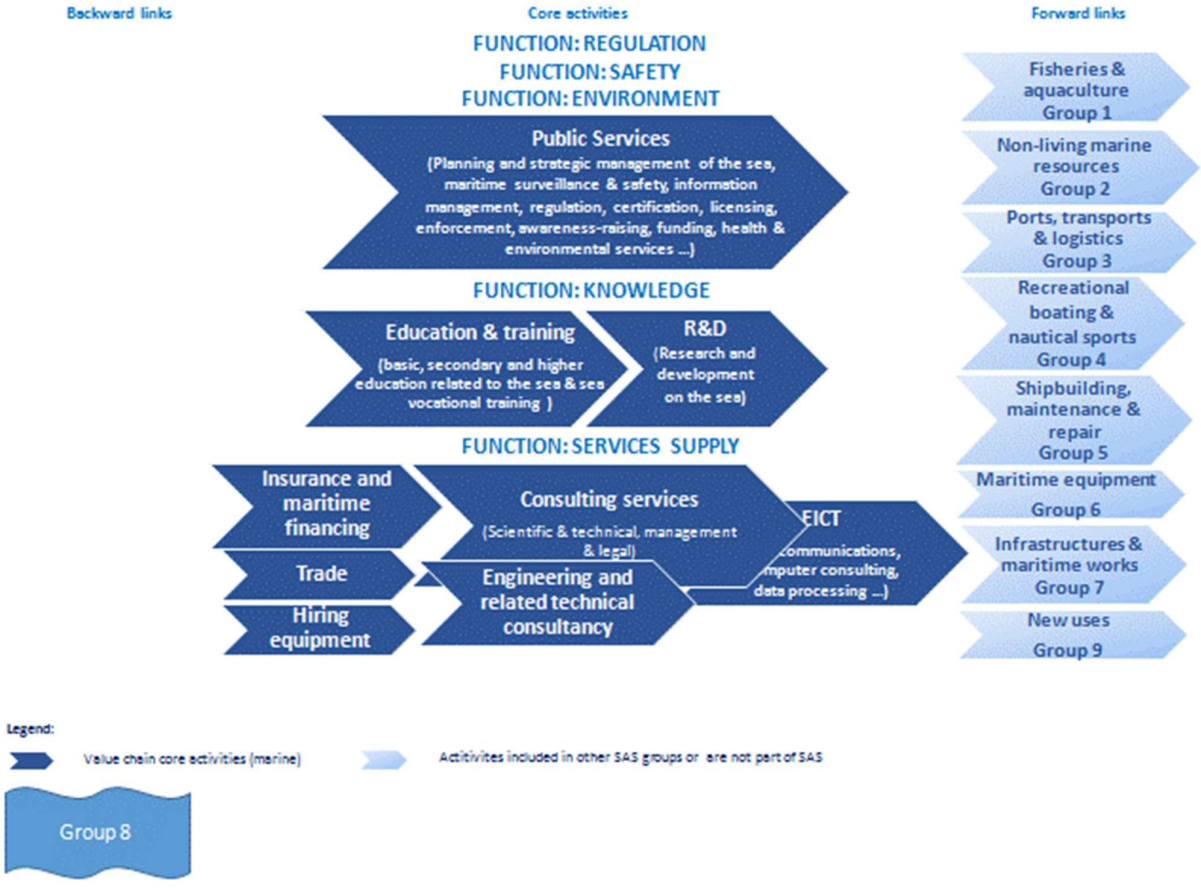


Source: Statistics Portugal and Directorate General for Maritime Policy

2.1.2.8 Maritime services

Group 8, Maritime Services, includes crosscutting services' activities related to the ocean, benefiting all other groups. It comprises activities such as education, training and R&D, governance activities (specifically, public administration), as well as maritime security activities and maritime spatial planning, and other service activities. Those include maritime information and communication services, consulting and business services in the areas of the ocean, financing and marine insurance, as well as trade and distribution activities related to the ocean, when not directly attributable to a specific group (e.g., fish and shellfish trade, attributable to group 1). These group's activities contribute to several functions: knowledge, regulation, safety, environment and services supply (Figure 12).

Figure 12 - OSA value chain for group 8 - Maritime services

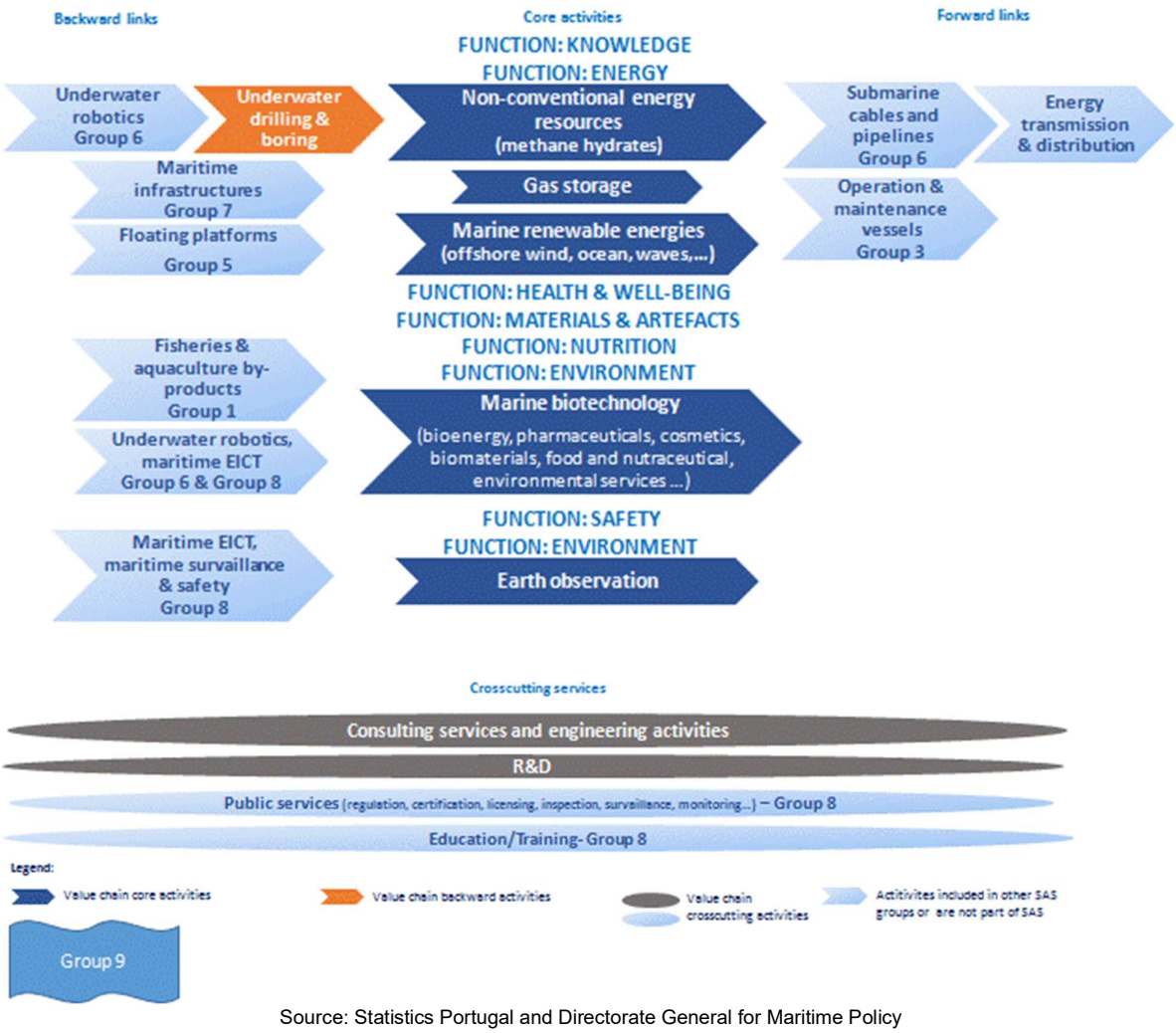


Source: Statistics Portugal and Directorate General for Maritime Policy

2.1.2.9 New uses and resources of the ocean

Group 9 was established in order to identify and quantify a set of emerging activities, yet with little economic importance, which would, otherwise, be "diluted" in other activities. It covers activities that will strengthen the national knowledge function in all emergent marine areas, as well as the energy function in a near future, such as marine renewable energies (offshore wind, waves, tides, currents), research and exploitation of unconventional energy resources (gas hydrates) and gas storage. It also includes marine biotechnology that may contribute to diverse functions, namely the energy through bioenergy production from seaweed, but also the health & well-being function (through production inputs for the pharmaceutical and cosmetic industries), materials & artifacts (through biomaterials), nutrition (inputs for nutraceutical) and environment. Earth observation is other emergent area, particularly active in Portugal, which will strongly contribute to safety and environment functions (Figure 13).

Figure 13 - OSA value chain for group 9 - New uses and resources of the ocean



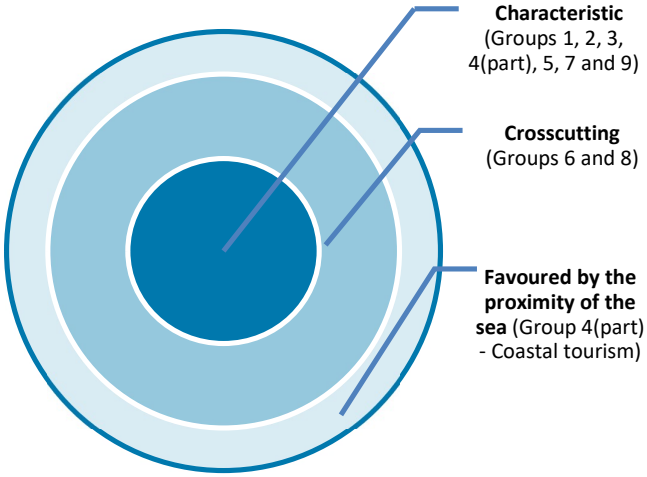
Source: Statistics Portugal and Directorate General for Maritime Policy

2.1.3 Scope by "observation level"

In addition, the OSA information was segmented into observation levels:

- **Characteristic activities** - activities in which an important part of the operations takes place at ocean or whose products come from or are intended for use at ocean or on the shore limit. This level includes all groups except 6 Maritime equipment, 8 - Maritime services and part of 4 - Recreation, sports, culture and tourism (notably coastal tourism)
- **Crosscutting activities** - activities of support to the remaining activities considered under the OSA scope. Includes 6 - Maritime equipment and 8 – Maritime services
- **Activities favored by the proximity of the ocean** - include the accommodation activities, restaurants and imputed rents of second homes located in villages in coastal areas (based on the European classification of coastal and noncoastal areas, i.e., parishes with maritime coast or with 50% or more of the surface up to 10 km away from the ocean). This set of activities corresponds to coastal tourism.

Figure 14 - OSA aggregation by "observation level"



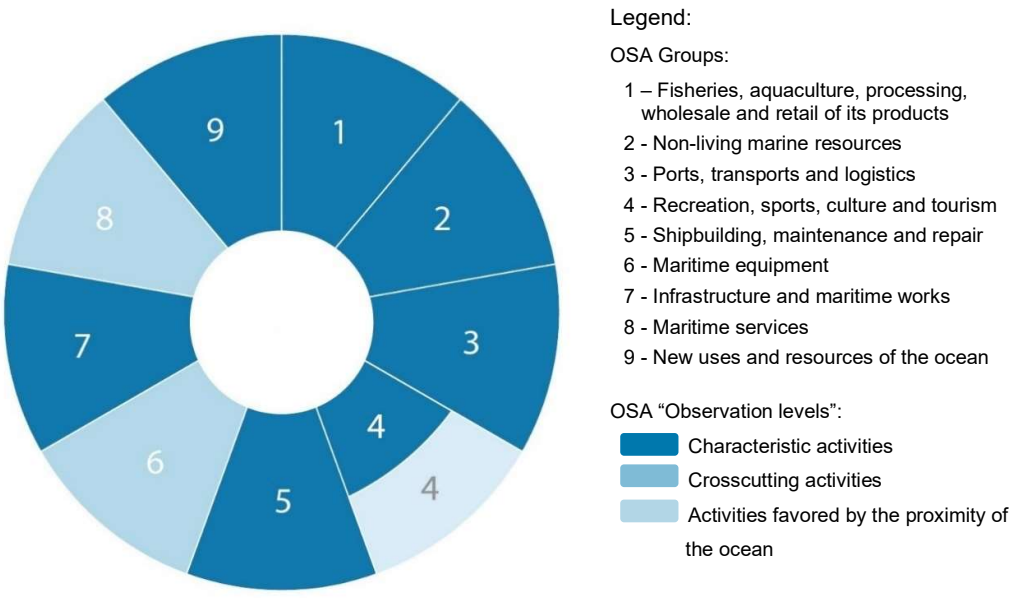
Source: Statistics Portugal and Directorate General for Maritime Policy

The purpose of this distinction was the specificities of the Portuguese economy concerning the territory. Calculations based on EUROSTAT database for Local Administrative Units, level 2 (LAU 2) population distribution in the period 1.1.2018 -31.12.2018, for the EU-28, indicate that 49% of the population is located in the coastal area (LAU 2 criteria, i.e., location in the coastal parish). Thus, there is prevalence of economic activities in general and of tourism in particular. Box 1 details this aspect.

This analysis also facilitates the use of OSA results in supporting public policies. Characteristic activities are major concerns of specific maritime policies. Activities favoured by the proximity of the ocean are strongly dependent on policies for marine environment quality policies, policies for coastal area and policies for the coordination between land and maritime spaces, among others. Crosscutting activities are fundamental to support the ocean economy and its growth. They include, for example, innovation and research, maritime carriers and training, as well as important technological and industrial fields, such as the ones related with equipment supply, and services like specific financial and assurance services. For these crosscutting activities it is essential a strong coordination of policies, considering the maritime specificities in broader policies, like the ones dedicated to research and innovation or to industrial development.

The link between the 9 groups and the 3 observation levels are presented in Figure 15.

Figure 15 - Link between OSA "observation levels" and groups



Source: Statistics Portugal and Directorate General for Maritime Policy

Box 1 – Tourism in coastal areas – how it was considered in OSA

Coastal tourism activities were included in the compilation of the OSA for Portugal.. The compilation of data on tourism within the OSA, which includes hotels and similar establishments, restaurants and similar establishments, travel agencies, tour operators and other reservation services and related activities, was particularly complex.

Under the OSA, and according to *Turismo de Portugal*, IP, in sea-related tourism analysis were considered two aspects:

- Consumption stemming from the motivations of consumers
- Territory (geographic location of consumers of tourism products), considering the definition of coastal area.

As far as the motivation of consumers is regarded, in the context of OSA, different types were registered, namely:

- Cruises
- Nautical (recreational/sports)
- Sun and sea
- Sporting event (who participate) and for sports-event (onlooker who goes to watch the event)
- Health tourism (e.g. thalassotherapy)
- Scientific tourism/research
- "Nature tourism" (e.g.: observation of cetaceans).

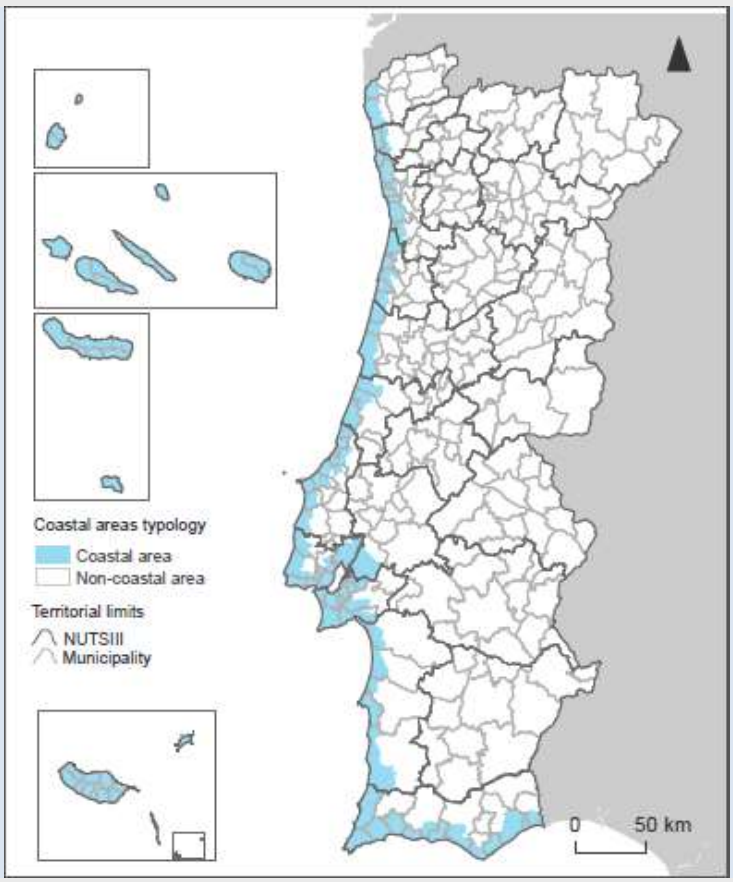
The selection of related kind of economic activity units, including hotels and restaurants, resulted, in a first phase, from the intersection with the geographical classification (i.e., check if the units were in parishes classified as coastal or not). However, the implementation of this methodology was complex due to numerous constraints, namely:

- **Definition of "regional/coastal zone"** – within the NUTS 3, parishes are classified as coastal according to coastal parish:
  - If the parish is by the sea, it is part of the coastal region
  - If the parish is not by the sea, but has 50% of its surface 10Km away from the sea, is also considered coastal parish
  - All other parishes are considered non-coastal.

In preparing the OSA to Portugal, this geographic criterion was used (v. Picture 16), complemented by:

- **Component motivation** - When considering only the geographical component one would be ignoring the motivation component (e.g., not all tourism which takes place in Lisbon and Oporto is related to the sea). Thus, the business component was not included in the OSA estimates.
- **Inclusion of river tourism** - this form of tourism sometimes uses the same means and equipment that "sun and sea" tourism and the same company can operate the means regardless of being in a river or marine environment. The importance of "river tourism" type, within the total tourism related to water (the number of Tourist Animation Agents in national tourism register whose activity is classified as "Water") was not considered relevant.

Figure 16 - Map of the coastal areas in Portugal – LAU 2



Source: Cartography based on CAOP - Official Administrative Map of Portugal, 2019; Coastal areas (Eurostat), 2016 (V03883)

The simple application of geographical criteria (i.e., location in the coastal parish) could imply, given the characteristics of the Portuguese territory, an overvaluation of the Ocean component (e.g.: not all hotels located in Lisbon chose this location due to the proximity of the sea. Indeed, while capital, Lisbon gathers other attributes beyond the geographical, which justify the choice). In very synthetic terms, the calculation methodology for this component may be summarized as follows:

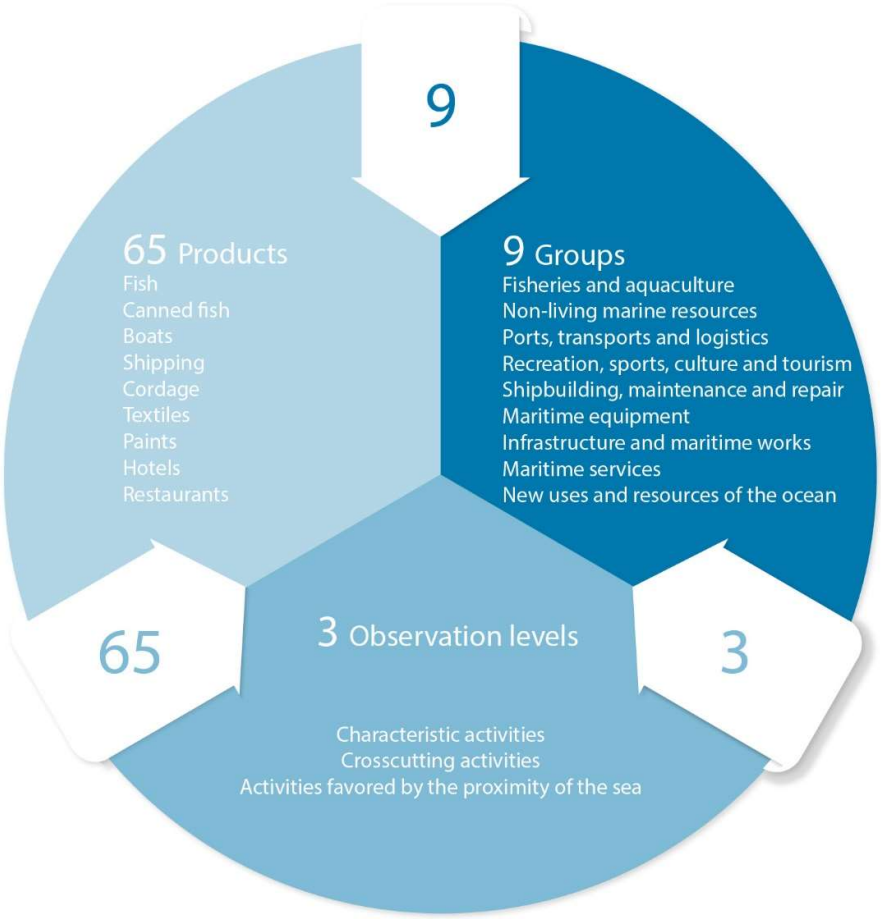
- **Restaurants** - the units selected were in coastal parishes (big restaurant chains and catering companies were not considered). Using detailed information on NA/Tourism accounts it was possible to consider only the consumption for leisure tourism purposes, i.e., the business was not included.
- **Hotels** - the selected units were in coastal parishes (the headquarters of hotel chains were not considered). As in the case of restaurants, using detailed information on NA/Tourism accounts it was possible to consider only the consumption for leisure tourism purposes, i.e., the business tourism was not included.
- **Imputed rentals of second homes** - imputed rents correspond to income associated with assets that families hold in the form of own housing and are the counterpart of accommodation services that this asset provides. Note that the estimated value for these services - the imputed rents - is embedded in GDP. The methodology for measuring the rents to be charged followed by NA resorted to the use of the 2011 Housing and Population Census, more specifically the information on actual rents, and the use of an econometric model of hedonic regression. For purpose of the OSA compilation it was applied the NA accounts methodology to coastal parishes. For the metropolitan areas of Lisbon and Oporto were also consulted real estate experts, in order to select only the coastal parishes in which the effect of the proximity of the sea was significant in the context of second homes.

2.1.4 Information scheme of OSA

The fundamental methodological references of OSA were the manual of the European System of Accounts (ESA 2010), and the first Portuguese Methodological Report on the Satellite Account for the Sea 2010-2013 (SAS 2010-2013).

The OSA information was organized in 3 levels: by observation level, by group and by product (Figure 17).

Figure 17 - Information scheme of OSA



Source: Statistics Portugal and Directorate General for Maritime Policy

2.2 Base year and period of analysis

This exercise covers the years 2016 to 2018 and uses the PNA benchmark-year 2016. The basis for this choice was the change of the PNA benchmark-year due, amongst other reasons, to the application of ESA 2010.

The OSA reference population was thoroughly analysed for 2016 and 2017. The year 2018 was projected as referred in the end of item 4.4. of this report.

The OSA data compilation and calculations were made for 2016 and 2017 simultaneously. That was an advantage, as comparisons allowed to detect inconsistencies and make improvements.

This compilation includes also, for the first time, a regional disaggregation by NUTS 1, that means a split for the Autonomous Regions of Azores and Madeira.

2.3 Classifications

The implementation of the OSA statistical data refers to the use of classifications and nomenclatures adopted at the level of international statistical institutions, considered by the European Statistical System (ESS) and the NSS.

Thus, further to the recommendations of international organizations, the following classifications were selected for the identification of activities and products related to the ocean economy:

- **Portuguese Classification of Economic Activities, Revision 3 (CAE Rev. 3)** - Classification and grouping of statistical units producing goods and services according to the economic activity, allowing its organization in a coordinated and consistent manner, by industry, and statistical comparability at national, EU and global level; the CAE Rev. 3 results from the adaptation of NACE Rev. 2, to the NSS
- **Statistical Classification of Economic Activities in the European Community (NACE**) (Rev. 1.1 and Rev. 2 were considered) - Allows to sort and group the statistical units, organize and disseminate statistical information, by industry (Regulation (EC) No 1893/2006 of the European Parliament and of the Council of 20 December 2006, published in the Official Journal L 393, 30.12.2006)
- **Classification of Products by Activity in the European Community, 2008 version (CPA, 2008)** - Central classification of goods and services from which other European and national classifications are organized. It allows the comparability of statistics of the Community production of goods and services
- **Classification of the Functions of Government (COFOG)**
- **Portuguese Classification of Individual Consumption by Purpose (COICOP/HICP)** - Establishes the classification of individual consumption described by the goal or end of the

consumption of goods and services made available to the households, used by the families, the non-profit institutions serving households (NPISH) and the general government, to the direct satisfaction of their needs. It was harmonized to meet the OECD Classification of Individual Consumption by Purpose (COICOP) and the European goods and services list from the Household Budget Survey (HBS/IDEF)

- **Classification of the Purposes of Non-Profit Institutions Serving Households (COPNI)**;
- **National Accounts Product Classification (Base 2016) (NPCN)** - Establishes a classification of products (goods and services) for NA (the nomenclature was inspired by Regulation (EC) No 2223/96 of 25 June 1996)
- **National Accounts Industry Classification (Base 2016) (NRCN)** - Establishes a classification of industries for the NA (the nomenclature was inspired by Regulation (EC) No 2223/96 of 25 June 1996)
- **Combined Nomenclature (CN) -** It is a nomenclature designed to meet the needs of the common customs tariff and the international trade statistics of the Community (goods traded in international trade); it is also used in intra-Community trade statistics
- **National Classification of Education and Training Areas (CNAEF)**
- **International Standard Classification of Occupations (ISCO)**
- **Smart specialization priorities regarding R&D for the ocean economy –** Codes designed specifically for the National Research and Innovation Strategy for Smart Specialization 2014-2020 (ENEI). These codes have been applied to IPCTN since 2016.

2.4 Data sources

NA are the economic synthesis statistics par excellence. They integrate multiple data sources.

In this context, and considering the main activities of the NSS, the main data sources used within the OSA are detailed ahead.

2.4.1 Statistics Portugal (National Accounts)

- Supply and use tables (SUT)
- Output matrix
- Intermediate consumption matrixes
- NA working files
- Government statistics.

2.4.2 Autonomous Regions of Azores and Madeira (Regional Accounts)

- Regional accounts of the Autonomous Region of Azores (RAARA)
- Regional accounts of the Autonomous Region of Madeira (RAARM).

2.4.3 Other data sources from the National Statistical System (NSS)

The following data sources were used resulting from statistical operations of Statistics Portugal or other delegated entities responsibility (Table 3).

Table 3 - OSA main data sources and responsible entities

Data source	Responsible entities
Balance of Payments	Banco de Portugal (Portuguese central bank)
Reports and Accounts Report and Financial Statements	Corporations and other private entities
Public Works Observatory (OOP) database	*Instituto dos Mercados Públicos, do Imobiliário e da Construção, I.P.* (IMPIC, I.P.) (Institute of public markets, real estate and construction)
Account of the Governments of the Azores and Madeira	Governments of the Azores and Madeira Statistics Portugal
Simplified Business Information (SBI/IES)	Ministry of Finance/Statistics Portugal/Banco de Portugal (Portuguese central bank)
Survey on National Scientific and Technological Potential (IPCTN)	Ministry of Science, Technology and High Education/DGEEC (Resident information on Statistics Portugal databases)
Biographical Register of Higher Education Teachers (REBIDES)	Ministry of Science, Technology and High Education/DGEEC
General State Accounts Account Management (Budgetary control maps of the expenditure and revenue)	Portuguese General Government
Budgets and Accounts of Private Institutions of Social Solidarity (OCIP)	*Instituto de Informática. I.P. da Segurança Social* (Institute of Information Technology of Social Security Ministry)
(Annual Survey to the Construction Business (IAEC) Annual Survey on Industrial Production (IAPI) Household Budget Survey (HBS/IDEF) International Trade Statistics (ITS) Labor Force Survey (LFS) National Accounts (NA) Simplified Business Information (SBI/IES) Survey on International Tourism (ITI) Survey on Tourist Demand of Residents (IPTR)	Statistics Portugal

2.4.4 Administrative data sources

Complementary to the already mentioned main data sources, there was a need for additional research, in order to bridge information gaps, particularly in economic activities that were not clearly identified.

During the selection process of the KAU to integrate OSA, it was necessary to search for additional information with the purpose of validating the existence of maritime activities, their importance and nature, to facilitate the classification by group and observation level.

For the Autonomous Regions of Azores and Madeira, specific administrative sources of those regions were used.

The main data sources were:

- General Government Budget (CGE)
- Autonomous Region of Azores Government Budget
- Autonomous Region of Madeira Government Budget
- Corporations' Annual Reports and Report and Financial Statements
- Corporations and other entities *website* or *facebook*
- Corporations/Institutions directories provided by third parties
- Ministry of Justice web*site* (*https://publicacoes.mj.pt/Pesquisa.aspx*)
- Nautical sport's Federations
- Profissional Associations
- Reference population of other satellite accounts, namely the Social Economy Satellite Account (SESA)
- Other administrative data sources.

2.4.5 Other information from partners through meetings and email contacts

The necessary data for the OSA accomplishment was complemented by other information from the ocean partners or other entities, through meetings and email contacts. As a significant part of the compilation of this account was performed during the COVID-19 Pandemic, the number of meetings was substantially reduced when compared with the first account. A close communication was maintained with the Autonomous Regions, as well as with DGPM, whenever necessary (Table 7 on Annex I). The main resulting information was the following:

- DGEEC, *Despesa Nacional em I&D por área temática da ENEI* (2014 - 2016) (R&D national expenditure, by area of the National Research and Innovation Strategy for Smart Specailization 2014-2020)
- DGEEC, *Lista de empresas OSA que declararam ter desenvolvido atividades de Investigação e Desenvolvimento (I&D)* (List of companies that reported having developed R&D activities)
- DGEEC, *Registo Biográfico de Docentes do Ensino Superior 2016 e 2017* (REBIDES) (Biographical Register of Higher Education Teachers – information available on DGEEC site)
- Jornal da Economia do Mar *(*Ocean economy newspaper*)*, several edictions
- RNAAT – *Registo Nacional dos Agentes de Animação Turística*, *"Água"* (National registry of business companies of touristic animation from Turismo de Portugal, regarding "Water")

For the Autonomous Regions of Azores and Madeira, several entities were contacted, as listed in Annex I.

3 OSA reference population

3.1 Kind-of-activity units' selection

The compilation of the OSA reference population was carried out by Statistics Portugal and the Statistics departments of the Autonomous Regions, supported by DGPM. The cross checking made by DGPM with other internal sources allowed to complete the reference population and refine the domains' classification.

The OSA reference population is a subset of the PNA reference population (Base 2016) by institutional sector. Considering the changes operated by ESA 2010, and the new benchmark-year of PNA, 2016 was also considered the base year in this edition of the OSA.

An exhaustive analysis of the years 2016 and 2017 was made. In a first phase, the Local KAU (Box 2) to integrate the OSA reference population were selected according to the criteria of industry classification of economic activities (CAE Rev. 3, 5 digits) of the KAU, according to NACE Rev. 2/CAE Rev. 3 codes list previously set for the OSA reference population. In a second phase, other codes were analyzed, for a set of entities identified as having a maritime character.

Box 2– Local Kind-of-activity unit (KAU) definition

KAU definition:

"*Definition: the local kind-of-activity unit (local KAU) is the part of a kind-of-activity unit (KAU) which corresponds to a local unit. The local KAU is called establishment in the 2008 SNA and ISIC Rev. 4. A KAU groups all the parts of an institutional unit in its capacity as producer contributing to the performance of an activity at class level (four digits) of the NACE Rev. 2 and corresponds to one or more operational subdivisions of the institutional unit. The institutional unit's information system must be capable of indicating or calculating for each local KAU at least the value of production, intermediate consumption, compensation of employees, the operating surplus and employment and gross fixed capital formation".*

Source: EUROSTAT (2013), ESA 2010, §2.148.

Where the NACE Rev.2/CAE Rev.3 codes could not be considered "totally" ocean, it was necessary to establish contacts with the relevant authorities involved for selective collection of information or, in several cases, to use the previous coefficients, used in the first account. A list of contacted entities and meetings can be found in Annex I.

The OSA reference population had PNA reference population (Base 2016) as framework. This is obtained basically from the Business Register (BR). This database provides the registration of statistical units (Corporations, Non-profit institutions (NPI), Public Administration, etc.) active in the Mainland and in the Autonomous Regions of the Azores and Madeira.

The SBI/IES benefits from continuous and annual updates, integrating information from various sources (internal and external), including administrative files (national register of legal persons); Ministry of Finance (income tax and VAT); Ministry of Economy (Single Report); Banco de Portugal (central balances); statistical surveys and specific surveys of Statistics Portugal, to update the file. Thus, the PNA reference population is updated each year for all active economic activity units.

According to ESA 2010 (§2.31 and §2.32), mandatory methodological reference for NA in the EU, "Ma*croeconomic analysis does not consider the actions of each institutional unit separately — it considers the aggregate activities of similar institutions. So units are combined into groups called institutional sectors, some of which are divided into subsectors" (…*)*"Each sector and subsector groups together the institutional units which have a similar type of economic behaviour…".*

The **classification of institutional sectors** provided by ESA 2010 with the breakdown considered in the OSA is the bellow mentioned:

S.1 Total economy

- S.11 Non–financial corporations – (§2.45) "Definition: the non-financial corporations sector (S.11) consists of institutional units which are independent legal entities and market producers, and whose principal activity is the production of goods and non-financial services. The non-financial corporations sector also includes non-financial quasi-corporations*"*

- S.12 Financial corporations - (§2.55) *"*Definition: the financial corporations sector (S.12) consists of institutional units which are independent legal entities and market producers, and whose principal activity is the production of financial services. Such institutional units comprise all corporations and quasi-corporations which are principally engaged in: financial intermediation (financial intermediaries); and/or auxiliary financial activities (financial auxiliaries). Also included are institutional units providing financial services, where most of either their assets or their liabilities are not transacted on open markets"

- S.13 General government - (§2.111) "Definition: the general government sector (S.13) consists of institutional units which are non-market producers whose output is intended for individual and collective consumption, and are financed by compulsory payments made by units belonging to other sectors, and institutional units principally engaged in the redistribution of national income and wealth"

- S.14 Households – (§2.118) "Definition: the households sector (S.14) consists of individuals or groups of individuals as consumers and as entrepreneurs producing market goods and non-financial and financial services (market producers) provided that the production of goods and services is not by separate entities treated as quasi-corporations. It also includes individuals or groups of individuals as producers of goods and non-financial services for exclusively own final use"

- S.15 Non-profit institutions serving households - (§2.129) “Definition: the non-profit institutions serving households (NPISHs) sector (S.15) consists of non-profit institutions which are separate legal entities, which serve households and which are private non-market producers. Their principal resources are voluntary contributions in cash or in kind from households in their capacity as consumers, from payments made by general government and from property income”

- S.2 Rest of the world - (§2.131) “Definition: the rest of the world sector (S.2) is a grouping of units without any characteristic functions and resources; it consists of non-resident units insofar as they are engaged in transactions with resident institutional units, or have other economic links with resident units. Its accounts provide an overall view of the economic relationships linking the national economy with the rest of the world. The institutions of the EU and international organisations are included”.

Based on the information gathered, Statistics Portugal prepared systematized listings of ocean Local KAU (name, tax number, site/other web information, institutional sector), by group, with the collaboration of DGPM. This selection was made based on the previous reference population (2012) and complemented with various information crossings, namely internal information of DGPM [e.g., EEA Grants projects database and ITIMAR database, for 2016 and 2017), …], administrative data (ex.: licenses) and manual collection from fairs and events catalogs or specialized ocean newspapers. This task was particularly time consuming, given the dispersion of data sources and units.

3.2 Main data sources to validate the OSA reference population

During the selection process of OSA reference population, it was necessary to search for additional information, in order to identify the activities related to the ocean, their importance and specific nature, with the intention of classifying the different local KAU by group.

Along the process several additional KAU were included and other withdrawn or transferred from one group to another, considering, in particular, the following cases:

- Adjustments resulting from further research on some specific KAU not initially considered, because they did not belong to the previous list of CAE Rev. 3 codes previously selected on SAS 2010-2013 Methodological Report list
- Exclusion of some CAE Rev. 3 codes considered on SAS 2010-2013 Methodological Report list, when it was concluded that the activity carried out by the respective KAU was

not directly related to the ocean and/or the information appropriation was not possible for the purpose of OSA.

Data for some units selected to integrate OSA reference population was considered only partially, through coefficients or weighting schemes. In these cases, their integration and accounting were based on information collected through additional data sources, such as annual reports and accounts of the entities themselves, Statistics Portugal's surveys or other resident sources on Statistics Portugal, such as the Public Works Observatory database (OOP) or the R&D Survey (IPCTN), among others (see item 2.4).

Considering the exposed methodological approach, the OSA reference population was stabilized in an average figure around 52,600 KAU, in the period 2016-2017, for the whole country. Mainland Portugal accounted for approximately 45,700 KAU, followed by around 3,600 KAU in the Autonomous Region of Azores and 3,300 KAU in the Autonomous Region of Madeira.

The main average results for the years 2016 and 2017 by NUTS 1, disaggregated by observation level, by group and by institutional sector are presented in Annex II.

3.3 The particular case of ocean training, education and R&D reference population

Ocean training, education and R&D had a specific treatment, given their relevance, especially in the case of education and R&D.

One of the difficulties experienced by the team relates to the identification of the entities that carry out ocean professional training, higher education and training and ocean R&D, as well as the delimitation of its activity. For the professional training the reference population was mainly based on the previous account. Training in areas of nautical sports were updated.

For the high-level education, the selection of ocean or ocean related courses relied on a first detailed analysis made by Statistics Portugal, using the databases from Directorate-General for Education and Science Statistics (DGEEC), then complemented by DGEEC (see Box 3).

Box 3 – Education at OSA

The **educational services related to ocean training** in the 2nd and 3rd level of basic education and secondary education levels were difficult to estimate. Although there are specific pilot projects at schools related to the ocean literacy (*Escola Azul*/Blue School), it was only not possible to gather data for some *Ciência Viva* Centers (Leaving Science Labs) where ocean related projects could be identified.

For the **high level education** a first selection of **ocean or ocean related courses** was made based on the information on the courses' designation, description, code of National Classification of Education and Training Areas (CNAEF), from the database provided by the Directorate-General for Education and Science Statistics (DGEEC). It was necessary to proceed to a thorough and time-consuming analysis of the bachelors, masters and doctorates courses related to the ocean, from a detailed list supplied by DGEEC, course by course.

The selection of the entities with ocean related courses was made with the following criteria:

- Entities with courses unquestionably related to the ocean
- Crosscutting courses such as engineering, biology or geology were not considered, although they might include ocean related subjects
- In case of doubt, the course was not included.

The criteria, which sought to follow a harmonized and balanced way, may have, possibly, underestimated the courses and the corresponding ocean related students, as it is known that some courses partially teach ocean materials.

The DGEEC database allowed the identification of the ocean courses, the respective teaching entities, and the total teaching hours in each institution. DGEEC provides Statistics Portugal with specific data on the teaching hours for the previous selected ocean courses. These variables allow the estimation of coefficients on a later stage.

Regarding the ocean R&D, DGPM and the Portuguese science and technology authority *Fundação para a Ciência e a Tecnologia* (FCT) (Portuguese science and technology authority) have been consulted and provided important contributions (see Box 4).

Box 4 - R&D at OSA

The main data source was the Survey on National Scientific and Technological Potential (IPCTN), which, since 2014, individualizes the ocean projects, through the following strategic priority codes:

- 10.1. Ocean economy - marine food resources (fisheries and aquaculture)
- 10.2. Ocean economy - natural systems and renewable energy resources
- 10.3. Ocean economy - deep sea resources
- 10.4. Ocean economy - ports, logistics, transport, shipbuilding and maritime works
- 10.5. Ocean economy - culture, tourism, sport and leisure.

These codes - **Smart specialization priorities regarding R&D for the ocean economy –** were specifically designed for the National Research and Innovation Strategy for Smart Specialization 2014-2020 (ENEI).

Regarding the **FCT own contribution to the ocean R&D**, it should be noted that, in close collaboration with that entity, Statistics Portugal had access to information involving a set of financing instruments (namely projects, scholarships, scientific employment, R&D units), allowing a more precise estimate of the ocean coefficient in the total FCT participation/financing compared to the previous edition (in which the coefficient used was only based on the ocean component of the R&D projects).

DGPM participated in this estimation, given its expertise in this area.

3.4 Industries within OSA

The selection of OSA units/KAU was based on the NACE Rev. 2/CAE Rev. 3 codes previously defined in the SAS 2010-2013 Methodological Report and adjusted along the selection process described in the last two items (3.1. and 3.2).

A set of NACE Rev. 2 class codes were totally considered in OSA, namely codes:

- 03.11- Marine fishing
- 03.12 - Freshwater fishing
- 03.21 - Marine aquaculture
- 03.22 - Freshwater aquaculture
- 10.20 - Processing and preserving of fish, crustaceans and molluscs
- 30.11 - Building of ships and floating structures
- 30.12 - Building of pleasure and sporting boats
- 33.15 - Repair and maintenance of ships and boats
- 47.23 - Retail sale of fish, crustaceans and molluscs in specialized stores
- 50.10 - Sea and coastal passenger water transport
- 50.20 - Sea and coastal freight water transport
- 50.30 - Inland passenger water transport
- 50.40 - Inland freight water transport
- 77.34 - Renting and leasing of water transport equipment

The industry codes considered sequentially and by level of observation and by group are detailed in Annex III.

3.5 Products within OSA

After the selection of OSA units/local KAU, ocean products were also chosen for the same purpose, based on the National Accounts Product Classification (NPCN), with the most detailed NA aggregation of 433 products (P433). In the ocean products process of choice there was a concern to maintain the maximum coherence between the products and the industries and groups previously selected. The results were than aggregated to an ocean' products P88 level.

Products such as fish and maritime transports were totally considered as ocean products, namely the products with the following NPCN (P433):

- 03001 - Fish, live
- 03002 - Fish, fresh or chilled
- 03003 - Crustaceans, not frozen
- 03004 - Molluscs and other aquatic invertebrates, live, fresh or chilled
- 03005 - Pearls, unworked
- 03006 - Other aquatic plants, animals and their products
- 03007 - Support services to fishing and aquaculture
- 1021 - Fish, fresh, chilled or frozen, Crustaceans, molluscs and other aquatic invertebrates, frozen, prepared or preserved, Flours, meals and pellets, unfit for human consumption, and other products n.e.c. of fish or of crustaceans, molluscs or other aquatic invertebrates, Smoking and other preservation and preparation services for manufacture of fish products; sub-contracted operations as part of manufacturing of processed and preserved fish, crustaceans and molluscs (10.20.1 + 10.20.3 + 10.20.4 + 10.20.9)
- 1022 - Fish fillets, dried, salted or in brine, but not smoked, Fish livers and roes dried, smoked, salted or in brine; flours, meals and pellets of fish, fit for human consumption, Fish, dried, whether or not salted, or in brine, Fish, including fillets, smoked (10.20.21 + 10.20.22 + 10.20.23 + 10.20.24)
- 1023 - Fish, otherwise prepared or preserved, except prepared fish dishes, Caviar and caviar substitutes (10.20.25 + 10.20.26)
- 3011 - Ships and floating structures
- 3012 - Pleasure and sporting boats
- 5001 - Sea and coastal passenger water transport services (50.1)
- 5002 - Inland passenger water transport services (50.3)

- 5003 - Sea and coastal freight water transport services and Inland freight water transport services (50.2 + 50.4).

Other products were considered only partially. In these cases, any appropriation to the OSA reference population was accompanied by an additional research work, considering, in particular, the relevance of the products, quality and credibility of available data sources and the feasibility of measurement for statistical purposes, in order to have robust estimates.

The final list of ocean products considered in OSA has 65 products and is presented in Annex IV.

3.6 Residence and territory criteria and international bodies

OSA reference population followed ESA 2010 regulation and manual concerning the resident unit's principle to build the NA (Box 5).

Box 5 – Resident and non-resident units – ESA 2010

According to ESA 2010 Manual (§1.61 to §1.63):

"Resident and non-resident units; total economy and rest of the world

1.61 ***The total economy is defined in terms of resident units.*** *A unit is a resident unit of a country when it has a centre of predominant economic interest on the economic territory of that country — that is, when it engages for an extended period (one year or more) in economic activities on this territory. […]*

1.62 ***Resident units engage in transactions with non-resident units*** *(that is, units which are resident in other economies). These transactions are the external transactions of the economy and are grouped in the rest of the world account. So the rest of the world plays a role similar to that of an institutional sector, although non-resident units are included only in so far as they are engaged in transactions with resident institutional units.*

1.63 ***National resident units, treated in the ESA 2010 system as institutional units****, are defined as:*

(a) those parts of non-resident units which have a centre of predominant economic interest (usually which engage in economic transactions for a year or more) on the economic territory of the country;

(b) non-resident units in their capacity as owners of land or buildings on the economic territory of the country, but only in respect of transactions affecting such land or buildings.

And ESA 2010 Manual (§2.04):

2.04 ***The units which constitute the economy of a country and whose flows and stocks are recorded in the ESA 2010 are those which are resident.*** *An institutional unit is resident in a country when it has its centre of predominant economic interest in the economic territory of that country. Such units are known as resident units, irrespective of nationality, legal form or presence on the economic territory at the time they carry out a transaction.*

A unit is considered resident of a country when it has a center of predominant economic interest on the economic territory of that country. ESA 2010 definition of economic territory is detailed in Box 6.

Box 6 - Economic territory and mobile equipment (fishing boats, other ships, floating platforms) - ESA 2010

ESA 2010 Manual (§2.05 to §2.06*):*

"2.05 ***Economic territory consists of the following:***

(a) the area (geographic territory) under the effective administration and economic control of a single government;

(b) any free zones, including bonded warehouses and factories under customs control;

(c) the national air-space, ***territorial waters and the continental shelf lying in international waters, over which the country enjoys exclusive rights;***

(d) territorial enclaves, these being geographic territories situated in the rest of the world and used, under international treaties or agreements between states, by general government agencies of the country (such as embassies, consulates, military bases, scientific bases, etc.);

(e) deposits of oil, natural gas, etc. in international waters outside the continental shelf of the country, worked by units resident in the territory as defined in points (a) to (d).

Fishing boats, other ships, floating platforms *and aircraft are treated in the ESA as* ***mobile equipment, whether owned and/or operated by resident units in the country, or owned by non-residents and operated by resident units.*** *Transactions involving the ownership (gross fixed capital formation) and use (renting, insurance, etc.) of mobile equipment are attributed to the economy of the country of which the owner and/or operator respectively are residents. In cases of financial leasing, a change of ownership is assumed.*

Economic territory may be an area larger or smaller than that defined above. An example of a larger area is a currency union such as the European Monetary Union; an example of a smaller area is a part of a country such as a region.

2.06 Economic territory excludes extraterritorial enclaves.

Also excluded are the parts of the country's own geographic territory used by the following organisations:

(a) general government agencies of other countries;

(b) institutions and bodies of the European Union; and

(c) international organisations under international treaties between states.

The territories used by the institutions and bodies of the European Union and international organisations are separate economic territories. A feature of such territories is that the only residents are the institutions."

4 Methodology

After the delimitation of the reference population, the collection of economic variables to the generation of income account (output, intermediate consumption, GVA, other taxes on production, other subsidies on production, gross operating surplus), by institutional sector was conducted. Afterwards, a simplified supply and uses table (SUT) for the ocean products was compiled, having as reference the SUT of PNA (127 industries x 433 products), which allowed to confront the supply and demand and assess the initial estimates. For the completion of this framework, it was necessary to calculate, by selected product, imports, exports, government consumption, private consumption, investment and intermediate consumption of the product. Whenever the detail of data sources allowed (namely Simplified Business Information – SBI/IES and general government administrative data), these values were obtained directly, without the use of coefficients.

Estimates for 2018 were also made, applying the Integrated System of Symmetric Input-output Matrices of 2017, published by Statistics Portugal, albeit without the analysis of the entire reference population, using a detailed study of the most relevant entities, of information relating to international trade and available detailed information of the final NA.

4.1 Main principles for the compilation of data

The design, data compilation and basic concepts used in the OSA pilot project followed the ones of ESA 2010 regulation and manual (Box 7).

Box 7 - Designing and compiling a satellite account - ESA 2010

According to the ESA 2010 Manual (§22.46):

"***Designing and compiling a satellite account consists of four steps***:

(a) defining the purposes, uses and requirements;

(b) selecting what is relevant from the national accounts;

(c) selecting relevant supplementary information, e.g. from various specific statistics or administrative data sources;

(d) combining both sets of concepts and figures into one set of tables and accounts.

Designing and compiling satellite accounts for the first time often reveals unexpected results during the four steps. As a consequence, drawing up satellite accounts is a work-in-progress. Only after experience of compiling and using the satellite, and making modifications where necessary, can an experimental set of tables be transformed into a mature statistical product.

In selecting what is relevant from the national accounts, three aspects can be distinguished: the international national accounting concepts, the operational concepts used in the national account statistics of a country, and the reliability of the national accounts statistics.

[…] Transforming a consistent satellite account into a product for data users may involve additional steps. An overview table with key indicators for a number of years may be introduced. These key indicators could focus on describing the size, components and developments of the specific issue involved, or may show the links to the national economy and its major components. Extra detail or classifications relevant for political and analytical purposes may be added. Detail with little value added or compiled at relatively high costs may be dropped. Efforts could also focus on reducing the complexity of the tables, increasing simplicity and transparency for data users and including standard book-keeping decompositions in a separate table."

Box 7 steps (a) to (c) were already described. Step (d) is described ahead.

The main variables, aggregates and statistical operations are listed and described ahead and in Annexes V and VI. It follows the methodology description by institutional sector and, finally, the building of a SUT for OSA.

4.2 Main variables, aggregates and statistical operations

ESA 2010 regulation and manual defines the main variables and statistic operations for the NA. The OSA used the same definitions, as referred ahead. Annex V details the main variables and aggregates definition from the list ahead:

- P.1 Output
- P.11 Market output
- P.12 Output for own final use

- P.13 Non-market output
- P.2 Intermediate consumption
- B.1g Gross-value added (GVA)
- P.3 Total final consumption expenditure (Households, Non-profit institutions Serving Households and Public Administration)
- P.31 Individual consumption expenditure
- P.32 Collective consumption expenditure
- P.4 Actual final consumption
- P.5 Gross capital formation (GCF)
- P.51c Consumption of fixed capital (CFC)
- P.51g Gross fixed capital formation (GFCF)
- P.52 Changes in inventories
- P.53 Acquisitions less disposals of valuables (ACOV)
- P.6 Exports of goods and services
- P.7 Imports of goods and services
- B.11 External balance of goods and services
- B.2g + B.3g Gross operating surplus and gross mixed income
- D.2 Taxes on production and imports
- D.3 Subsidies
- D.1 Compensation of employees
- D.11 Wages and salaries
- D.12 Employers' social contributions.

Employment was also considered (in full time equivalent – FTE):

- Total
- Self employed
- Employees.

The main ESA transactions and algorithms, as well as the main data sources, are listed in Annex VI. The listing is structured by ESA 2010 sequence of accounts, main set of tables (SUT) and by institutional sector.

4.3 Methodology by Institutional sectors

Similarly to the NA, the OSA reference population was grouped by institutional sector. This is justified by the difference in the calculation algorithms, as well as in data sources.

4.3.1 Non-financial corporations (S.11) and Households (S.14)

The compilation of variables for these institutional sectors was carried out based on the reference population defined in the previous stage for the following institutional subsectors:

- Non-financial corporations (S.11)
- Households (S.14).

The selected local KAU, which compose a subset of the NA universe, were classified according to the group they belong, among 9 groups (as defined in the Section 2.1.1), NACE Rev. 2 section, and total or partial character of the ocean related activity.

The initial compilation of data considered the extraction of detailed information for each unit, namely the relevant ESA 2010 transactions of the annual NA. This extraction used as data source PNA working files, files that convert accounting information from the Integrated Business Account System (IBAS/SCIE) into ESA 2010 transactions (output, intermediate consumption, compensation of employees, etc.), through algorithms.

Based on a detailed product analysis of the ocean products, a first estimate of the output allocation by product was made, having as reference output matrices of PNA. Those NA matrices are in a_{ij} format, where i corresponds to the industry (NRCN) - 127 industries) and j corresponds to the product (NPCN - 433 products), at current and constant prices, by institutional sector and by nature. A OSA matrix was extracted from that main matrix, containing only the OSA selected industries and products in each of the 9 groups considered. On a second estimate some adjustments were made, in order to shorten the range of products for each industry, considering only the main ones, regarding the ocean.

In the case of the ocean unit/KAU considered as partial, the output allocation was also partial, usually using a coefficient assigned to that specific KAU or through a coefficient attributed to that specific NACE Rev. 2/CAE Rev. 3 industry.

On a first phase, those coefficients were mainly obtained directly, by:

- Annual reports of the major units, whenever ocean activities could be individualized
- Estimates from ocean agents (professional associations, ocean clusters association, regulators)
- Etc.

Output (P.1), **Intermediate consumption (P.2), GVA** and the **total compensation of employees (D.1)** were estimated per unit/KAU and aggregated by group of industries.

$$\text{P.1 } estimate \ = \sum Ouput\ by\ product$$

$$\text{P.2 } estimate \ = \text{P.2} * \frac{\text{P.1 estimate}}{\text{P.1}}$$

$$GVA\ estimate = \text{P.1 } estimate - \text{P.2 } estimate$$

This methodology preserves not only the operational structure of the corporation (technical coefficient), but also the consistency between the different variables in the ocean output estimates.

$$\text{D.1 } estimate = \text{D.11} + \text{D.12}$$

where

D.11 – Wages and salaries

D.12 – Employers' social contributions

4.3.2 General government (S.13)

The OSA general government institutional sector' selected entities were classified according to the respective NACE Rev. 2/CAE Rev. 3 industry, the Classification of the Functions of Government (COFOG), the National Accounts Product Classification (NPCN) (resulting from NACE Rev. 2/CAE Rev. 3 in the case of non-market output) and OSA group (mainly group 8 – Maritime services).

The basic information used for these entities was the same that feeds the accounts of general government (S.13) and, in general, corresponds to the accounts of each of the entities on their annual plans or accounts or Standardized Accounting System (SNC).

The underlying values were classified in the respective Output/Distributive transactions of ESA 2010, using NA classification tables for the government output (S.13).

The following operations/transactions were determined using direct units' information: output (P.1) on ocean products, intermediate consumption (P.2), compensation of employees (D.1), other taxes on production (D.29) and other subsidies on production (D.39), as well as the Final consumption expenditure by general government on ocean products, the GVA and the operating surplus and gross mixed income, for the remaining variables.

To this end, the same base algorithms from the NA were used:

- **Output estimates (P.1)**

$$P.1 = P.11 + P.12 + P.13$$

with

$$P.13 = P.131 + P.132$$

where

P.11 – Market output

P.12 – Output for own final use

P.13 – Non-market output

P.131 - Payments for non-market output (partial payments)

P.132 – Non-market output, other.

The General Government (GG) institutional sector (S.13) produces mainly 'Non-market output, other' (P.132), which is the output provided for free or at not economically significant prices. This variable is determined by calculating the production costs, using the following algorithm:

$$P.132 = P.2 + D.1 + P.51c + D.29 \text{ paid} - P.11 - P.12 - P.131 - D.39 \text{ received}$$

where

P.11 – Market output

P.12 – Output for own final use

P.131 - Payments for non-market output (partial payments)

P.2 – Intermediate consumption

D.1 – Compensation of employees

D.29 – Other taxes on production

D.39 – Other subsidies on production

P.51c – Consumption of fixed capital.

All the transactions listed are usually directly calculated, with the application of the accounting elements conversion table of the entities to ESA 2010 transactions, although in some cases, some parcels have to be estimated indirectly.

- **Compensation of employees estimates (D.1) inherent to 'Non-market output, other' (P.132)**

The compensation of employees (D.1) is the result of three components:

$$D.1 = D.11 + D.121 + D.122$$

where

D.11 – Wages and salaries

D.121 – Employer's actual social contributions

D.122 - Employer's imputed social contributions.

Wages and salaries and actual employers' social contributions derived directly from the application of the conversion table between the accounts of entities and ESA 2010 transactions. On the contrary, imputed social contributions of employers (D.122[2]) were indirectly estimated, for each of the entities of the GG sector that were part of the OSA reference population.

- **Employer's imputed social contributions estimates (D.122)**

Estimations of Employer's imputed social contributions (D.122) in NA are divided into two categories: Employers' imputed pension contributions (D.1221) and Employers' imputed non-pension contributions (D.1222), that include the Government transfers to the General Retirement Fund (Caixa Geral de Aposentações - CGA), to face retirement expenditures for which CGA is responsible.

- **Intermediate consumption estimates (P.2)**

The estimate of intermediate consumption (P.2) on NA brings together two components. The first results from the direct application of the conversion table in ESA 2010 transactions to the items in the entities' accounts. Another comes from the treatment of Financial intermediation services indirectly measured (FISIM). FISIM calculations take into account the interests paid on loans and received on deposits. The shares of FISIM by institutional sub-sector and industry in the NA were used for the estimation of this service in OSA.

4.3.3 Financial corporations (S.12)

Following the definition of the OSA reference population for this institutional subsector, the extraction of detailed information was made for each unit, including the relevant economic operations of the annual NA, mainly from the SBI/IES, IBAS/SCIE and bank supervision data.

[2] "*Definition*: *employers' imputed social contributions (D.122) represents the counterpart to other social insurance benefits (D.622) (less eventual employees' social contributions) paid directly by employers to their employees or former employees and other eligible persons without involving an insurance enterprise or autonomous pension fund, and without creating a special fund or segregated reserve for the purpose.".* Source: EUROSTAT (2013), ESA 2010, page 90.

In an exploratory exercise a consistent allocation of economic data from the previously selected units/KAU was made for the ocean products and classified according to the OSA groups.

If the unit/KAU was partially ocean, the allocation of output, intermediate consumption and compensation of employees to OSA was also partial, usually through coefficients obtained from the NA, assigned to the main ocean product or more related to the industry. For each unit, intermediate consumption (*ditto* for compensation of employees) by industry was estimated in proportion to the respective output due to the total output of the KAU. Thus, it was preserved the operational structure of the company (technical coefficient and labour costs in total production) and the consistency between the different variables in the ocean products output estimates.

4.3.4 Non-profit institutions serving households (S.15)

Similarly to other satellite accounts, for each year, a systematic work was carried out for crossing data sources files that may be used in this sector, namely:

- SBI/IES - Simplified Business Information - given the characteristics of the NPISH units (S.15), preference was given to Annexes A (resident entities engaged, primarily, commercial activity, industrial or agricultural and non-resident entities with a permanent establishment) and D – Business simplified information (residents who do not exercise, primarily, commercial activity, industrial or agricultural)
- Social Security Wage Contributions Returns
- Database of the Instituto de Informática da Segurança Social (IT Department of the Portuguese Social Security), concerning the accounts and budget for the NPISH
- Statistics Portugal survey on the non-governmental organizations for the environment (NGOE)
- Annual reports of NPISH
- R&D Survey (IPCTN).

With the available information, estimates were made for the main variables: output, intermediate consumption, GVA, subsidies and compensation of employees, by NACE Rev. 2 and group, for the years 2016-2017.

The estimates used the following algorithm:

$$\mathrm{P.13} = \mathrm{P.2} + \mathrm{D.1} + \mathrm{P.51c} + (-\mathrm{D.39}) - \mathrm{P.11} - \mathrm{P.12}$$

where

P.2 – Intermediate consumption

D.1 - Compensation of employees

P.51c - Consumption of fixed capital

D.39 - Other subsidies on production

P.11 - Market output

P.12 - Output for own final use

P.13 - Non-market output

being:

$$P.2 + D.1 + P.51c + (-D.39) = P.13 + P.11 + P.12$$

or

$$P.1 = P.2 + D.1 + P.51c + (-D.39)$$

where

P.1 – Output

$$GVA = P.1 - P.2$$

Subsidies were treated using the data already processed by NA (GG accounts) by data source/paying entity and recipient entity classified as in the NA. The largest foundations had a specific treatment, with the appropriation of information already treated for the purposes of other accounts, including the SESA, the CSA and the SSA.

Combining all the information available from different data sources, it was possible to improve the clearance related to ocean products and groups. Note that treatment of NPISH (S.15) had an additional difficulty in that the units that make up this institutional sector show heterogeneous features, with different NACE Rev. 2/CAE Rev. 3 codes and various dimensions, with multiple very small units, with lack of information.

Gross Operational Surplus is estimated through the following balance relation, for all institutional sectors:

$$\text{Gross Operational Surplus estimate} = \text{GVA estimate} - D.1 \text{ estimate} - D.29 \text{ estimate} + D.39 \text{ estimate}\ .$$

where

GVA – Gross value Added

D.1 – Compensation of employees

D.29 – Other taxes on production

D.39 – Other subsidies on production.

4.3.5 The particular cases of education and R&D

Regarding **education**, an estimate was made for services related to teaching of subjects/courses linked to the ocean. This estimate was based on a pre-selection of courses unequivocally related to the ocean as described previously (point 3.3.). The identified high education institutions providing ocean courses are mainly public entities, classified in the institutional sector S.13. Thus, the calculation methods followed the same rules as described in 4.3.2. The coefficients for the fraction of the ocean costs on the total costs of an institution were calculated using, as a proxy, the ratio of the number of teaching hours in ocean courses in the institution over the total teaching hours in the institution.

For **Research and Development (R&D)**, the main data sources are IPCTN, SBI and a database from FCT individualizing the "ocean component" of its financing activity. The methodology was the same used by PNA to calculate the national R&D.

Calculations of R&D output and GFCF were based on ESA 2010 regulation and manual (Box 8) as well as the Frascati manual and followed the NA algorithms.

Several public academic institutions provide simultaneously high education ocean courses and R&D services on the ocean or ocean related. In those cases, the calculations were made for each institution considering both contributions individually.

4.3.6 The particular cases of tourism

Improvements were made regarding the first account's edition. Some of them resulted from adjustments necessary due to the breakdown by NUTS 1.

- **The coefficients calculation for accommodation, restaurants and travel agencies**

Following the internal discussions between Statistics Portugal, Statistics Azores and the Regional Directorate of Statistics of Madeira, on the data sources and methodology concerning coefficients calculation for accommodation, restaurants and travel agencies, the chosen option is synthetised on Table 4.

Table 4 – Tourism coefficients – options considered by NUTS 1

NUTS 1	Activity NACE code	Activity designation	2012	2016	2017	Data source
Mainland Portugal	55	Accommodation (excluding business tourism)	0,951	0,841	0,850	TSA
	56	Restaurants (excluding business tourism)	0,266	0,335	0,395	TSA
	79	Travel agencies	0,333	0,395	0,395	HBS "Beach"
Autonomous Region of Madeira	55	Accommodation (excluding business tourism)		0,958	0,958	RTSA
	56	Restaurants (excluding business tourism)		0,466	0,466	RTSA
	79	Travel agencies (% *incoming* + *outgoing*)		0,829	0,829	RTSA/HBS
Autonomous Region of Azores	55	Accommodation (excluding business tourism)		0,932	0,932	RTSA
	56	Restaurants (excluding business tourism)		0,398	0,398	RTSA
	79	Travel agencies (% *incoming* + *outgoing*)		0,650	0,650	RTSA/HBS

Notes: HBS "Beach"- Household Budget Survey regarding those expenditures that refer to travels with "Beach" purposes"; TSA – Tourism Satellite Account; RTSA – Regional Tourism Satellite Account

In this OSA edition, the procedure of excluding the parcel referring to business tourism was extended to the Restaurants activities. In the previous edition it has only applied to Accommodation's activities. The availability of regional Tourism Satellite Accounts, both for Azores and Madeira, allowed the usage of that same methodology.

Regarding Travel agencies, the method used in the first edition was now applied only to Mainland Portugal. This method consisted on the identification of the parcel of expenditure in travels done for “Beach” purposes, using the HBS by NUTs 1.

For Azores and Madeira, the Regional TSAs allowed the distinction between resident and non-resident consumers. To the residents’ expenditure parcel, the method applied was the same as for Mainland Portugal (when visiting their own Region or abroad - outgoing). For non-residents (incoming) it was assumed that all their expenditures concerned Ocean.

- **Travel agencies output**

Following ESA 2010, only the intermediation services were considered for the purposes of valuing the Travel Agencies' output. The value of intermediated services - accommodation, transport, etc. - was deducted, if included in the value of the provision of services. For coherence purposes, the same happened with the intermediate consumption of these entities. Therefore, the respective GVA does not change with this methodology.

4.3.7 Imputed rentals of second homes

The methodology used to estimate the imputed rents was based on the appropriation and stratification of the Census 2011 (general survey of the population and housing), as used by NA.

The methodology used makes it possible to infer, based on rents which were effectively paid, the rents to be imputed using a hedonic regression econometric model.

The model was estimated considering a vast set of attributes (337), namely in relation to location, size, accommodation type, kind of occupation and age.

For seasonal residence dwellings, the imputed rents followed the same methodological procedures to calculate the imputed rents. However, the fact that the dwelling was seasonally occupied meant that the rent was attributed for only a part of the year and not the entire year, as is the case with permanent houses.

After applying the model to the Census 2011 database all the dwellings were attributed an average monthly rental value. To determine the output of dwelling services the information derived from the use of the model was multiplied by 12 months (in the case of habitual residential housing) and by 3 months (for seasonal residential housing), thus obtaining a rental value per Nomenclature of Territorial Units for Statistics, Level 3 (NUTS 3) and according to type of occupation.

OSA only considered buildings in coastal areas and seasonal residential housing, therefore, only three months of rent were imputed to buildings located in coastal areas, all around the country.

Considering OSA reference years (2016-2018), estimated values were updated using the consumer price-index methodology (available at Statistics Portugal website: https://www.ine.pt/xportal/xmain?xpid=INE&xpgid=ipc&xlang=en).

In *Área Metropolitana de Lisboa* (Metropolitan area of Lisbon) and in *Área Metropolitana do Porto* (Metropolitan area of Oporto) coastal areas were identified with the help of real estate experts, due to the complexity of the real estate market in these cities, and to the vicinity of the ocean (and the rivers) in both cases. In the rest of the country, only geographical criteria were used to identify the buildings included in the OSA estimation of imputed rents.

For the Autonomous Regions of Azores and Madeira, OSA incorporated the specific estimates of the Regional Accounts/ NA for each of these regions and years of reference since the whole islander territories were considered due to the vicinity of coastal areas.

4.3.8 Financial Intermediation Services Indirectly Measured (FISIM) and Non-Life Insurance Services

This OSA edition incorporated the full calculation of Financial Intermediation Services Indirectly Measured (FISIM) and Non-Life Insurance Services accounted.

FISIM were calculated for each entity of OSA considering its main activity, using a similar distribution of FISIM by activity as used by NA. In the cases of S.11 and S.14, FISIM were calculated as follows:

- **S.11**

$$FISIM = \sum_i \sum_j \frac{(Deposits\ estimate + Loans\ estimate)OSAij}{(Deposits\ + Loans)NAi} * Total\ FISIM\ of\ NAi$$

Where:

- (Deposits estimates + loans estimate) OSA (previously multiplied by the ocean coefficient of each entity)
- i = main activity
- j = entity
- Calculations are made for each entity, by main activity

- **S.14**

$$FISIM = \sum_i \sum_j \frac{(\text{Output estimate})\text{OSA}ij}{(Output)NAi} * Total\ FISIM\ of\ NAi$$

Where:
- i = main activity
- j = entity
- Calculations are made for each entity, by main activity

At the end, FISIM obtained for OSA, by activity, was compared with total FISIM of NA, by activity, for S.11/S.14. Adjustments were made when it was exceeded.

For activities 03 - Fishing, 102 – Processing and preserving of fish, crustaceans and molluscs and 50- Water transports, its value was matched to the one of the NA. For the remaining activities, whenever they have exceeded the NA level, the lowest percentage for 2016 and 2017 was chosen and applied for the 2 years.

Non-Life Insurance Services (NonLIS), constituting intermediate consumption, were estimated for each entity j of each Institutional Sector i, based in its Gross Non-Life Insurance Premiums paid, as follows:

$$NonLife\ IS = \sum_i \sum_j \frac{(Gross\ NonLife\ IP\ paid)OSAij}{(Gross\ NonLife\ IP\ paid)NAi} * NonLife\ IS\ of\ NAi$$

Where:
- i = Institutional Setor
- j = entity
- NonLife IS = Non-Life Insurance Service
- Gross NonLife IP paid = Gross Non-Life Insurance Premiums paid
- Calculations of Gross Non-Life Insurance Premiums paid are made for each entity (previously multiplied by the ocean coefficient of each entity)

4.4 OSA supply and use tables

Building simplified supply and use tables (SUT) for the ocean was the last phase of the OSA. It mainly consisted on the confrontation of all information obtained independently, for the sake of consistency. The OSA supply and use table is a subset of the national supply and use table and it followed the same building criteria, defined on ESA 2010.

According to EUROSTAT, ESA 2010, page 23, "*Supply and use tables show the whole economy by industry (e.g. motor vehicles industry) and products (e.g. sports (*or ocean) *goods). The tables show links between components of GVA, industry inputs and outputs, and product supply and demand. Supply and use tables link different institutional sectors of the economy (e.g. public corporations) together with detail of imports and exports of goods and services, government expenditure, household and NPISHs expenditure and capital formation.*

Producing supply and use tables allows an examination of consistency and coherence of national accounts components within a single detailed framework and, by incorporating the components of the three approaches to measuring GDP (i.e. production, income and expenditure), enables a single estimate of GDP to be determined.

When balanced in an integrated manner, supply and use tables also provide coherence and consistency in linking the components of the following three accounts:

(1) goods and services account;
(2) production account (by industry and by institutional sector); and
(3) generation of income account (by industry and by institutional sector)".

This final phase of the OSA complemented previous validation steps. The balance between supply and use of the ocean products was also used as an indirect method to calculate the coefficients for partially ocean units. As an example, output and exports by product were systematically compared leading to output supplements in some cases. SUT follow the compilation of economic variables from the income account by institutional sector, industry and group:

- Output of ocean or ocean related products, (NPCN)
- Output at basic prices, by industry (NRCN) base 2016 (these being measured and reconciled with detailed values of the NA);
- Intermediate consumption valued at purchasers' prices;
- Ocean GVA;
- Compensation of ocean employees;
- Other taxes on ocean production;
- Other subsidies on ocean production.

For each year of the OSA, from 2016 to 2018, simplified SUT were subsequently prepared for the ocean or ocean related products by group (Figure 19), with reference to the national SUT of the PNA, that include 127 industries X 433 products. They followed the rules of ESA 2010 (Box 8).

To fill in these tables it was necessary to calculate several variables, by ocean or ocean related product. Whenever the detail of data sources has allowed, these data were obtained through their direct incorporation, in order to minimize the use of applying coefficients.

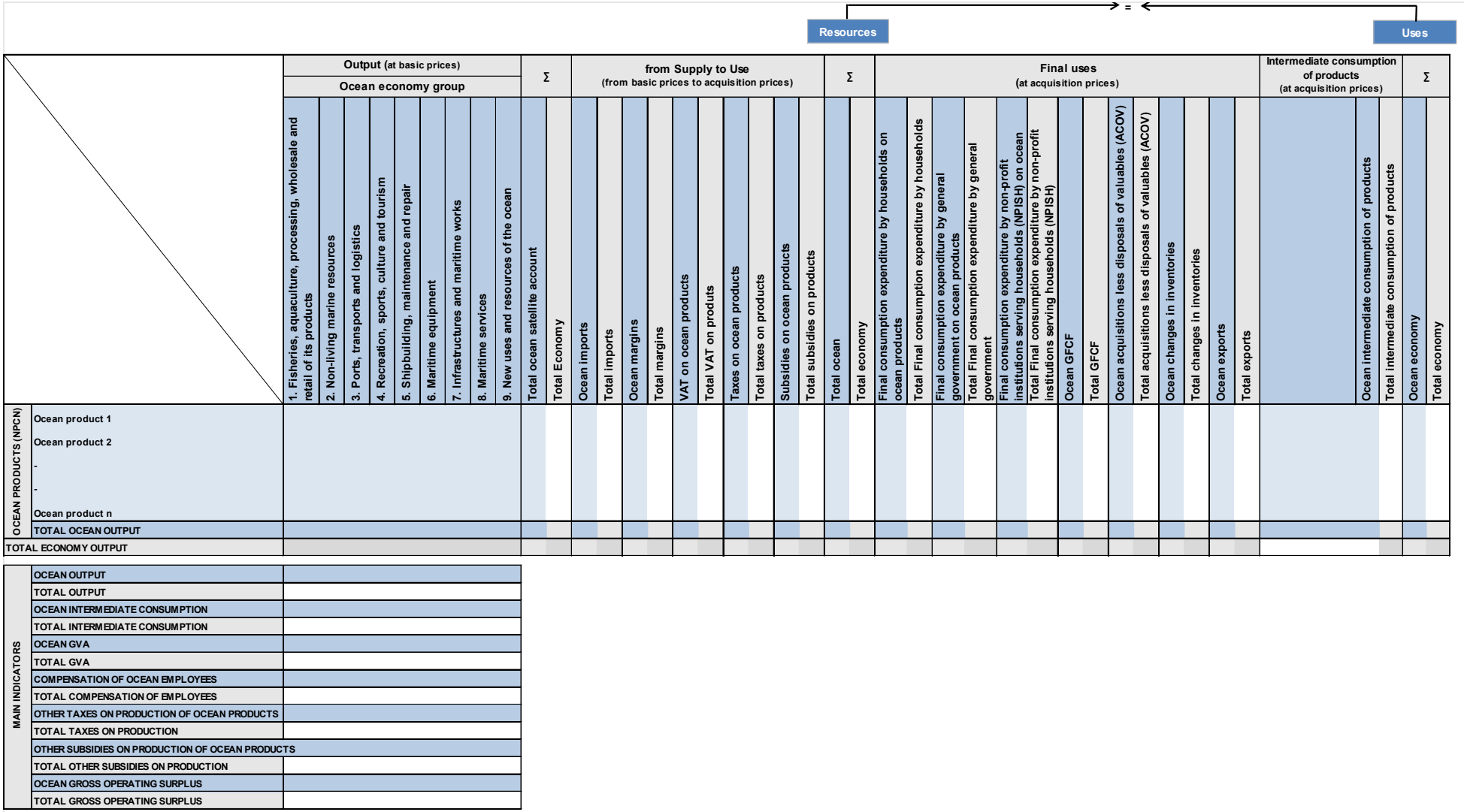
Thus, to obtain the **ocean resources** (supply) by product NPCN Base 2016 at purchasers' price, besides the output of ocean products at basic prices, the following variables were estimated for the ocean products:

- Imports;
- Trade and transport margins;
- Taxes on products (with a positive sign), subdivided between VAT and Other taxes on products;
- Subsidies on products (with a negative sign).

The **ocean uses** by product were obtained through the calculation of the following variables:

- Final consumption expenditure by: households, general government and NPISH;
- Gross capital formation;
- Exports;
- Intermediate consumption of ocean products, at purchaser prices.

Figure 18 - OSA supply and use tables



Source: Statistics Portugal

Box 8 - Supply and use tables (SUT) - ESA 2010

ESA 2010 (§9.06) refers the following:

"*In the supply and use tables the following identities apply:*

(a) for each industry, output equals intermediate consumption plus gross value added;

(b) for each product, supply equals the sum of all uses, shown in balanced rows in the supply and use framework.

Accordingly, ***for each product****:*

supply *at purchasers' prices is equal to*

output of the product at basic prices

plus imports at basic prices

plus trade and transport margins

plus taxes less subsidies on products

which ***is equal to use*** *of the product at purchasers' prices, which is equal to*

intermediate demand for the product

plus final consumption expenditure

plus gross capital formation

plus exports.

At the level of the total economy, total intermediate demand is equal to total intermediate consumption, trade and transport margins sum to zero over the whole economy as they are matched by the output of the margin industries, and so this identity can be stated as:

output + imports + taxes on products less subsidies on products = Intermediate consumption + final consumption +gross capital formation + exports

therefore

output – intermediate consumption + taxes on products less subsidies on products

= final consumption + gross capital formation + exports less imports

which shows the equivalence of the production and expenditure approaches to measuring GDP;

(c) gross value-added is the difference between output and intermediate consumption by industry. It is identical to the sum of the incomes generated. So ***gross value-added equals the sum of compensation of employees, consumption of fixed capital, net operating surplus/mixed income, and other taxes less subsidies on production.*** *This enables the consistency of the income approach to measuring GDP to be checked with the production approach.*

As a first step, the GVA calculation by group was made through the SUT, as well as the gross operating surplus by group. It was in the context of the balance between supply and use (supply and demand) for each specific product, that important decisions with an impact on determining the final GVA and its components were taken. In a second phase, the accounts of each institutional sector and the respective balances were analysed.

After the compilation of detailed results for 2016 and 2017, estimates were made for 2018 without a unit-by-unit analysis of the reference population, but using detailed information for some of the

most relevant entities (e.g., R&D units), international trade and the application of detailed coefficients from NA.

For each year in the OSA the values for the variables were checked in order to ensure a balance between supply and use. The confrontation and comparative analysis with detailed NA data, by sector and by product, implied sometimes the need to change the initial estimates. Additional comparisons between the values of the variables have been made, in the three years period, so that one could validate the appropriateness of certain ratios and/or coefficients.

4.4.1 Ocean resources (supply)

4.4.1.1 International trade estimation - imports

For the estimates on international trade, having NA international trade has framework, the Statistics Portugal International Trade of Goods database, the SBI and the Balance of Payments of Portugal from the Bank of Portugal, were considered as main data sources.

In a first phase, NA data were used directly for the products considered totally ocean. For other cases, in order to determine the ocean fraction of International Trade, the classification of international trade statistics was studied in detail. Whenever the classification allowed to determine the share (or fraction) related to the ocean, information of the respective flows to economic activity units that made up the OSA reference population was appropriated (for example, the detail of the Combined Nomenclature (CN) for fishing nets allowed the appropriation of information on imports and exports of ropes and nets). Whenever the detail of nomenclature was not enough to determine what fraction would be ocean, the economic activity units of the OSA reference population were studied, identifying the cases that would be more relevant and/or that would be specifically related to the ocean, considering only the trade flows of these units (e.g., in the case of "other electrical equipment", only imports and exports of units specifically related to the ocean were identified).

In the context of international trade, the final consumption expenditure of residents outside the national economic territory associated with hotels, restaurants and similar services and travel agency services, tour operators and other reserves and related services, were also considered as imports. The estimate for OSA was based on the Households Budget Survey (HBS/IDEF) structures and on the production structures of these products, calculated in the OSA compilation. Similarly, it was considered as exports the final consumption expenditure of non-residents in national economic territory associated with the hotel establishments services, restaurant and similar services and travel agency services, tour operators and other reservation and related services. It was adopted the same line of methodological operation that has been applied to imports of these products. Consequently, household’s consumption expenditures of these products are compliant with the residence principle.

When it was not possible to determine which part (or fraction) of international trade related to the ocean for the KAU from OSA reference population, no imports or exports were considered.

4.4.1.2 Trade and transport margins

In the case of trade (NACE Rev. 2 code Divisions 46 and 47), output was determined by combining the information on margin rates (retail and wholesale), product by product, with the information in the business database. Output of product trade is the sum of all trade margins. It was established a correspondence between product/group and the output (sum of trade margins of each product was imputed to the respective group). OSA assumed the trade margins estimated by PNA. Afterwards, Intermediate consumption and Compensation of Employees were estimated applying the technical coefficients observed by the commerce units in the reference population.

Trade margins (and transport margins) were identified as resources (national output and imports), imputed to the respective products and broken down according to the various uses. Thus, the output for NACE Rev. 2 code Divisions 46 and 47 is the sum of the trade margins estimated for the various ocean products.

Trade margins were calculated for the whole country and split afterwards between Mainland Portugal and the Autonomous Regions of Azores and Madeira. Each Autonomous Region's margins result from the application of the output (P.1) ratio of the Autonomous Region (AR) in the total country Portugal, to the margins of the country:

$$Margins\ (AR) = Margins\ (Portugal) * \frac{P.1\ (AR)}{P.1\ (Portugal)}$$

Where:

- P.1 = Output
- AR = Autonomous Region

4.4.1.3 Taxes on products

Taxes on products (D.21) are subdivided into VAT (D.211) and Other taxes on products except VAT (D.212 + D.214).

$$\mathrm{D.21} = \mathrm{D.211} + \mathrm{D.212} + \mathrm{D.214}$$

with

$\mathrm{D.211} = \text{value added type taxes (VAT)}$

D.212 = taxes and duties on imports excluding VAT

D.214 = taxes on products, except VAT and import taxes

VAT (D.211) was estimated applying the ratios, of OSA coefficient of product i produced plus imported in NA to the D.211 level of National Accounts (NA), by product i.

$$D.211 = \sum_i \left\{ D.211(NA)i * \left[\frac{P.1(OSA)i + M(OSA)i}{P.1\,(NA)i + M(NA)i} \right] \right\}$$

with

$D.211(NA)_i$= value added type taxes (VAT) from National Accounts, for product i

$P.1(OSA)_i$= output from OSA, for product i

$M(OSA)_i$= imports from OSA, for product i

$P.1(NA)_i$= output from National Accounts, for product i

$M(NA)_i$= imports from National Accounts, for product i

For other components of D.21 only D.212 is estimated, in general. The general algorithm for estimating D.212 applies the OSA coefficient of product i imported, in the total NA level of product i imports, to the D.212 level of National Accounts (NA), by product i.

$$D.212 = \sum_i \left\{ D.212(NA)i * \left[\frac{M(OSA)i}{M(NA)i} \right] \right\}$$

with

$D.212(NA)_i$= taxes and duties on imports excluding VAT from National Accounts, for product i

$M(OSA)_i$= imports from OSA, for product i

$M(NA)_i$= imports from National Accounts, for product i

Concerning petroleum products, the subset “Other taxes on products except VAT (D.212 + D.214)” is estimated together, applying the OSA coefficient of product i imported in the total NA level of product i imports, to the D.212 + D.214 level of National Accounts (NA), by product i.

$$D.212 + D.214 = \sum_i \left\{ [D.212(NA)i + D.214(NA)i] * \left[\frac{[P.1(OSA)i + M(OSA)i]}{[P.1(NA)i + M(NA)i]} \right] \right\}$$

with

$D.212(NA)_i$= taxes and duties on imports excluding VAT from National Accounts, for product i

$D.214(NA)_i$= taxes on products, except VAT and import taxes from National Accounts, for product i

$P.1(OSA)_i$= output from OSA, for product i

$M(OSA)_i$= imports from OSA, for product i

$P.1(NA)_i$= output from National Accounts, for product i

$M(NA)_i$= imports from National Accounts, for product i

Since taxes and duties on imports (D.212) and excise duties and consumption taxes included in D.214 depend directly or indirectly from imports and output, a proportion of these variables vis-à-vis their NA values is used.

4.4.1.4 Subsidies on products

Subsidies on products (D.31) were estimated applying the output ratios between OSA and NA, to the D.31 level of National Accounts (NA), by product i.

$$D.31 = \sum_i D.31(NA)i * \left[\frac{P.1(OSA)i}{P.1(NA)i}\right]$$

with

$D.31(NA)_i$= subsidies on products from National Accounts, for product i

$P.1(NA)_i$= output from National Accounts, for product i

$P.1(OSA)_i$= output from OSA, for product i

4.4.2 Ocean uses

4.4.2.1 *Final consumption expenditure by households, general government and NPISH*

The Final consumption expenditure definition, according to ESA 2010 "consists of expenditure incurred by resident institutional units on goods or services that are used for the direct satisfaction of individual needs or wants or the collective needs of members of the community." It is calculated by institutional sector according to the definitions described in Annex V.

- ***Final consumption expenditure (P.3) by households***

The primary data is obtained from the HBS/IDEF and the definition of households final consumption expenditure is described in ESA 2010, §3.94 (Annex 5).

In the case of products totally considered for ocean uses, OSA used the Final consumption expenditure by product from the NA. A thorough analysis was made to the final consumption of the households by objective (HBS/IDEF) and those uses considered ocean or ocean related, were included. For other products the ratio between Final consumption expenditure and output for the whole economy was considered as a proxy for the ocean share, applied to the ocean output figures.

- **Final consumption expenditure (P.3) by government**

According to ESA 2010, §3.98 , "*Final consumption expenditure (P.3) by government includes two categories of expenditures: (a) the value of the goods and services produced by general government itself (P.1) other than own-account capital formation (corresponding to P.12), market output (P.11) and payments for non-market output (P.131); (b) purchases by general government of goods and services produced by market producers that are supplied to households, without any transformation, as social transfers in kind (D.632). General government pays for these goods and services that the sellers provide to households*".

Conceptually:

$$P.3 = P.13 - P.131 + D.632$$

where

P.13 – Non-market output

P.131 – Payments for non-market output

D.632 – Social transfers in kind — market production purchased by general government and NPISH.

In the cases where the product was fully considered an ocean product (such as fish or maritime transport), the final consumption expenditure (P.3) by government corresponded to the value of NA final consumption expenditure (P.3) by government, for the product concerned. In other cases, the above formula was applied to the entity/KAU.

- **Final consumption expenditure (P.3) by NPISH**

The definition of NPISH final consumption expenditure is described in ESA 2010, §3.97 (Annex V)).

4.4.2.2 Gross Fixed Capital Formation (GFCF) estimation

ESA 2010 §3.124 defines Gross fixed capital formation (P.51g) (Annex V).

"*Gross fixed capital formation (P.51) consists of resident producers' acquisitions, less disposals, of fixed assets during a given period plus certain additions to the value of non-produced assets realized by the productive activity of producer or institutional units. Fixed assets are produced assets used in production for more than one year.*"

The types of gross fixed capital formation that can be distinguished are on Box 9.

GFCF by product was obtained from the NA GFCF matrix for the products totally considered for ocean uses. The primary data for the institutional sectors S.11 and S.14 was obtained from the SBI/IES.

Box 9 - Types of Gross Fixed Capital Formation - ESA 2010

According to ESA 2010 manual, (§3.127):

"*3.127 The following types of gross fixed capital formation are distinguished:*

(1) dwellings;

(2) other buildings and structures; this includes major improvements to land;

(3) machinery and equipment, such as ships, cars and computers;

(4) weapons systems;

(5) cultivated biological resources, e.g. trees and livestock;

(6) costs of ownership transfer on non-produced assets, like land, contracts, leases and licenses;

(7) R&D, including the production of freely available R&D. Expenditure on R&D will only be treated as fixed capital formation when a high level of reliability and comparability of the estimates by the Member States has been achieved;

(8) mineral exploration and evaluation;

(9) computer software and databases;

(10) entertainment, literary or artistic originals;

(11) other intellectual property rights."

Among these items (2), (3) and (7) were the most relevant for OSA.

Some cases were analysed, by their importance for the ocean uses, namely the investments in fishing ports, commercial ports, dredging and coastal protection and defence works. This set of investments was considered as GFCF in product 42 – Constructions and construction works for civil engineering. They include the industries considered as totally ocean: NACE Rev. 2 codes 03 – Fishing, 50 – Water transports and 5222 – Services activities incidental to water transportation, which data was compiled from the NA GFCF. Regarding construction works partially considered ocean or ocean related, a thorough analysis was made on the Public Works Observatory (OOP) databases. A search by contracting and awarding entities allowed the selection of the contracts regarding coastal protection and defence works, dredging and other projects related to ocean

works. The contractual value was assumed as the total investment and weighted by the contract period (from the date of contract signature on), to obtain the investment by project and by year.

GFCF for R&D was obtained as previously described in point 4.3.6., Box 9, and assumed in product 72 – Scientific research and development services.

For other products considered partially ocean or ocean related, GFCF was calculated assuming, as a proxy, the ratio ocean output by product/ output for the whole ocean economy applied to total GFCF for the economy.

$$GFCF\ (OSA)i = GFCF\ (NA)i * \frac{P.1\ (OSA)i}{P.1(NA)i}$$

where

$GFCF(NA)_i$= gross fixed capital formation from National Accounts, for product i

$GFCF(OSA)_i$= gross fixed capital formation from OSA, for product i

$P.1(NA)_i$= output from National Accounts, for product i

$P.1(OSA)_i$= output from OSA, for product i

4.4.2.3 International trade estimation - exports

The same text as for 4.4.1.1., on international trade estimation – imports, applies to the exports.

4.4.2.4 Intermediate consumption of ocean products, at purchaser prices, by group

The Intermediate consumption of ocean products, at purchaser prices (P.2) was calculated by institutional sector and by group as described in the methodology by institutional sector, in 4.4.

4.5 Employment estimation

According to ESA 2010, "§11.32, employment has the following definition:

"§11.32 *Definition: full-time equivalent employment, which equals the number of full-time equivalent jobs, is defined as total hours worked divided by the average annual number of hours worked in full-time jobs within the economic territory*."

In the context of the OSA elaboration, it was considered relevant to assess the relative importance of the ocean in terms of employment. Similar to the methodology adopted for the monetary variables, the estimate of employment followed NA approach.

Although different statistical approaches can be used to estimate ocean employment, it was considered that NA methodology would be the one that would provide a better measure for labour input.

Ocean employment estimates for the years 2016-2017 consisted in the calculation of Full Time Equivalent (FTE), employees (paid) and self-employed (unpaid), of industries and groups.

FTE was used as a measure of employment, as an alternative to jobs and individuals. It was considered more appropriate to compare with the associated output, as it considers the hours actually worked.

The estimate of employment in the OSA consisted of the calculation of FTE for economic activities considered and by institutional sector. More specifically, in the case of S.11 - Non-financial corporations and S.14 - Households, the output / FTE ratios from NA were used; in the case of S.13 - General Government and S.15 - Non-profit institutions serving households (NPISH), the compensation of employees/ FTE ratios, also from the NA, were used instead (since the output estimate for these sectors is based on the valuation of production costs, it was considered that the compensation of employees would be more directly related to employment variables).

Even though the described methodology was the most used, in many cases, focused analyses by group and industry was made and additional information from the original data sources was used.

In the case of General Government, that methodology was applied to the most populous group, group 8 - Maritime services, while in the other groups the calculation of employment was exhaustively calculated. The same happened with S.12 - Financial corporations, whose value was also estimated in an exhaustive manner.

Regarding the Autonomous Regions of Azores and Madeira, the methodology used was the same as for Portugal: NA ratios by industry and institutional sector were applied. Nevertheless, given the smaller representativeness of the OSA groups within each Region, there were more situations where original data, by entities, had to be assessed and directly considered. In those cases, within each OSA group, it was estimated an average compensation by industry (by job then converted into FTE); then the previously estimated OSA compensations were divided by that average compensation obtaining OSA FTE. This method allowed a more realistic picture of the specific reality of the OSA employment and economy within the Regions.

The calculation of employment and subsequent analysis (temporal and structure) also allowed to validate the resulting estimates of ocean SUT and, if necessary, revise previous estimates.

In summary, the OSA results do not correspond to the sum of information available for each unit/KAU selected for the final OSA reference population. The results have a macroeconomic nature and were estimated in accordance with the best methodological practices, adjusted to the national reality, to the available data sources, and to ESA 2010 rules, that are consistent with the PNA (benchmark-year 2016).

4.6 Measuring the OSA indirect effects on the economy

Direct effects measure the impact generated on activities resulting from an increase in the final demand directed at them. Indirect effects measure the entire chain impact generated in the various activities that supply the activities, when these increase their demand for factors of production to, in turn, meet an increase in final demand. In addition to the OSA direct effects, previously explained, it was possible to determine the indirect effects of the ocean economy activities on the national economy. This was accomplished by applying the 2017 Integrated System of Symmetric Input-output Matrices, published by Statistics Portugal, to the main OSA results. This system, respecting a general balance between aggregate demand and supply, represents the interconnections between industries, allowing the determination, under certain conditions and hypotheses, of the effect of propagation to the various activities of the variation in demand for ocean economy products. Among these hypotheses, the following stand out: constant technical coefficients; lack of economies of scale; absence of variation in relative prices and substitution effects; unlimited productive capacity; homogeneous products; and absence of financial restrictions.

5 The use of Ocean Satellite Account (OSA) for decision-making and monitoring

Concepts like blue economy, blue growth, ocean economy and other similar concepts are widely applied without any conceptual harmonisation at international level. In Portugal, namely for statistical purposes and in the framework of National Ocean Strategy (NOS), the concept widely used is ocean economy, as defined by OSA. At this stage it is important to remind that OSA and NOS go hand in hand: NOS is a fundamental reference to OSA and OSA supports NOS to establish concepts, that need to be in accordance with statistical methodological references. Nevertheless, when describing the international context in this chapter, there is the concern of respecting the international terminology adopted in those contexts (e.g., in the Blue Economy Report of DGMARE it is used the concept of Blue Economy).

This chapter presents different frameworks in which the OSA definitions, methodological framework and estimates are considered to support national obligations, policy monitoring and decision-making support. At the same time, these contexts have been a source/requirement during the OSA conceptualization and, hopefully, will continue in the future.

This chapter describes the progress made in the use of OSA for decision-making and monitoring of blue economy and opens other lines of work on the framework of NA to have better and more complete estimates of the national ocean economy and more comparable data at international level.

5.1 National context

5.1.1 National Ocean Strategy 2013-2020 and Mar-Portugal Plan

The OSA exercise for the period 2016-2018 is aligned with the National Ocean Strategy 2013-2020 (NOS 2013-2020)[3], that was the public policy umbrella in Portugal, until 2020. The NOS 2013-2020 identified the main areas of intervention and includes an action plan, the Mar-Portugal Plan, following the vison that the "*Mar-Portugal is a national designium whose potential will be implemented by the economic, social and environmental appreciation of the ocean and coastal areas, to the benefit of all the Portuguese*"[4] .

The long-term objectives established by the NOS 2013-2020 were:

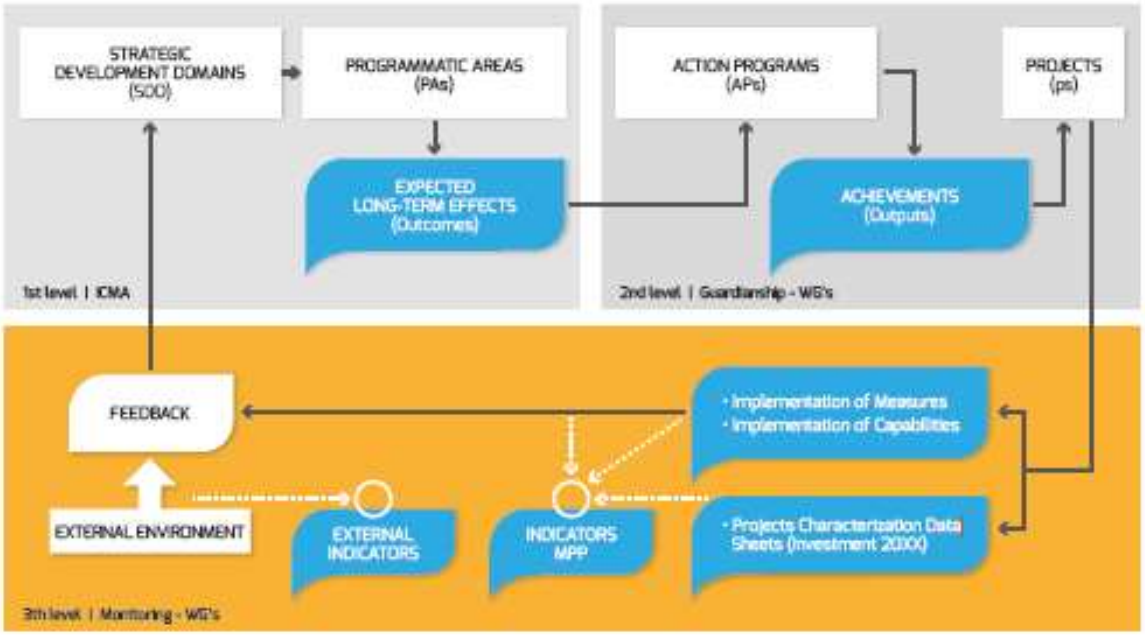
- To reaffirm the national maritime identity by promoting a modern, proactive and entrepreneur business sector in ocean economy;

[3] DGPM, National Ocean Strategy 2013-2020.

- To promote the economic, geopolitical and geostrategic potential of the national maritime territory through its action plan, Mar-Portugal Plan;
- To create conditions for attracting national and international investment in the different ocean economy sectors, promoting growth, employment, social cohesion and territorial integrity;
- To increase, by 2020, the direct contribution of the ocean economy to the national GDP by 50%;
- To strengthen national scientific and technological capacity;
- To promote Portugal, globally, as a leading maritime nation and as a key player of the Integrated Maritime Policy (IMP) and the European Union Maritime Strategy for the Atlantic (EUMSAA).

OSA estimates were used to monitor the unique long-term objective of NOS 2013-2020 with a quantitative goal (to increase, by 2020, the direct contribution of the ocean economy to the national GDP by 50%), being part of the monitoring process (Figure 19), and of the definition of the new NOS for the period 2021-2030 (NOS 2021-2030).

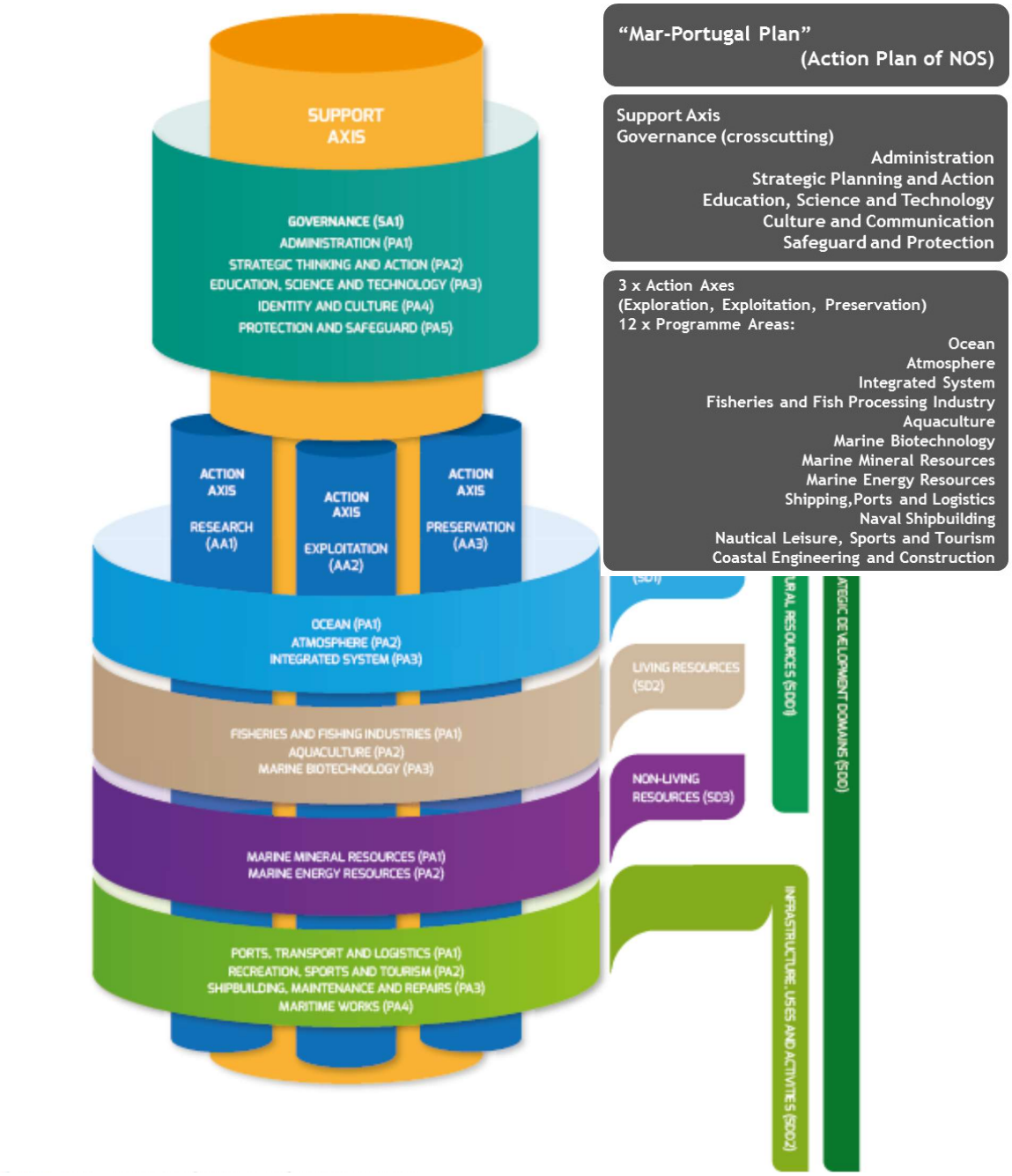
Figure 19 - Portuguese NOS 2013-2020, monitoring, evaluation, and review framework



Source: NOS2013-2020

The NOS 2013-2020 Action Plan, "Mar-Portugal Plan" (MPP), was organized according to Programmatic Areas (PA) and a support axis related with governance crosscutting issues (Figure 20).

Figure 20 - "Mar-Portugal Plan" (MPP) structure



Source: NOS 2013-2020

OSA is a very important tool to monitor the economic pillar of NOS 2013-2020 in the long term, by allowing the measurement of the relative macroeconomic importance of Ocean Economy and to follow the structural changes due to ocean related activities. For inter-sectorial analysis,

considering public and private bodies, the OSA relies on National Accounts, that are the underlying basis is the preferential way to coherently support the blue growth studies and comparisons.

Table 5 shows the relation between the different strategic development domains adopted in NOS 2013-2020 and the nine groups of activities considered in OSA.

Table 5 - Crosscutting table between OSA and NOS 2013-2020

OSA Groups of activities	NOS 2013-2020 – Strategic Development Domains				
	Living resources	Non-living resources	Infrastructures, Uses and Activities		Governance
			Industry	Services	
1. Fisheries, aquaculture, processing wholesale and retail of its products	x			x	x
2. Non-living resources		x			
3. Ports, transports and logistics				x	x
4. Recreation, sports, culture and tourism				x	
5. Shipbuilding, maintenance and repair			x		
6. Maritime equipment			x		
7. Infrastructures and maritime works			x		
8. Maritime services				x	x
9. New uses and resources of the ocean	x	x	x		

Source: Statistics Portugal and Directorate General for Maritime Policy, based on NOS 2013-2020

There is a two-way relation between OSA groups of activities and NOS 2013-2020 Strategic Development Domains, except for the cases of groups of activities 1, 3, 8 and 9. Groups 1 and 3 include the institutional sector of public administration bodies directly related to the group of governance activities, since this institutional sector is normally dedicated exclusively to those activities. Group 1 also includes business entities dedicated to wholesale and retail trade of fisheries products. Group 8 is a crosscutting activities' group, which includes all public administration bodies and business entities that provide services to all other groups of activities, excluding the ones already included in groups 1 and 3. Finally, group 9 includes the activities of new uses and resources of the ocean, that are part of three NOS 2013-2020' domains (living resources, non-living resources and industrial infrastructures, uses and activities. At the present, the economic estimates for Group 9 activities are undervalued and include activities strongly related with Research and Development (R&D). A broader analysis would require complementary indicators that do not result from NA, but that would enrich the NOS monitoring process.

In terms of geographical scale, NOS 2013-2020 is national, but the respective MPP considered a NUTS I division (Continent, Azores, and Madeira). As mentioned before, the OSA exercise for the 2016-2018 period considered this geographical disaggregation for the first time.

Considering that OSA results had a time-lag of 23 months to be available, relatively to the year in course, other economic and physical indicators, strongly correlated with economic performance, are needed for sectorial short-term analysis.

National legislation also envisages a mechanism, named ITI MAR (Integrated Territorial Investment of Sea)[4], to monitor and to assess how much the European Structural & Investment Funds (ESIF) have been funding ocean related projects, having in mind the objectives of the NOS. The OSA results also support and complement the ITI Mar strategic monitoring assessment. Considering the seven regional Operational Programmes (OP) of the Portuguese Multiannual Framework of ESIF for 2014-2020 (Portugal2020) for the five Portuguese Continental regions at NUTS 2 level, all with a coastal border, it would be important to have OSA estimates at higher level of regional disaggregation, namely considering a NUTS 2 level.

5.1.2 National Ocean Strategy 2021-2030

As previously mentioned, the definition of the new National Ocean Strategy 2021-2030 (NOS 2021-2030) considered OSA estimates for 2016-2018. The National Ocean Strategy 2021-2030 (NOS 2021-2030), approved in June 2021, will be the framework for marine and maritime affairs, including the blue growth agenda, in Portugal, until 2030.

Aligned with the main international references for sustainable development, such as the United Nations 2030 Agenda, the EU Green Deal, the EU Biodiversity Strategy 2030, and the Farm-to-Fork Strategy, NOS 2021-2030 vision is *to promote a healthy ocean, supported in scientific knowledge, as the only means to leverage a sustainable blue development, the Portuguese wellbeing and to consolidate Portugal as a global leader in ocean governance*[5].

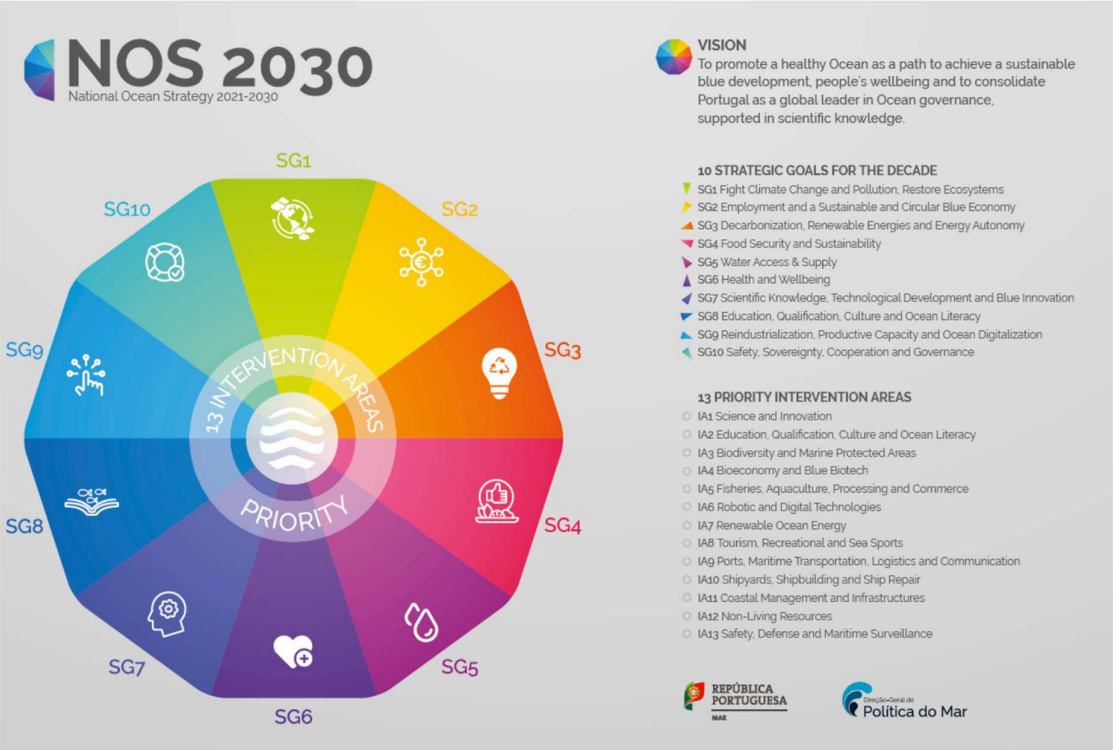
The NOS 2021-2030 defines 10 national Strategic Goals for the decade:

FIGHT CLIMATE CHANGE AND POLLUTION, PROTECT AND RESTORE ECOSYSTEMS
FOSTER EMPLOYMENT AND SUSTAINABLE AND CIRCULAR BLUE ECONOMY
DECARBONISE THE ECONOMY AND PROMOTE RENEWABLE ENERGIES AND ENERGY AUTONOMY
SUPPORT TRACEABILITY AND SUSTAINABILITY OF SEAFOOD SUPPLY CHAINS
FACILITATE WATER ACCESS AND SUPPLY
PROMOTE HEALTH AND WELL-BEING
STIMULATE SCIENTIFIC KNOWLEDGE, TECHNOLOGICAL DEVELOPMENT AND BLUE INNOVATION
PROMOTE EDUCATION, QUALIFICATION, CULTURE AND OCEAN LITERACY
PROMOTE REINDUSTRIALIZATION AND PRODUCTIVE CAPACITY AND OCEAN DIGITALIZATION
ENSURE SAFETY, SOVEREIGNTY, COOPERATION AND GOVERNANCE OF THE OCEAN

[4] DGPM, Relatório de Monitorização do ITI Mar 2020 (only Portuguese version is available)
[5] DGPM, National Ocean Strategy 2021-2030.

The NOS 2021-2030 action plan[6] includes a set of 185 measures, dully aligned with the 10 Strategic Goals for the decade and the 13 Priority Intervention Areas (Figure 21), to achieve the targets established for the year 2030 (baseline in 2020).

Figure 21 - NOS 2021-2030, Vision, Strategic Goals and Priority Intervention Areas



Source: Directorate General for Maritime Policy

The OSA Group of Activities are aligned with NOS Priority Intervention Areas (PIA), according to Table 6. There is a two-way relation between OSA groups of activities and NOS 2021-2030 Priority Intervention Areas, except for the cases of groups of activities 8 and 9.

Table 6 - Crosscutting table between OSA and NOS 2021-2030

OSA Groups of activities	PIA 1	PIA 2	PIA 3*	PIA 4	PIA 5	PIA 6	PIA 7	PIA 8	PIA 9	PIA 10	PIA 11	PIA 12	PIA 13
1. Fisheries, aquaculture, processing wholesale and retail of its products					x								
2. Non-living resources												x	
3. Ports, transports and logistics									x				
4. Recreation, sports, culture and tourism								x					
5. Shipbuilding, maintenance and repair										x			
6. Maritime equipment						x							
7. Infrastructures and maritime works											x		
8. Maritime services	x	x	x										x
9. New uses and resources of the ocean				x			x						

* Only includes public entities responsible for biodiversity planning and management which are considered under the National Accounts Public Administrations universe.

Source: Directorate General for Maritime Policy based on OSA and NOS 2021-2030

5.2 International context

5.2.1 Integrated Maritime Policy and Blue Growth in European Union

The importance of ocean economy for sustainable growth and society wellbeing, even during the crisis and pandemic scenarios is part of national and international agendas.

To achieve a sustainable blue economy, marine environment must be protected. Human pressures and their potential marine impacts must be assessed, forewarned, and mitigated and programmes of measures and monitoring the environmental status of marine ecosystems must be implemented. Ocean economy assessments play an important role in monitoring and instruments such as the OSA represent a tool to perform long-term macroeconomic analysis that guarantees coherence and international comparability.

The Communication from the European Commission "An Integrated Maritime Policy for the European Union"[7], the "Blue Book", marks a first step in IMP, recognizing the need for an integrated and an inter-sectorial approach, considering that a compartmentalized policy development and decision-making was no longer adequate in a context of rapid globalisation and competitiveness, climate change, degradation of the marine environment, maritime safety and security, and energy security and sustainability.

[7] EC (2007), Communication An Integrated Maritime Policy for the European Union.

The IMP, as proposed in 2007, was anchored in the Lisbon Agenda for jobs and growth and in the Gothenburg agenda for sustainability, based on the excellence in marine research, technology and innovation and focused on a wide range of sectors: shipbuilding and shipping, ports and fisheries, offshore energy (including oil, gas and renewables), coastal and maritime tourism, exploitation of mineral resources, aquaculture, blue biotech and sub-sea technologies. It was also considered important the recreational, aesthetic, and cultural humankind uses of the seas and of the ecosystem services they provide.

One of the major difficulties identified when launching IMP was the lack of information to support the development of policy measures: *"the need for improved socioeconomic data on the maritime sectors and coastal regions is also clear as difficulties in obtaining this information are limiting the ability of regional stakeholders to develop rational, long-term plans and investments".* In response to this, the "Blue Book" proposed to develop, by 2009, a database on socioeconomic data for maritime sectors and coastal regions to measure and systematically monitor the trends, the performance and progress of the Blue Economy. The "Study in the field of maritime policy - Approach towards an Integrated Maritime Policy Database", by Ifremer et al., constitute the main reference of this database and an important methodological reference of OSA.

In September 2012, a Communication from the Commission[8] established that the Blue Economy integrated individual sectors which are interdependent, rely on common skills and shared infrastructure, such as ports and electricity distribution networks, and depend on others using the sea sustainability. Blue economy is presented as a set of economic activities' value chains that include marine and maritime activities measured in terms of GVA and Employment.

The several studies performed by DG MARE[9] intend to answer to the need for monitoring the developments in the EU blue economy, inherent to the need to support the assessment of the progress of the IMP, of European Union Maritime Strategy for the Atlantic Area (EUMSAA) implementation and of Blue Economy.

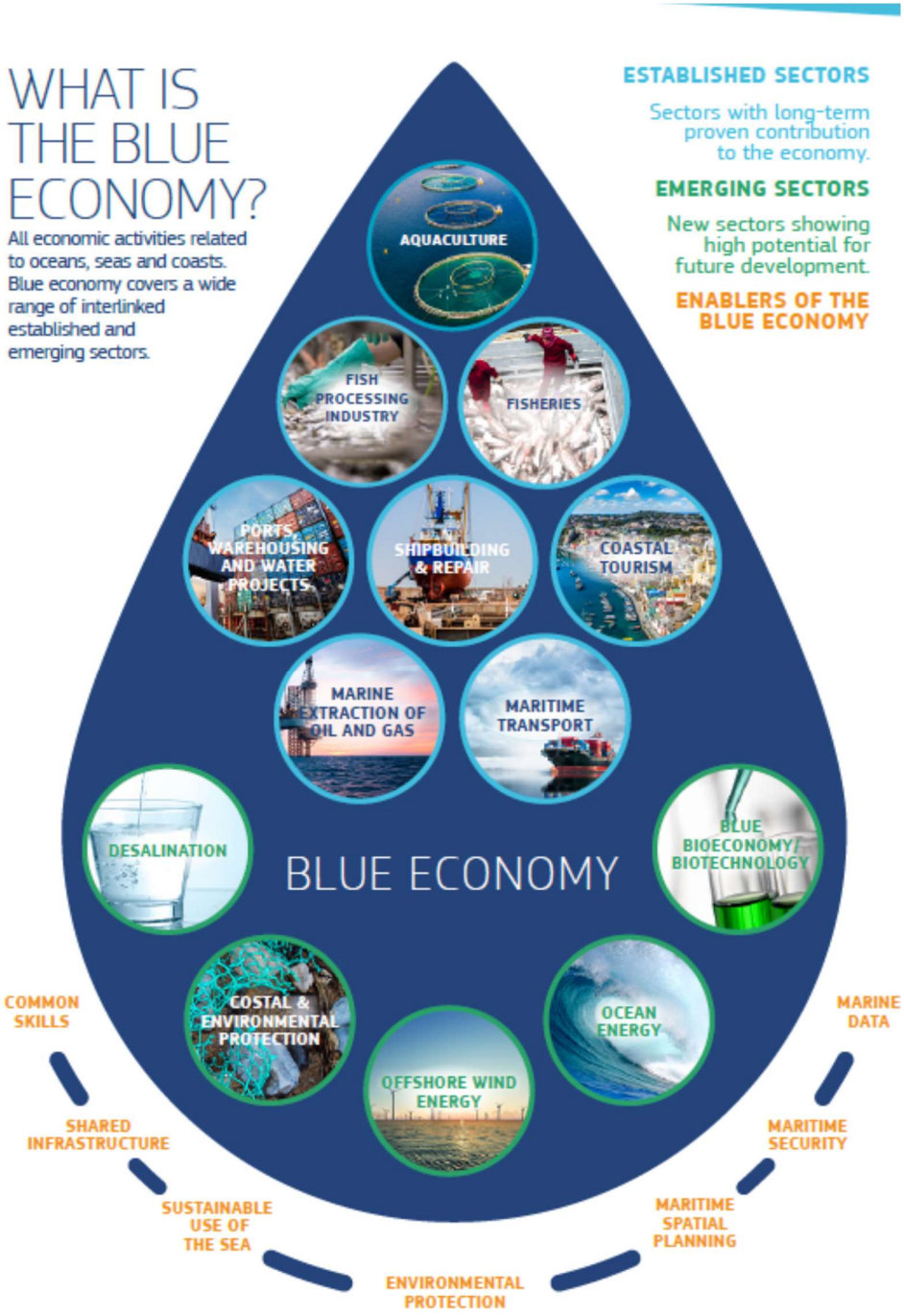
The first edition of the EU Blue Economy Report (BER) was published in 2018 and complemented the already existing reports of European Commission covering the EU fishing fleet, the EU aquaculture sector and the EU processing sector, but also the ones produced by other international organizations and maritime nations. The last edition occurred in 2021(June).

The main objective of this annual report is to measure and monitor the socio-economic impacts of EU Blue Economy, analysing the drivers behind trends. In BER, Blue Economy is defined as all economic activities related to oceans, seas, and coasts, covering a wide range of interlinked established and emerging sectors, being established and emerging sectors, that are part of

[8] EC (2012), Communication Blue Growth Opportunities for marine and maritime sustainable growth.
[9] Directorate-General of Maritime Affairs and Fisheries, European Commission.

Marine-based activities or Marine-related activities, encompassing all sectoral and cross-sectoral economic activities along the value chain.

Figure 22 – What is the Blue Economy?



Source: DG MARE, European Commission; Blue Economy Report 2018.

Established sectors are defined as those sectors that traditionally contributed to the blue economy (marine living resources; marine non-living resources; marine renewable energy, ports activities, shipbuilding and repair, maritime transport, and coastal tourism) while emerging sectors are defined as those sectors that bring new opportunities for investment and hold huge potential for future development of blue economy (ocean energy; blue bioeconomy and biotechnology, desalination, marine minerals, maritime defence, security and surveillance, research and education, and infrastructure and maritime works such as submarine cables, robotics).

Since the first edition of BER it is recognised by European Commission the need of valuing marine ecosystem services, when presenting a case study on this subject. Since 2019, BER dedicates a complete chapter on natural capital and ecosystem services, recognising the importance of ecosystem services for assessing the economic value of the Blue Economy.

Despite the different methodological framework OSA considers as methodological reference the work done and in progress by the European Commission / DG MARE in the blue Growth scope within BER, since:

- OSA methodology defines Ocean Economy as "Economic activities that take place at sea and others that are not taking place at sea but depend on it, including marine natural capital and non-tradable services of marine ecosystems " (which are not, however, recorded in the OSA);
- The scope of the Ocean Economy considered in the OSA aggregates activities in two main areas: "Established activities" and "Emerging activities" which, in turn, are divided into groups. It was considered nine groups, eight of which correspond to established activities (groups 1 to 8) and the last group 9 - New uses and resources of the ocean, which congregates emerging activities. The adopted criterion for the classification of economic activities as established or emerging obeyed the international logic of maturity level of the markets, namely what was followed in the EU, in the "Blue Growth" report for the purpose of international comparisons. The nine groups or value chains considered in OSA, respect the context of the blue economy initiative launched by the EC and are considered valuable for their monitoring, as it can be seen in Table 1.
- The first pilot experience of OSA considered only direct impacts while the 2016-2018 edition considered indirect impacts estimates applying the Integrated System of Symmetric Input-Output. Since OSA estimates are consistent with the National Accounts concepts (ESA 2010), these estimates can be compared with the main macroeconomic indicators (GVA and GDP).
- In 2016-2018 OSA exercise, the values presented in the 2020 BER edition were used as a reference for international comparisons, for timeliness reasons and because it includes almost all countries of the European Union, bearing in mind that there is no total harmonization in activities, products and methodologies considered in the European

Commission document and in the national OSA. Comparisons were made with some caution, and one should not try to identify strict differences in quantitative terms.

Note that estimates for EU Blue Economy are based in different types of data sources - primary or derived statistics, studies, production indicators -, and not exhaustive to all the institutional sectors that contribute to Blue Economy. All analyses of direct impacts of established Blue Economy sectors are based on two main data sources: Structural Business Statistics (SBS, Eurostat, for industry, construction, and trade) and EU Data Collection Framework (DCF) for the primary sectors (fisheries and aquaculture). For this set of established sectors, the main economic indicators (GVA and Persons Employed) are analysed at the EU level but also at national level emphasizing the contribution made by key Member States to the different sectors and the contribution of Blue Economy to national economies. When data is available for, indirect and induced economic effects are incorporated into specific Blue Economy sectors or are made references to in the specific sector analyses.

Eurostat intends to develop a methodological framework reference for the implementation of an OSA at the European level, and it is expected that Portuguese experience should be taken as reference.

Portugal is the only European country with an OSA. There are, however, some estimates of the value of the Ocean economy at global and regional level, as well as several studies carried out by some countries, which attempt to quantify the relative importance of the ocean in the economy (in terms of GVA / GDP and employment). Nevertheless, these estimates are not based in international and harmonized national methodological reference, as OSA is to what concerns NA framework. In this respect OSA is a step ahead.

Recently, under the Commission Communication on a new approach for a sustainable blue economy in the EU, Transforming the EU's Blue Economy for a Sustainable Future[10], it is recognized the importance of a sustainable blue economy to achieve the European Green Deal objectives, the Communication enhances the importance of "*reliable, high-quality and harmonised ocean data as the prerequisite for a sustainable transformation of the blue economy. Better knowledge of the ocean and its ecosystems, together with free access to data, will enable industry, public authorities and civil society to make informed decisions.*"

To create the knowledge needed for the transition to a sustainable blue economy, the Commission set up in 2021 a Blue Economic Observatory with the Commission's Joint Research Centre. In 2022, an Ocean Observation Initiative will be developed in order to structure and harmonise the collection of data in the oceans for different purposes, such as environmental monitoring, fisheries and aquaculture management, research, safe navigation. It is also foressen to release a stable

[10] EC (2021), Communication on a new approach for a sustainable blue economy in the EU, Transforming the EU's Blue Economy for a Sustainable Future.

methodology to integrate the concept of 'natural capital' in economic decisions. This implies assessing and quantifying both the economic value of marine ecosystem services and the socio-economic costs and benefits derived from keeping the marine environment healthy.

In Portugal, DGPM made available a Blue Economy Observatory[11], a monitoring platform that compiles main economic, social, and environmental indicators. The main reference sources are the SEAMInd project – Monitoring Indicators (that includes a networking between public entities with marine and maritime indicators) and the OSA. More recently, and fully aligned with the ambitions of the European Commission regarding the Blue Economic Observatory and the Ocean Observatory Initiative, Portugal has been investing in the implementation of the SEAMInd Platform, which intends to be an interoperable platform for indicators to support NOS monitoring. It is expected that the SEAMInd Platform constitutes a Portuguese contribution to the fullfilment of the Commission ambitions regarding a better knowledge of the ocean and its ecossystems.

5.2.2 Marine Strategy Framework Directive in European Union

The European IMP encompasses the protection and sustainable use of marine waters and marine resources and the Marine Strategy Framework Directive (MSFD)[12] is considered its environmental pillar. The main objective of the MSFD is to achieve or maintain Good Environmental Status (GES)[13] in the marine environment by the year 2020 at the latest.

Below are identified the main socioeconomic issues demanded by the MSFD, considering a simplified step by step implementation process to be followed by Member States, which include:

- An initial assessment that includes "an economic and social analysis of the use of those waters and the cost of degradation of the marine environment". Member States shall ensure that assessment methodologies are consistent across the marine region or sub-region, by means of a coordination defined in the MSFD, that includes the coordination within the Regional Sea Conventions (OSPAR convention in the Portuguese case);
- The determination of GES and the establishment of environmental targets and associated indicators, to guide progress towards achieving this status. Those targets must take into consideration social and economic contexts among other issues;
- The programme of measures to achieve or maintain GES in the marine waters can include economic incentives or subsidies, according to MSFD. Member States also shall focus on

[11] Blue Economy Observatory (only available in Portuguese version).
[12] Directive 2008/56/EC, establishing a framework for community action in the field of marine environmental policy (Marine Strategy Framework Directive).
[13] Article 3 of MSFD Directive defines Good Environmental Status (GES) as "the environmental status of marine waters where these provide ecologically diverse and dynamic oceans and seas which are clean, healthy and productive".

sustainable development and social and economic impacts of the measures when drawing up the programme of measures.

Nevertheless, the Directive states that Member States are not obliged to take specific measures when there is no significant risk to the marine environment or when the costs are disproportionate, taking into account the risks to the marine environment and providing that there is no further deterioration.

The socioeconomic analyses plays a significant role in the MSFD implementation process, as presented before, and the coordination, within each region or sub-region (OSPAR region in the Portuguese case), is important to guarantee consistent results and a good environment status at that geographic level.

The need for the definition of a common methodology for supporting the implementation of the MSFD by the different Member States was the basis for the definition of the Common implementation Strategy (CIS), agreed by the Member States and the EC. The WG ESA document[14] has been developed under the core of the Working Group on Economic and Social Assessment (WG ESA) and intended to be an advisory guidance, not binding, to support the consistency of the initial assessment. In 2018, this MSFD Guidance Document for CIS was updated[15] under the core of the WG POMESA (Working Group on Programmes of Measures and Economic and Social Assessment).

The WG ESA document describes two alternative approaches for the economic and social analysis of the use of marine waters that can be considered for this assessment:

- Ecosystem Services approach takes the ecosystem services obtained from marine waters as a starting point. This approach provides a qualitative assessment of the use of marine waters, identifies and, if possible, quantifies and values the welfare derived from the ecosystem services, using different methods to estimate the use and non-use values of these services, and identifies the drivers and pressures affecting the ecosystem services. This approach is an ambitious approach considering its starting point and the data requirements.
- Marine Water Accounts approach is based on the System of National Accounts (SNA), making use of the experience derived from the Water Account's Approach considered for the Water Framework Directive. This approach takes as a starting point economic sectors using marine waters. "Marine Water Accounts are based on the regional economic accounts. These give quantitative description of the economic processes in the various

[14] EC (2010), A Guidance Document, A non – legally binding document.
[15] EC (2018), Economic and social analysis for the initial assessment for the Marine Strategy Framework Directive (MSFD Guidance Document 1).

regions in the country in such a way that the economic processes can be linked to the national accounts." [16].

The WG ESA document considers the following activities as potentially relevant when identifying the economic sectors that use the marine waters:

- Aquaculture and marineculture;
- Shipping construction and transport;
- Coastal defence and flood protection;
- Defence – Military;
- Fisheries;
- Tourism;
- Mining (gravel, sand and shell extraction);
- Oil and gas;
- Cables (e.g., Power transmission, Telecommunications, Pipelines – interconnectors);
- Renewable energy (e.g., wind farms);
- Storage (of gases e.g., CO_2, CCS);
- Water abstraction;
- Water transport;
- The use of the marine water for waste and wastewater disposal (agriculture, industry, households etc.);
- Supporting infrastructure (e.g., ports, marinas, navigation aids).

The following indicators are proposed for assessing use values for these sectors:

- Value added;
- Production value;
- Income;
- Employment.

In the first cycle (2012-2018), the component of the socio-economic analysis was based on the economic accounts for marine waters. The characterization of economic/human uses or activities in the marine environment was carried out using a qualitative description, complemented by characteristic indicators of each activity, and by a set of relevant socio-economic indicators estimated considering NA with additional information for partitions (Gross Value Gross Added. Employment and Production Value).

[16] EC (2010), A Guidance Document, A non – legally binding document.

In the second cycle of the MSFD, the methodological references of the first cycle are maintained and deepened, in accordance with the methodology of economic accounts for marine waters and using the first estimates of the OSA.

The groups of economic activities of PT_OSA include the activities identified as relevant by ESA document. To what concerns new uses or activities, that in the national context are not considered established activities, they have a non-significant expression in PT_OSA as commercial activities and are included most of the cases in research and innovation activities.

The socio-economic analysis was based, namely, on the Production, GVA and Employment indicators and the additional sectoral indicators (in CAE Rev3), at NUTS I level when available. At that time the results from the pilot OSA 2010-2013 were at a national level and, in the case of human uses and activities that correspond to CAE exclusively at sea, OSA results were complemented with Business Statistics data for recent years and for a breakdown at the NUTS I level (Mainland, Azores, and Madeira).

The recent results of OSA for 2016 – 2018 already consider a NUTS I detail allowing a full appropriation of data for future cycles of MSFD implementation in Portugal.

Mulazzari and Malorgio (2017) refers that “the MSFD provides for an ecosystem-based approach to achieving GES, which is based on a strong vision of sustainability development, while the IMP is focused on weak sustainability, balancing the needs of different economic sectors”. In this view it is considered that ecosystem services analysis and cost of degradation very relevant.

The second cycle of MSFD implementation in Portugal included for the first time an analysis of the dependence on marine ecosystem services based on orientations included in the document “MSFD Guidance Document 14, version 5.1 - April 2018”, using the Common International Classification of Ecosystem Services (CICES). Table 7 was part of a technical note developed by DGPM to support and guide this first attempt to link the marine water uses and the marine ecosystems that they depend on.

This work constitutes a basis for future work towards an approach to ecosystem services. However, at time of the second cycle of the MSFD no methodological maturity and no available data were available, at national and European level, to adopt this methodology in the context of MSFD assessment. This exercise constitutes an input for the future development of a Marine Ecosystem Services Account.

Table 7 - Dependence on marine ecosystems of economic activities of Ocean Economy

Groups of economic activities for the ocean economy in PT_OSA	Dependence on marine ecosystems (ecosystem services on which the activity depends)	
	Issues related to	Concrete dependence ecosystem services refer to:
1. Fisheries, aquaculture, processing, wholesale and retail of its products		
Commercial Fishing, seaweed and other seafood	Food, regulation of harmful effects of residues, toxics and other contaminants and the maintenance of physical, chemical and biological	Spontaneous plants, algae and their outputs, wild animals and their outputs, all ecosystem services related to the regulation of waste, toxics and other contaminants, maintenance of juvenile populations, sites of reproduction and habitats, protection of genetic diversity, pest control, disease control and saltwater chemical conditions
Recreational fishing		Wild animals and their outputs, filtration / sequestration / storage / accumulation through ecosystems, maintenance of juvenile populations, breeding sites and habitats, protection of genetic diversity, pest control, control of diseases and and saltwater chemical conditions
Aquaculture		
Processing of fishery and aquaculture products		Common to the ecosystem services on which fishing and aquaculture activities depend, and the following can be identified: wild animals and their outputs, wild animals. aquaculture, filtration / sequestration / storage /accumulation through ecosystems, maintenance of juvenile populations, breeding sites and habitats, protection of genetic diversity protection, pest control, disease control and saltwater chemical conditions
Marketing of fishery and aquaculture products		Spontaneous plants, algae and their outputs, wild animals and their outputs, all ecosystem services related to the regulation of waste, toxics and other contaminants, maintenance of juvenile populations, sites of reproduction and habitats, protection of genetic diversity, pest control, disease control and saltwater chemical conditions
2. Non-living marine resources		
Conventional energy resources (oil and gas)	No ecosystem services on which the activity depends were identified	
Marine mineral resources	No ecosystem services on which the activity depends were identified	
Sea salt extraction and refining	No ecosystem services on which the activity depends were identified	
Water withdraw and desalination	No ecosystem services on which the activity depends were identified	
3. Ports, transports and logistics		
Ports and logistics	No ecosystem services on which the activity depends were identified	
Maritme Transport	No ecosystem services on which the activity depends were identified	
4. Recreation, sports, culture and tourism		
Recreational Boating	Food, the regulation of harmful effects of waste, toxics and other contaminants, maintaining physical, chemical and biological conditions and sustaining and enhancing spiritual and cultural interactions with ecosystems and landscapes	Wild animals and their outputs, all ecosystem services related to the regulation of waste, toxics and other contaminants and all ecosystem services related to the maintenance of physical, chemical and biological conditions of salt water. All ecosystem services realted with the enjoyment of landscapes and the physical use of landscapes in different environments
School water sports	Regulation of the harmful effects of residues, toxics and other contaminants and with the theme related to sustain and increase spiritual and cultural interactions with ecosystems and landscapes	All ecosystem services related to the regulation of waste, toxics and other contaminants and enjoyment of landscapes in different environments and physical use of landscapes in different environments
Sports Boating	Regulation of the harmful effects of waste, toxics and other contaminants, maintaining physical, chemical and biological conditions and sustaining and/or increasing physical and intellectual interactions with ecosystems and landscapes	
Marinas and recreational ports (infrastructures)		
Coastal Tourism	Food and sustaining and/or increasing physical and intellectual interactions with ecosystems and landscapes	All ecosystem services related to food, the enjoyment of plants, animals and landscapes in different environments, the physical use of marine landscapes in different environments and heritage, cultural, recreational and aesthetic values
Bathing	The maintenance of physical, chemical and biological conditions and the support and/or increase of physical and intellectual interactions with ecosystems and landscapes	Chemical conditions of salt water, enjoyment of landscapes in different environments and physical use of marine landscapes in different environments
Cruise Tourism	Sustaining and/or increasing physical and intellectual interactions with ecosystems and landscapes	Enjoyment of plants, animals and landscapes in different environments and physical use of marine landscapes in different environments

(continues)

(continuation)

Groups of economic activities for the ocean economy in PT_OSA	Dependence on marine ecosystems (ecosystem services on which the activity depends)	
	Issues related to	Concrete dependence ecosystem services refer to:
5. Shipbuilding, maintenance and repair		
Shipbuilding	No ecosystem services on which the activity depends were identified	
Naval maintance and repair	No ecosystem services on which the activity depends were identified	
6. Maritime equipment		
7. Infrastructures and maritime works		
Coastal defense work	No ecosystem services on which the activity depends were identified	
Patches for artificial feeding of coastal areas	No ecosystem services on which the activity depends were identified	
Dredged Immersion	No ecosystem services on which the activity depends were identified	
Cables, pipelines and submarine outfalls	No ecosystem services on which the activity depends were identified	
Artificial reefs	The maintenance of physical, chemical and biological conditions, specifically all ecosystem services related to the maintenance of physical, chemical and biological conditions	
Ports infrastructures	No ecosystem services on which the activity depends were identified	
8. Maritime services		
Education and R&D	The need of sustaining and/or enhancing physical and intellectual interactions with ecosystems and landscapes	The ecosystem services specifically identified correspond to the scientific and the educational
9. New uses and resources of the ocean		
Unconventional energy sources	No ecosystem services on which the activity depends were identified	
Marine Renewables	No ecosystem services on which the activity depends were identified	
Marine Biotechnoogy	The need of sustaining and/or enhancing physical and intellectual interactions with ecosystems and landscapes	The ecosystem services specifically identified correspond to the scientific and the educational
Unconventional energy sources	No ecosystem services on which the activity depends were identified	

Source: Directorate General for Maritime Policy, based on Estratégia Marinha, Relatório do 2º ciclo, Parte C Análise Económica e Social

Mulazzari and Malorgio (2017) also stated that "even if the SEEA[17] Experimental Ecosystem Accounting deliberately refrains from providing specific recommendations, it provides a logical framework for the estimation of a degradation-adjusted measure of GDP" and for this it would be relevant in the context of the MSFD implementation and future developments to enlarge the OSA.

Ecosystem services contribute to two categories of benefits for human well-being:

- The products produced by economic units, that could be referred to as SNA benefits, as these are considered to measure GDP and are already included in the OSA estimates;
- The benefits which are not produced by economic units, that could be referred to as non-SNA benefits, whenever they are not considered in the OSA estimates.

In the context of the SEEA Experimental Ecosystem Accounting (SEEA EA), these authors mentioned that "ecosystem accounting encompasses the measurement of the contribution of ecosystems to standard measures of economic activity, such as the GDP and the measurement of other benefits of human well-being which are commonly unpriced and not included in the GDP".

[17] System of Environmental Economic Accounting.

Additionally,[18], it takes a spatial approach to accounting, and "ecosystem accounts are commonly presented using maps, bringing together geographical, environmental, ecological, and economic information in one place, as well as tables". SEEA EA can be compiled at different spatial scales, including the subnational (e.g., protected area), and across marine areas.

This makes SEEA EA a very relevant methodology to go beyond OSA when making estimates of ocean economy.

5.2.3 Maritime Spatial Planning and Integrated Coastal Zone Management

Maritime Spatial Planning (MSP) is a key instrument for the IMP. In 2008 EU published a Roadmap for Maritime Spatial Planning[19] (MSP) and in 2009 the Intergovernmental Oceanographic Commission (IOC) of UNESCO published A Step-by-step Approach for Marine Spatial Planning[20]. Both documents consider the necessary steps for monitoring and evaluation MSP:

- The EU Roadmap recognises MSP as "a tool for improved decision-making. It provides a framework for arbitrating between competing human activities and managing their impact on the marine environment. Its objective is to balance sectoral interests and achieve sustainable use of marine resources in line with the EU Sustainable Development Strategy."[21] , highlighting the need for a transparent and regular monitoring and evaluation mechanism as part of MSP. This Roadmap also refers the need too incorporate monitoring and evaluation in the planning process since MSP occurs in an environment in constant change and, by this, the "planning process must be flexible enough to react to such changes and allow plans to be revised in due course. To meet these two requirements, a transparent regular monitoring and evaluation mechanism should be part of MSP". The document also mentions the need to develop an MSP based on sound information and scientific knowledge, and in an integrated system of information[22].

  The Roadmap also states that MSP "should be used to manage ongoing activities and guide future development in a sea area. A strategic plan for the overall management of a given sea area should include detailed objectives. These objectives should allow arbitration in the case of conflicting sectoral interests."

[18] https://seea.un.org/ecosystem-accounting
[19] EC (2008), Communication Roadmap for Maritime Spatial Planning: Achieving Common Principles in the EU.
[20] Ehler, C., and Douvere, F. (2009), Marine Spatial Planning: a step-by-step approach toward ecosystem-based management. Intergovernmental Oceanographic Commission and Man and the Biosphere Programme, IOC UNESCO.
[21] EC (2008), Communication Roadmap for Maritime Spatial Planning: Achieving Common Principles in the EU.
[22] At the present: European Marine Observation and Data Network (EMODNET), an integrated database for maritime socio-economic statistics (under ESTAT), the European Atlas of the Seas and the Global Monitoring for Environment and Security (Kopernikus).

- The Step-by-Step Approach proposed by Intergovernmental Oceanographic Commission (IOC) of UNESCO considers MSP "a practical way to create and establish a more rational organization of the use of marine space and the interactions between its uses, to balance demands for development with the need to protect marine ecosystems, and to achieve social and economic objectives in an open and planned way. Marine spatial planning (MSP) a public process of analyzing and allocating the spatial and temporal distribution of human activities in marine areas to achieve ecological, economic, and social objectives that are usually specified through a political process."[23]. MSP is a continuous process and is an interactive process that adapts over time. This Step-by-Step Approach identifies at least two types of monitoring relevant to MSP:
    - Assessment of the state of the system (for example, what is the state of biodiversity in the marine management area?);
    - Measuring the performance of the MSP management actions (for example, are the management actions we have taken to produce the outcomes we desire effective, efficient, and equitable?).

An effective performance monitoring system begins with a clear set of well-specified planning objectives, as recognized on the UNESCO Document. McLeod K. and Leslie H. (2009), cited by Douvere F. (2010). It considers that "since MSP aims at achieving social, economic, and ecological objectives, a range of social, economic, and ecological indicators will need to be identified and used to measure performance of the spatial and temporal measures taken toward achieving them".

The EU Directive on MSP[24], adopted in 2014, stated in the preamble that "maritime spatial planning should cover the full cycle of problem and opportunity identification, information collection, planning, decision-making, implementation, revision or updating, and the monitoring of implementation, and should have due regard to land-sea interactions and best available knowledge.".

At the national context, DGPM is responsible for the assessment of national maritime spatial planning instruments, in accordance with the powers assigned to DGPM as the national competent authority for monitoring the implementation of the Directive 2014/89/EU. DGPM competences in the context of MSP assessment is reinforced in Decree Law N 38/201525, recognizing DGPM competences in the promotion of the permanent assessment of the state of the maritime spatial planning of the national maritime space, namely considering the strategic objectives, priority areas, goals and indicators established for the monitoring and evaluating the National Ocean Strategy.

For these purposes DGPM ensures the collection and processing of relevant information, namely from the monitoring of the uses and activities of the national maritime space, preparing periodic evaluation reports, which focus on the socio-economic effects achieved and any environmental

[23]Ehler, C., and Douvere, F. (2009), Marine Spatial Planning: a step-by-step approach toward ecosystem-based management. Intergovernmental Oceanographic Commission and Man and the Biosphere Programme, IOC UNESCO.
[24] Directive 2014/89/EU, establishing a framework for maritime spatial planning
[25] Decree Law No. 38/2015 of March 12 – Develops LBOGEM and implementing Directive 2014/89/EU, establishing the legal framework for MSP

impacts identified, recommending, if necessary, the revision or alteration of the national maritime spatial planning instruments. This close link between the NOS strategic objectives and the assessment of the MSP results, makes the OSA estimates relevant for MSP assessment in Portugal.

OSA estimates provide relevant insights in long term socioeconomic outcomes of a MSP process, although some specific estimations are required specifically for the set of activities that take place on the marine zones. The recent developments at NUTS I level of the Portuguese OSA are also important for spatial measures, like MSP. Nevertheless, additional indicators and complementary analysis at a lower geographical level are need in the case of MSP.

Integrated, multidisciplinary and cross sector management ensuring consistency between the spatial planning of the national maritime space and the spatial planning of the land territory is a challenge. In particular, coastal zone is one of the principles imposed by Portuguese law to MSP. OSA results give some indirect insights for this since includes a chain value analysis that, in many cases, depends not only on activities in marine space but also on those that continues in land, coastal areas and other areas.

5.2.4 Convention for the Protection of the Marine Environment of the North-East Atlantic (and other Regional Sea Conventions)

MSFD requires that, in developing their marine strategies, Member States use existing regional cooperation structures to co-ordinate among themselves and to make every effort to coordinate their actions with those of third countries in the same region or sub-region.

In Europe, there are four cooperation structures which aim to protect the marine environment and bring together Member States and neighbouring countries that share marine waters: the Regional Sea Conventions (RSC):

- The Convention for the Protection of the Marine Environment in the North-East Atlantic, the OSPAR Convention (OSPAR)
- The Convention on the Protection of the Marine Environment in the Baltic Sea Area, the Helsinki Convention (HELCOM)
- The Convention for the Protection of Marine Environment and the Coastal Region of the Mediterranean, Barcelona Convention (UNEP-MAP)
- The Convention for the Protection of the Black Sea, the Bucharest Convention.

The Convention for the Protection of the Marine Environment of the North-East Atlantic (the "OSPAR Convention"[26]) entered into force on the 25 March 1998 and is the legal instrument guiding

[26] Convention for the protection of the marine environment of the North East Atlantic.

international cooperation for the protection of the marine environment of the North-East Atlantic, being the objective of protecting the marine environment of the North East Atlantic in line with the objective of MSFD to achieve or maintain GES. The Contracting Parties are Belgium, Denmark, Finland, France, Germany, Iceland, Ireland, Luxembourg, The Netherlands, Norway, Portugal, Spain, Sweden, Switzerland and United Kingdom, together with the European Union. OSPAR region corresponds to three of the regions identified within the Northeast Atlantic Ocean under Article 4 of MSFD:

- The Greater North Sea, including the Kattegat, and the English Channel;
- The Celtic Seas and
- The Bay of Biscay and the Iberian Coast.

Under the North-East Atlantic Environment Strategy (NEAES 2010-2020)[27], OSPAR activities are "guided by the application of the Ecosystem Approach which is the comprehensive integrated management of human activities based on the best available scientific knowledge about the ecosystem and its dynamics, in order to identify and take action on influences which are critical to the health of the marine ecosystems, thereby achieving sustainable use of ecosystem goods and services and maintenance of ecosystem integrity".

OSPAR has only recently begun to work on economic and social analyses. In 2013, the OSPAR report "Strategic Support for the OSPAR Regional Economic and Social Analysis"[28] identified some potential barriers that reduce the accuracy of a collated OSPAR-region ESA report and restrict its potential future usefulness to inform marine management measures: Some of the identified barriers were:

- "The different methods (approaches) as well as the variations on methods used will hinder the comparability of country data across the OSPAR Region. This is most relevant with regards to the: o limited number of sectors covered in most countries' ESA reports:
  - approaches selected to determine the costs of degradation;
  - lack of uniform business-as-usual scenarios; and
  - variable approaches to analyzing environmental impacts.
- "Different types of data (i.e., monetary, quantitative, and qualitative) will pose difficulties to creating a harmonized assessment. Moreover, varying quantitative/economic data types such as turnover and value added are also not directly comparable";
- "The use of different reference years or time series for economic data will hinder the compatibility of country data";
- "The coverage of economic sectors in the country WG ESA reports differ significantly, with a wide range of sectors defined, only three of which (commercial sea fisheries, Ports and shipping, and recreation) are common to all countries. Some sectors are included in most

[27] OSPAR COMMISSION (2021), The North-East Atlantic Environment Strategy
[28] OSPAR COMMISSION (2013), Strategic Support for the OSPAR Regional Economic and Social Analysis

countries with understandable absences in others. Some sectors' omissions from some country reports, however, reflect important differences in how countries choose to classify their activities."

However, there were also some areas with compatibility between data, such as most countries using the Marine Accounts Approach and reporting employment figures for key sectors.

The report presents the first collated data of OSPAR ESA data. The sectors covered by the OSPAR 2013 document were those reported for enough countries to give a reasonable picture of activity in the OSPAR region namely:

- Commercial sea fisheries;
- Recreation & Tourism
- Ports and shipping;
- Aquaculture;
- Oil and gas;
- Renewable energy;
- Aggregate extraction;
- Submarine cable setting and maintenance.

Estimates presented for the covered sectors referred to turnover, Gross Value Added and Employment. A series of recommendations were presented to improve the consistency in OSPAR countries' ESA data. It was included in the recommendations the need to identify options for coordination on methodological issues (e.g. definitions used by national statistical offices). Some examples were given:

- "Adopt common terminology for the same or similar marine sectors and activities (e.g. navigation is described in different ways by different countries);
- Adopt a common format for reporting definitions of marine sectors and activities (i.e. share the parameters through which definitions are made). For example, marine tourism accommodation may often be described by distance to the coast".

Some of the suggestions presented in OSPAR 2013 document were accommodated in OSA methodology with all the activities covered by OSPAR being part of OSA universe.

In line with NEAES 2010-2020, OSPAR countries are committed to continue to progressively implement the Ecosystem Approach to the management of human activities to reduce impacts on the marine environment, considering all pressures from human activities on the marine environment.

In a broad context, economic and social analysis in OSPAR region is based on statistical data used by EU Member States who are contracting parties of MSFD. Contracting Parties agreed to use as

far as possible the internationally agreed nomenclature of economic activities (NACE). Despite these arrangements, the collected national data are not fully comparable. Two important differences relate to the level of detail at which the economic sector and its sub-activities are reported and to the scale of the reported indicators (national data versus national part of the regional sea).

OSA estimates are a potential data source that provide comparable and harmonized data for ESA, since is possible to obtain direct information for all the sectors covered by OSPAR ESA, including market and non-market data by NACE codes.

Table 8 - NACE Rev. 2 class codes with a total inclusion in OSA

	NACE Rev. 2 Class Codes with a total inclusion level in OSA
Commercial sea fisheries and Aquaculture	**03.11 Marine fishing** **03.21 Marine aquaculture** 10.20 Processing and preserving of fish, crustaceans and molluscs 47.23 Retail sale of fish, crustaceans and molluscs in specialised stores (03.12 Freshwater fishing) (03.22 Freshwater aquaculture)
Ports and shipping	**50.10 Sea and coastal passenger water transport** **50.20 Sea and coastal freight water transport** 77.34 Renting and leasing of water transport equipment 52.22 Service activities incidental to water transportation (50.40 Inland freight water transport)
Shipbuilding, maintenance and repair	30.11 Building of ships and floating structures 30.12 Building of pleasure and sporting boats 33.15 Repair and maintenance of ships and boats
Recreation, sports, culture and tourism	**50.30 Inland passenger water transport** 50.40 Inland freight water transport

The use of satellite accounting in the core of Portuguese NA will also provide some insights on Recreation & Tourism, considering results from the Tourism Satellite Accounts and the geographic criteria adopted in this report for Group 4 - Recreation, Sports, Culture and Tourism. The shipbuilding and maintenance and repair are not considered within OSPAR report, but it is possible to consider NACE Rev. 2 codes with total inclusion on the OSA. Special attention shall be given to the fact that these indicators correspond to national figures that do not match necessarily to the OSPAR region. Because of this, proxy use would be necessary.

This discussion about the opportunity of OSA use, in the OSPAR framework, would be also useful for the other European Sea Conventions, although the main activities and the most significant environmental problems could be different.

As for OSA methodological references and challenges towards natural capital services accounting, Intersessional Correspondence Group on Economic and Social analyses, OSPAR (IGC ESA) has been developing some studies and workshops on this subject:

- In September 2018, IGC ESA organized a workshop on natural capital and ecosystem services, hosted by The Netherlands. The objective of the workshop was the exchange experiences with these rather new concepts and to determine the potential role and relevance of natural capital and ecosystem services in socio-economic analyses –in general – but more specifically for OSPAR plans and strategies. As a follow up of this workshop the OSPAR group on economic and social analysis supervised the preparation of the "Report on possibilities of application of Ecosystem Services and Natural Capital approaches in OSPAR activities"[29].
- In July 2021, OSPAR held a special meeting on Marine Natural Capital Accounting, with presentations on what natural capital accounting is and how it can be used to support decision-making. Experiences were shared from Australia, South Africa, Canada, Finland, France, The Netherlands, United Kingdom, Norway, and Spain. Also, a first version of natural capital accounts for the OSPAR area was presented.

The work developed by OSPAR in Natural Capital Accounting (NCA) is in line with the new economic and environmental framework, the SEEA EA[30] adopted by the UN Statistical Commission in March 2021. NCA and ecosystem accounting are on the global and European agenda and will be considered in OSPAR's North-East Atlantic Environment Strategy 2030 launched at OSPAR's Ministerial meeting on 1 October 2021.

5.2.5 Ocean Economy Assessment by OECD

The report "The Ocean Economy in 2030"[31] was the first endeavor by OECD, under the Directorate for Science, Technology, and Innovation (STI), to consider the global oceanic activities with an economic and foresight perspective, with a view to supporting national and international efforts towards a more sustainable development of the ocean economy in the future. This report presented a first estimate of the global value of the ocean economy, measured in terms of the ocean-based industries' contribution to economic output (GVA) and employment (jobs). The results were disaggregated by economic sectors and broad geographic regions. The ocean-based industries selected were:

- Industrial capture fisheries;
- Industrial marine aquaculture;

[29] Report on possibilities of application of Ecosystem Services and Natural Capital approaches in OSPAR activities
[30] UN Statistical Commission (2021), SEEA Ecosystem Accounting (SEEA EA), Final draft
[31] OECD (2016), The Ocean Economy in 2030.

- Industrial fish processing;
- Maritime and coastal tourism;
- Maritime equipment;
- Offshore oil and gas;
- Offshore wind.
- Port activities;
- Shipbuilding and repair;
- Water transport.

This selection excluded economic activity in the artisanal and/or self-employment activities which are significant in some parts of the world (e.g., capture fisheries, aquaculture and shipping). Some were not considered due difficulties in access to data at international level (e.g., marine biotechnology, ocean renewable energy, seabed mining) and others due to the fact that some new activities have not yet developed to a commercial scale at a world level (e.g., marine biotechnology, ocean renewable energy, seabed mining).

Several progresses have been made in OECDs Ocean Economy Agenda, with the work that is being developed in the core of the OECD's STI Ocean Economy Group, which mission is to improve the measurement of ocean economic activities, and provide evidence on the role of science, technology, and innovation as drivers of ocean sustainability, to support policy makers. STI Ocean Economy Group research and analyses refer to:

- Measuring ocean economic activities (taking into account their sustainability aspects)
- Tracking developments in ocean economy knowledge and innovation networks
- Researching / building ocean science, technology and innovation related indicators with the ocean research community
- Providing evidence on the economics of sustained ocean observations and
- Exploring advances in ocean-based technologies.

More recently, the report "Rethinking Innovation for a Sustainable Ocean Economy"[32] constitutes a second international reference of OECDs work in this area. OECD continues the effort to develop Internationally Comparable Statistics on Ocean Economic Activity[33].

Portugal is part of the STI Ocean Economy Group since the beginning, in a partnership between DGPM and the Fundação para a Ciência e Tecnologia (FCT). Under the implementation of OSA-PT this partnership also considers the active collaboration of Statistics Portugal.

The experience of the two Portuguese OSA is internationally recognised, since Portugal is one of the two OECD countries (United States of America was the second one to publish an OSA) that

[32] OECD (2019), Rethinking Innovation for a Sustainable Ocean Economy.
[33] Jolliffe, James; Jolly, Claire; and Stevens, Barrie (2021) "Key Considerations for the Development of Internationally Comparable Statistics on Ocean Economic Activity," Journal of Ocean and Coastal Economics: Vol. 8: Iss. 2, Article 6.

compile OSA and, as already mentioned, is the only European country with this statistical instrument. This allows Portugal to have an active participation in the definition of international methodologies but also in knowledge sharing.

Portugal will continue to participate in the STI Ocean Economy Group. Looking ahead the OECD work program, the proposed activities are much in line with the work done and is aligned with the work in progress and policy priorities in Portugal. In the context of improving the measurement of ocean economy, and after the experience gathered in the Portuguese OSA for 2016-2018, Portugal intends to explore the use of OECD's Input-Output Tables (IOTs) and Inter-Country Input-Output (ICIO) Tables in order to better understand indirect impacts of the ocean economy and to inter-country flows, providing also a contribute to a future analysis on the supply chains. Other ambition is to measure the impact of unpredictable/conjunctural events in the ocean economy and in the correspondent global value chains.

Portugal is a pilot to analyze the economics of marine/ocean observations to better understand the value chains of marine data in place, namely those based on public data made available for free. These are not well traced and understood, and their recognising can be a source of improvement for future exercises of the OSA.

5.2.6 United Nations World Ocean Assessment

The Regular Process for Global Reporting and Assessment of the State of the Marine Environment, including Socioeconomic Aspects (the Regular Process) is a process of United Nations General Assembly responsibility with the purpose of "contributing to the strengthening of the regular scientific assessment of the state of the marine environment in order to enhance the scientific basis for policymaking"[34].

"The regular process under the United Nations would be recognized as the global mechanism for reviewing the state of the marine environment, including socioeconomic aspects, on a continual and systematic basis by providing regular assessments at the global and supra-regional levels and an integrated view of environmental, economic and social aspects […] Ecosystem approaches would be recognized as a useful framework for conducting fully integrated assessments"[35].

The Regular Process concluded the first and the second cycles (2010-2014 and 2016-2020). The third cycle, launched by the General Assembly in December 2019, covers five years (2021 to 2025).

The First Global Integrated Marine Assessment (World Ocean Assessment - WOA) was the output of the first cycle of the Regular Process (2010 to 2014) and was released at the end of 2015. Its

[34] World Ocean Assessment: United Nations Regular Process.
[35] United Nations (2010), Oceans and the law of sea.

findings were alarming, with experts' warnings that the ocean is facing major pressures simultaneously with such great impacts that the limits of its' carrying capacity are being, or in some cases have been, reached. The report includes an analysis of some sectors, namely:

- Capture fisheries;
- Aquaculture;
- Seaweeds;
- Shipping;
- Ports;
- Submarine cables and pipelines;
- Offshore hydrocarbon industries;
- Other marine-based energy industries;
- Offshore mining industries;
- Marine debris;
- Tourism and recreation;
- Desalinization;
- Use of marine genetic resources
- Marine scientific research.

The Second World Ocean Assessment (WOA II) is the major output of the second cycle (2016-2020) of the Regular Process. Lessons learned from the First Cycle of the Regular Process consider the need to include more data on socioeconomic aspects and the need for more diversity in the professional backgrounds of the Experts Group members, economic and social aspects expertise, alongside the knowledge on marine science.

One of the outputs of the third cycle of the Regular Process will be the production of one or more assessments of the marine environment, including socioeconomic aspects. It will also include a coherent capacity-building programme with the aim of strengthening the ocean science-policy interface at national, regional, and global levels.

The second cycle did not consider the methodology proposed by the OSA. In this third cycle, and to what concerns Output I: Assessment(s) of the state of the marine environment, including socioeconomic aspects, OSA methodology would be considered since it is an important reference for the application of a comparable and integrated analysis of ocean economy, by considering the activities that depend on the ocean goods and services and the value chains which they belong to. Portugal expertise in OSA, including technical reports published, would be an added value in *Ad-Hoc* Working Group.

5.2.7 Convention on Biological Diversity

Our planet is currently facing life-threatening emergencies that put human societies at risk. Biodiversity loss is one of such emergencies. Biodiversity is deteriorating worldwide at an unprecedented rate and will continue to worsen under business-as-usual scenarios, putting at risk of extinction over 1 million species and jeopardizing the provision of ecosystem services essential for environmental, social and economic reasons. This situation derives mostly from current economic and financial systems' failure to account for the essential products and services provided by biodiversity.

Thus, to reverse biodiversity loss, besides other concrete measures, all biodiversity values must be recognized in key national policy and planning documents, as proposed at the Post-2020 Global Biodiversity Framework currently under discussion at the Convention on Biological Diversity.

Developing tools that enable the integration of biodiversity values into policy instruments across all sectors of the economy is a crucial step forward in this regard. In order to account for the contribution of ecosystem services to the economy it is fundamental to incorporate them into national accounting systems.

Quantifying the benefits provided by nature to the society is far from an easy task, but models and analytical frameworks are under development and discussion.

In Portugal, the work performed under the Ocean Satellite Account, in support of the National Ocean Strategy, recognizes the relationship between the ocean economy and marine ecosystem services. This relationship has been recognized since the beginning of the definition of OSA. Indeed, the definition of ocean economy established for statistical proposes includes the marine natural capital and non-tradable services of marine ecosystems, though the latter are not considered in the OSA results.

The marine biodiversity data and information gathered under MSDF and nature legislation, namely other European Directives and the Convention on Biological Diversity, are considered under the OSA and National Accounts works in Portugal of major importance for accountability exercises.

Ecosystem assets are spatial areas from which ecosystem services are generated but for marine areas there are some other considerations, that are not considered for terrestrial ecosystems, which are yet to be fully worked through, e.g., depth of the ocean (Mulazzari, L. and Malorgio, G., 2017).

The NOS 2021 – 2030 includes a target "To classify 30% of national maritime area as protected by 2030, approving the respective management and conservation plans, and to ensure that 1/3 is strictly protected", and a flag action "To implement a national programme for the mapping of marine and coastal habitats, ecosystems, and services, including a status assessment and application of priority restoration measures". Mapping marine and coastal habitats, ecosystems, and services

will be of major relevance to feed and enlarge OSA results and to consider a SEEA Central Framework and/or a SEEA EA in the future works.

The Priority Intervention Area 4 of the NOS 2021-2030 is dedicated to promoting and enlarge the importance of the bioeconomy and blue biotech. In this sense, biodiversity needs to be seen as natural capital, part of the Portuguese wealth, in which well management marine and coastal habitats is a guarantee for a flow of ecosystem services that contributes to society's well-being at national and international level. To have 30% national maritime area as protected by 2030 will have a regional in the Atlantic and beyond importance for the global sustainability agenda. An Ecosystem Accounting system would help to balance costs and benefits of public and private decisions in this domain.

As stated by Gaetano (2021) "the feasibility of developing accounts will depend on the benefit provided by the additional information as compared to the cost. Innovative ways should be sought to develop information of benefit to both public and private sector activities. New technologies for remote data collection and automated data analysis, like the SEEA ARIES tool, offer potential for significant advances in ecosystem accounts analysis and information flows".

As mentioned, accounting for the benefits derived from marine ecosystems is recognized as fundamental for decision making support but many challenges arise when trying to develop a framework for recurrent and comprehensive approach at national level, coupled to the NA. Nevertheless, the definition of national ocean policies and OSA development have been going hand in hand, mutually reinforcing. One of the main advantages is the close cooperation between departments involved with ocean policies and national statistics. This cooperation will be enlarged in future works to include those that are responsible for monitoring ocean condition, including biodiversity in coastal and offshore areas. Bring other academic areas, like marine biologists, and other sources of data, along with those resident in National Statistical Institutes will be an upgrade to develop and test a methodological framework to assess marine ecosystem services in NA accoupled to NOS. Research units from universities and specific international cooperation are also foreseen.

6 Results

The national results of OSA are publicly available, at Statistics Portugal website:

Press release:

(https://www.ine.pt/xportal/xmain?xpid=INE&xpgid=ine_destaques&DESTAQUESdest_boui=459804030&DESTAQUESmodo=2)

Infographic:

(https://www.ine.pt/xportal/xmain?xpgid=ine_inst_infografia&INST=464161214&xpid=INE)

Tables:

(https://www.ine.pt/xportal/xmain?xpid=INE&xpgid=ine_destaques&DESTAQUESdest_boui=459804030&DESTAQUESmodo=2)

Portugal - https://www.ine.pt/xportal/xmain?xpid=INE&xpgid=cn_quadros&boui=391708850

Autonomous Region of Azores - https://www.ine.pt/xportal/xmain?xpid=INE&xpgid=cn_quadros&boui=391709151

Autonomous Region of Madeira - https://www.ine.pt/xportal/xmain?xpid=INE&xpgid=cn_quadros&boui=391709437

The OSA results for the Autonomous Region of Azores is available on:

https://srea.azores.gov.pt/conteudos/Relatorios/lista_relatorios.aspx?idc=29&idsc=1117&lang_id=1

https://srea.azores.gov.pt/Conteudos/Media/file.aspx?ida=9991

The OSA results for the Autonomous Region of Madeira is available on:

https://estatistica.madeira.gov.pt/en/download-now-3/economic/contaseconomicas-gb/ocean-satellite-account/ocean-satellite-account-press-release.html?highlight=WyJvY2VhbiIsInNhdGVsbGl0ZSIsImFjY291bnQiLCJvY2VhbiBzYXRlbGxpdGUiLCJvY2VhbiBzYXRlbGxpdGUgYWNjb3VudCIsInNhdGVsbGl0ZSBhY2NvdW50Il0=

7 Conclusions

The OSA 2016-2018 is the second edition of the Portuguese OSA. It follows a pilot project for 2010-2013, at the time the first OSA worldwide. The Portuguese OSA illustrates the economic weight of around 53 thousand national entities with activities totally or partially related to the ocean.

The OSA results do not correspond to the sum of information available for each unit/KAU selected for the final OSA reference population. The results have a macroeconomic nature and were estimated in accordance with the best methodological practices, adjusted to the national reality, to the available data sources, and to the ESA 2010 rules, that are consistent with the PNA (benchmark-year 2016).

Box 10 - OSA main results - the ocean economy in Portugal (2016-2018)

The ocean economy represented, on average, **3.9% of Gross Value Added (GVA)** in the 2016-2018 triennium and **4.0% of employment (Full Time Equivalent - FTE)** of the Portuguese economy, in the period 2016-2017.

The performance of the economic activities considered in the OSA was above the overall national economy: between 2016 and 2018, the GVA grew 18.5% (the national GVA increased 9.6%) and, between 2016 and 2017, employment grew 8.3% (in the national economy the change was 3.4% in the same period).

Concerning the importance by group:

GVA - in the 2016-2018 period group 4 - Recreation, sport, culture and tourism was the most relevant, followed by group 1 - Fishing, aquaculture, wholesale and retail of its products and groups 3 - Ports, transport and logistics and 8 – Maritime services. In the three-year period under analysis, the 30.5% growth in GVA of group 4 stands out.

Employment - a similar hierarchy is observed to that verified of GVA. In 2016 and 2017, group 4 - Recreation, sport, culture and tourism, concentrated almost 40% of OSA employment, followed by group 1 - Fishing, aquaculture, wholesale and retail of its products, with more than 30% of total OE employment. Once again, the increase observed in group 4 (18.3%) stands out.

Compensation of employees - it was evidenced in 2016-2017, in groups 4 - Recreation, sport, culture and tourism (more than 40% of the total) and 1 - Fishing, aquaculture, processing and marketing of their products (24.0% of the total). The average compensation of employees per FTE showed a significant dispersion, with groups 8 - Maritime services and 9 - New uses and resources of the ocean registering the highest average compensation of employees. At the opposite extreme were groups 1 - Fishing, aquaculture, wholesale and retail of its products and 6 - Maritime equipment, with an average compensation of employees below the national average. To a large extent, this high dispersion may reflect the heterogeneity of the qualifications of human resources associated with the different groups.

Applying the Integrated System of Symmetric Input-Output Matrices of 2017, which enables to obtain an expanded picture of the inter-sectoral relations of the economy allowing to capture indirect effects, it is estimated that, in 2018, the **direct and indirect impact of the ocean economy on the national economy has been translated into 5.4% of GVA and 5.1% of the Gross Domestic Product (GDP).**

In this edition of the OSA, **results for the Autonomous Regions (Azores and Madeira) are available for the first time.** In 2016-2017, 10.7% of the GVA of the ocean economy was generated in these regions, 6.1 percentage points more than the relative weight that these regions have globally in the national GVA.

The comparison between the results of the 2010-2013 account and the 2016-2018 account can be made for the large aggregates at national level, namely GVA and Employment of the ocean economy and their respective weights in the national economy. The main methodological differences between the two Portuguese OSA are:

- Scope - In this edition, tourist products considered for import and export purposes now include the product NPCN 5502 - Other accommodation services, which include, for example, services provided by campsites, residential tourism and short rental
- Improvements in the estimates of some activities, using the same methods as in the NA, namely Travel agencies, Auxiliary transport services, Financial Intermediation Services Indirectly Measured (FISIM) and Non-Life Insurance Service.
- Data sources - In close collaboration with the Foundation for Science and Technology (FCT), Statistics Portugal had access to information involving a set of financing instruments (namely projects, scholarships, scientific employment, units of R&D), allowing a more precise estimate. It should also be noted that the Survey of National Scientific Potential (IPCTN) now has individualized codes for the ocean R&D projects.

The OSA compilation for 2016-2018 includes estimations of indirect effects of the ocean economy in the total economy, using input-output analysis.

The main advantages of this account are the feasibility and reliability, as the OSA reference population is a sub-reference population of the PNA. It also allows comparability, both internally, with NA, and externally, if other countries chose to adopt a similar methodology, namely following ESA 2010 as a common framework.

With the presentation of OSA results, the National Statistical System (NSS) and its users have sectorial information, robust and consistent with the NA, on the main variables that characterize the ocean economy at a national level.

The implementation of the OSA was complex and time consuming, given the requirement of methodological rigor in face of a pioneer account, as well as the fragility and, sometimes, the lack of detailed and updated data sources for the sector.

The OSA required a comprehensive desk research of the state of the art of the international methodologies, used worldwide, to account the ocean economy and the interaction and discussions with many entities and partners of the ocean related activities to define the ocean reference population.

According to OECD, any complete ocean economy definition should contemplate, besides the set of economic activities that take place at ocean and others that are not performing at ocean, but depend on it, also the marine natural capital and the non-marketable services of the marine

ecosystems. However, these activities are not integrated in the Portuguese OSA, since they are not included in the NA production boundary according to the ESA 2010. The OSA results include only the direct effects of the activities connected with the ocean and are conditional on the adopted methodological choices, given the pilot nature of the project and the available information in some areas.

The main driver of the OSA design was to support the assessment of the blue growth performance on the context of the National Ocean Strategy 2013-2020 and to provide further input on the Integrated Maritime Policy at a European Level. Nevertheless, the methodological roots of the present OSA can be considered a step ahead on integrated instruments to support decision making and an open window to further multilevel policies and for balancing environmental and socioeconomic policies. For these reasons, OSA should be considered an instrument par excellence for an integrated maritime policy.

OSA has a great potential and the classifications and methodologies used may enable further additional estimates. OSA sub-products could encompass tailor made products to monitor several maritime policies. OSA design classified, originally, each entity (KAU) by NACE Rev.2, by product, by level of observation and by group. Other dimensions could be added, namely the corresponding function and sub-national level, allowing additional estimates and crossing tables with several dimensions. They may include additional estimations at a sectorial level, by function, at a geographical level, and a mix of the several dimensions.

Since OSA considers a value chain perspective and many characteristic activities of the ocean economy depend on others, or on support infrastructures, located in coastal zone, an analytical tri-dimensional analysis approach of OSA (activities and its location/NACE Rev. 2 codes, sub-national analysis and a Geographical Information System (GIS) analysis of establishments or marine space utilization) could be a future research area.

NOS 2021-2030 considers the possibility of establishing a marine ecosystem services account. Further improvements on this area are considered of outmost importance, namely, to establish methodologies and their application to complement the analysis presented in this report with marine ecosystem services accounting. This would be relevant in support of the NOS vision that the ocean health is the key element for a sustainable development based on the ocean.

To finalize, the Portuguese OSA for 2010-2013 was a pilot project and the first ocean satellite account worldwide, apart from an experimental exercise by the Philippines, in 2010. Since the beginning of this pilot project, in 2013, more countries are using NA to evaluate the ocean economy. In 2021, the United States of America published its first Marine Economy Satellite Account, that includes the nation’s oceans and Great Lakes related economies. OECD continues working with pilot experiences in some countries in order to improve ocean economy measurement namely to develop internationally comparable statistics on ocean economy. Portugal is willing to contribute to this important new area.

8 Framework legislation

National

- Decree-Law No. 381/2007 of November 14 - Establishes the Portuguese Classification of Economic Activities, Revision 3;
- Decree-Law No. 108/2010 of October 13 - Establishes the legal framework for the measures necessary to ensure the good environmental status of the marine environment by 2020, transposing Directive No. 2008/56/EC, of the European Parliament and of the Council, of 17 June;
- Decree-Law No. 136/2012 of July 2 - Organic Law of Statistics Portugal: Establishes the rules which governs the Statistics Portugal;
- Decree-Law No. 38/2015 of March 12 - Develops LBOGEM and implements Directive 2014/89/EU establishing the legal framework for MSP;
- Implementing Decree No. 17/2012 of January 31 - Creation of the Directorate- General for Maritime Policy;
- Law No. 5/1998 of January 31 and amended by Decree-Law 142/2013 of October 18 - Organic Law of Banco de Portugal;
- Law No. 67/1998 of October 26 – Personal Data Protection Law: transposes into Portuguese law the Directive 95/46/EC of the European Parliament and of the Council of 24 October 1995 on the protection of individuals with regard to the processing of personal data and the free movement;
- Law No. 22/2008 of May 13 - Establishes the General Bases for the National Statistical System;
- Law No. 17/2014 of April 10 - Law that establishes the basis for the Maritime Spatial Planning and Management (LBOGEM);
- Ordinance No. 423/2012 of December 28 - approves the statutes of Statistics Portugal, which define their internal organization;
- Regional Implementing Decree 7/2013/A of July 11 - Establishes the structure of the Azores Regional Statistics Service and approves the respective framework of management staff;
- Regional Legislative Decree 13/2015/M of August 17 - Approves the organic of the Regional Directorate of Statistics of Madeira;
- Resolution of the Council of Ministers No 12/2014 – Approves the National Ocean Strategy 2013-2020;

- Resolution of the Council of Ministers No. 99/2017 of July 10 - determines the establishment of an Ocean Satelitte Account, every three years, integrating the Portuguese Official Statistics;
- Resolution of the Council of Ministers No 68/2021 – Approves the National Ocean Strategy 2021-2030;
- Resolution of the Council of Ministers No 120/2021 – Approves the Action Plan of the National Ocean Strategy 2021-2030.

International

- Decision (COM) No 504/2012 of the Commission, of September 17. Relative to EUROSTAT;
- Directive 2008/56/EC of the European Parliament and the Council, of June 17, establishing a framework for community action in the field of marine environmental policy (Marine Strategy Framework Directive);
- Directive 2014/89/EU of the European Parliament and of the Council, of July 23, establishing a framework for maritime spatial planning;
- Recommendation 2002/413/EC of the European Parliament and of the Council, of May 30, concerning the implementation of Integrated Coastal Zone Management in Europe;
- Regulation (EC) No 831/2002 of May 17. Implementing Council Regulation (EC) No 322/97 on Community statistics, concerning access to confidential data for scientific purposes;
- Regulation (EC) No 177/2008 of the European Parliament and of the Council, of February 20. It establishes a common and harmonized framework for business registers for statistical purposes. Repealing Regulation (EEC) No 2186/93 which established a common framework for setting up business registers for statistical purposes with harmonized definitions, characteristics, scope and updating procedures;
- Regulation (EC) No 222/2009 of the European Parliament and of the Council of March 11. (Burden of proof). Amending Regulation (EC) No 638/2004 which established the basic provisions for Community statistics relating to trade in goods between Member States;
- Regulation (EC) No 223/2009 of the European Parliament and of the Council of March 11. Establishes a legal framework for the development, production and dissemination of European statistics;
- Regulation (EC) No 471/2009 of the European Parliament and of the Council, of May 6. It establishes a common framework for the systematic production of Community statistics relating to the trading of goods with third countries (referred to as 'international trade statistics');

- Regulation (EU) No 520/2010 of the Commission, of June 16. Amending Regulation (EC) No 831/2002 concerning access to confidential data for scientific purposes for surveys and statistical data sources available;
- Regulation (EU) No 1097/2010 of the Commission, of November 26. It establishes a common framework for business registers for statistical purposes, as regards the exchange of confidential data between the Commission (EUROSTAT) and central banks;
- Regulation (EU) No 549/2013 of the European Parliament and of the Council, of May 21. European System of National and Regional Accounts in the European Union;
- Regulation (EU) No 557/2013 of the Commission, of June 17. Access to confidential data for scientific purposes and repealing Regulation (EC) No 831/2002;
- Regulation (EU) No 692/2011 of the European Parliament and of the Council, of June 6. European statistics on tourism and repealing Council Directive 95/57/EC;
- OSPAR Convention (1992), Convention for the Protection of the Marine Environment in North - East Atlantic.

9 References

- CBD (2021). Scientific and technical information to support the review of the proposed goals and targets in the updated zero draft of the Post-2020 Global Biodiversity Framework, Document CBD/SBSTTA/24/3/Add.2/Rev.1, 23 April 2021
- CBD (2021), First Draft of the post-2020 Global Biodiversity Framework. Note by the Co-Chairs of the Open Ended Working Group on the Post-2020 Global Biodiversity Framework, Document CBD/WG2020/3/3, 5 July 2021
- CBD (2021), One Papers on the goals and targets of the first draft of Post-2020 Global Biodiversity Framework. Note by the Executive Secretary. Document CBD/WG2020/3/INF/3, 4 August 2021
- Comissão de Implementação do Investimento Territorial Integrado Mar, (2020), Monitorização do ITI Mar 2019 - Monitorização Integrada da utilização dos Fundos Europeus Estruturais e de Investimento no Mar, dezembro 2020
- CY (2012) EU Cyprus Presidency of the Council of the European Union (2012), Declaration of the European Ministers responsible for the Integrated Maritime Policy and the European Commission, on a Marine and Maritime Agenda for growth and jobs the “Limassol Declaration”, October 8, 2012
- DGEEC (2018), Despesa Nacional em I&D por área temática da ENEI (2014 - 2016), August 2018
- DGPM (2020), Relatório de Monitorização da Estratégia Nacional para o Mar 2013-2020, Documento de Suporte às Políticas do Mar, Lisboa, dezembro 2020
- Douvere F. (2010), Marine spatial planning: Concepts, current practice and linkages to other management approaches. Ghent University, Belgium
- EC (2007), Communication An Integrated Maritime Policy for the European Union, COM (2007) 575. Brussels, 10.10.2007
- EC (2008), Communication Roadmap for Maritime Spatial Planning: Achieving Common Principles in the EU, COM (2008) 791 final. Brussels, 25.11.2008
- EC (2010), Initial assessment for the Marine Strategy Framework Directive. A Guidance Document, A non – legally binding document, Brussels, 21.12.2010
- EC (2011), Communication Developing a Maritime Strategy for the Atlantic Ocean Area, COM (2011) 782 final, Brussels, 21.11.2011
- EC (2012), Communication Blue Growth Opportunities for marine and maritime sustainable growth COM (2012) 494 final, Brussels, 13.9.2012

- EC (2013), Communication Action Plan for a Maritime Strategy in the Atlantic area Delivering smart, sustainable and inclusive growth, COM(2013) 279 final, Brussels, 13.5.2013
- EC (2013a), Communication Proposal for a directive of the European Parliament and of the Council establishing a framework for Maritime Spatial Planning and Integrated Coastal Management, COM (2013) 133 final, Brussels, 12.3.2013
- EC (2018), Economic and social analysis for the initial assessment for the Marine Strategy Framework Directive (MSFD Guidance Document 1), Brussels, 15.6.2018
- EC (2021), Communication on a new approach for a sustainable blue economy in the EU, Transforming the EU's Blue Economy for a Sustainable Future, COM (2021).240 final, Brussels, 17.5.2021
- ECORYS *et al* (2012), Blue Growth Study - Scenarios and drivers for Sustainable Growth from the Oceans, Seas and Coasts, August 2012 (Client: DG MARE)
- ECORYS *et al* (2013c), Blue Growth in the EU sea basins: methodology for data gathering and processing for the North Sea and Atlantic Arc. Annex I Methodology to sea basin reports, Rotterdam/Brussels, 19th December 2013 (Client: DG MARE)
- Ehler, C., and Douvere, F. (2009), Marine Spatial Planning: a step-by-step approach toward ecosystem-based management. Intergovernmental Oceanographic Commission and Man and the Biosphere Programme. IOC Manual and Guides No. 53, ICAM Dossier No. 6. Paris: UNESCO
- European Commission (2020), The EU Blue Economy Report. 2020
- EUROSTAT (2013), European system of accounts, ESA 2010, Luxembourg: Publications Office of the European Union, 2013
- EUROSTAT (2013a), Methodological Manual for Tourism Statistics, version 2.02, September 2013
- EUROSTAT (2015), Regions in the European Union. Nomenclatures of territorial units for statistics NUTS 2013/EU-28, Luxembourg, 2015
- Government of Portugal/Ministry of the Sea (2021), National Ocean Strategy 2021-2030, 2021, November 2021

  https://96594c97-1436-40ba-b257-d6d0d780b25f.filesusr.com/ugd/eb00d2_066d6252d6f84342aa34d8f9f301ae32.pdf
- Government of Portugal/Ministry of Agriculture and Sea (2021), Plano de Ação da Estratégia Nacional para o Mar 2021-2030, September 2021

  https://96594c97-1436-40ba-b257-d6d0d780b25f.filesusr.com/ugd/eb00d2_d5eabd273e69472a9a374a7361cc33d5.pdf

- Government of Portugal/Ministry of Agriculture and Sea (2013), National Ocean Strategy 2013-2020, November 2013

  (http://www.dgpm.mam.gov.pt/Documents/NOS2013_2020.pdf)

- Government of Portugal/Ministry of Agriculture and Sea (2012), Portuguese Marine Strategy for the subdivision of the continent, October 2012

  (http://www.dgrm.mam.gov.pt/xportal/xmain?xpid=dgrm)

- Grilli, Gaetano; Luisetti, Tiziana; Thornton, Ann; and Donovan, Deanna (2021) "Developing ecosystem accounts for the marine and coastal environment: Limitations, opportunities and lessons learned from the United Kingdom experience.," Journal of Ocean and Coastal Economics: Vol. 8: Iss. 2, Article 4. DOI: https://doi.org/10.15351/2373-8456.1145
- Ifremer *et al* (2009), Study in the field of maritime policy "Approach towards an Integrated Maritime Policy Database", Study for EUROSTAT, 2009
- Jolliffe, James; Jolly, Claire; and Stevens, Barrie (2021) "Key Considerations for the Development of Internationally Comparable Statistics on Ocean Economic Activity," Journal of Ocean and Coastal Economics: Vol. 8: Iss. 2, Article 6
- Mulazzari, L. and Malorgio, G., 2017, Blue growth and ecosystem services, Marine Policy 85 (2017) 17-24
- OECD (2021), Blueprint for improved measurement of the international ocean economy: An exploration of satellite accounting for ocean economic activity, OECD Science, Technology and Industry Working Papers, April 2021
- OECD (2020), OECD work in support of a sustainable ocean, June 2020
- OECD (2016), The Ocean Economy in 2030, OECD Publishing, Paris
- OECD (2019), Rethinking Innovation for a Sustainable Ocean Economy, OECD Publishing, Paris
- OECD (2015), Frascati Manual 2015: Guidelines for Collecting and Reporting Data on Research and Experimental Development, The Measurement of Scientific, Technological and Innovation Activities, OECD Publishing, Paris
- OSPAR (2012), Strategic Support for the OSPAR Regional Economic and Social Analysis Draft Final Interim Report, 8th October 2012
- OSPAR (2021), The North-East Atlantic Environment Strategy - Strategy of the OSPAR Commission for the Protection of the Marine Environment of the North-East Atlantic 2010–2020, OSPAR Agreement 2021-01
- Statistics Portugal (2021), Portuguese National System of Accounts, benchmark-year 2016, Inventory of Sources and Methods, National Accounts Department, December 2021 (Internal Report)

- Statistics Portugal/DGPM (2016), Satellite Account for the Sea 2010-2013 – Methodological Report, 2016

  (https://www.ine.pt/xportal/xmain?xpid=INE&xpgid=ine_docmetodsec2010_cn&contexto=cs&perfil=220677460)

- United Nations General Assembly (2010), Resolution adopted by the General Assembly on 4 December 2009, Oceans and the law of the sea, 12.3.2010

- United Nations Environment Programme (UNEP). (2021). Making Peace with Nature: A scientific blueprint to tackle the climate, biodiversity and pollution emergencies. Nairobi: UNEP

  (https://www.unep.org/resources/making-peace-nature)

- UN Statistical Commission (Committee of Experts on Environmental-Economic Accounting) (2021), SEEA Ecosystem Accounting (SEEA EA), Final draft, February 2021

- Veretennikov, P. Van der Veeren, R., Report on possibilities of application of Ecosystem Services and Natural Capital approaches in OSPAR activities, Ministry of Infrastruture and Water Management, The Netherlands,

- WG ESA (2010), Economic and Social Analysis for the Initial Assessment for the Marine Strategy Framework Directive: A Guidance Document. Working Group on Economic and Social Assessment, Directorate-General Environment, European Commission

Acronyms and abbreviations

AI Navais –*Associação das Indústrias Navais* (Portuguese shipbuilding association)

ANEPC – *Autoridade Nacional de Emergência e Proteção Civil* (National Emergency and Civil Protection Authority)

APRAM – Madeira Ports

AR – Autonomous Region

ARAE - *Autoridade Regional das Atividades Económicas* (Regional Authority for Economic Activities), Madeira

ARDITI - *Agência Regional para o Desenvolvimento da Investigação, Tecnologia e Inovação* (Regional Agency for the Development of Research, Technology and Innovation), Madeira

BER – EU Blue Economy Report

BR – Business Register

CAE Rev. 3 –Portuguese Classification of Economic Activities, Revision 3

CBD – Convention of Biological Diversity

CCS - Carbon Capture and Storage

CFC – Consumption of Fixed Capital (P.51c)

CGA - *Caixa Geral de Aposentações* (General retirement fund)

CGE - General Government Budget

CICES - Classification of Ecosystem Services

CIS – MSFD Common implementation Strategy

CN - Combined Nomenclature

CNAEF - *Classificação Nacional das Áreas de Educação e Formação* (National classification of education and training areas)

CO_2 – Carbon Dioxide

COFOG - Classification of the Functions of Government

COICOP – Classification of Individual Consumption by Purpose

COICOP/HICP - Portuguese Classification of Individual Consumption by Purpose

COPNI – Classification of the Purposes of Non-Profit Institutions Serving Households

CPA 2008 - Classification of Products by Activity, 2008 version

CSE - Statistical Council Portugal

DGEEC - Directorate-General for Education and Science Statistics

DGEG - Directorate-General for Energy and Geology

DGMARE - Directorate-General for Maritime Affairs and Fisheries from the European Commission

DGRM - Directorate-General for Natural Resources, Safety and Maritime Services

DGPA - Directorate-General for Fisheries and Aquaculture

DGPM – Directorate-General for Maritime Policy

DGRDN - *Direção-Geral de Recursos da Defesa Nacional* (Directorate-General for resources and national defence)

DRAP Algarve - *Direção-Regional de Agricultura e Pescas do Algarve* (Regional directorate for agriculture and fisheries of Algarve)

DRAP Lisboa e Vale do Tejo - *Direção-Regional de Agricultura e Pescas de Lisboa e Vale do Tejo* (Regional directorate for agriculture and fisheries of Lisboa e Vale do Tejo)

DRAP Norte - *Direção-Regional de Agricultura e do Norte* (Regional directorate for agriculture and fisheries of Norte)

DRAPS – *Direção-Regional para a Administração Pública do Porto Santo* (Porto Santo regional directorate for Public Administration

DREM - Regional Directorate of Statistics of Madeira

DROTA - Direção-Regional do Ordenamento do Território e Ambiente da Madeira (Regional Directorate for the spatial planning and the environment of Madeira)

DRPRGOP - *Direção Regional de Planeamento, Recursos e Gestão de Obras Públicas* (Regional Directorate for Planning, Resources and Management of Public Works), Madeira

EBE - Operating surplus and gross mixed income

EC – European Commission

EEA – European Environmental Agency

EEA Grants - European Economic Area (EEA) Agreement on Multiannual Financial Mechanism, through which Iceland, Liechtenstein and Norway provide financial support to Member States of the European Union including Portugal.

EICT - Electronics, Information and Communication Technologies

ENEI - National Research and Innovation Strategy for Smart Specialization 2014-2020

ESA 2010 - European System of Accounts 2010

ESF - European Social Fund

ESIF - European Structural Investment Funds

ESS - European Statistical System

EU - European Union

EUMSAA - EU Maritime Strategy for the Atlantic Area

EUROSTAT - Statistical Office of the European Union

FCC – Fixed Capital Consumption

FCG/GSP – Calouste Gulbenkian Foundation/ Gulbenkian Sustainability Program

FCT – *Fundação para a Ciência e a Tecnologia* (Portuguese science and technology authority)

FISIM - Financial intermediation services indirectly measured

Fórum Oceano - *Associação da Economia do Mar* (Association of Maritime Economy)

FOS - Fields of Science

FTE - Full Time Employment

FRCT - Regional Fund for Science and Technology, Azores

GCF - Gross Capital Formation

GDP – Gross Domestic Product

GES – MSFD Good Environmental Status

GFCF - Gross Fixed Capital Formation

GIS - Geographic Information System

GNR - National Republican Guard

GVA - Gross Value Added

HBS/IDEF- Household Budget Survey

HELCOM - The Helsinki Convention on the Protection of the Marine Environment in the Baltic Sea Area

IAEC – *Inquérito Anual às Empresas de Construção* (Annual survey to the construction business)

IAPI –Annual Survey on Industrial Production

IASM - *Inquérito às associações de socorros mútuos* (Survey to the mutual societies)

IBAS/SCIE - Integrated Business Account System

ICMA – Inter-Ministerial Commission for Maritime Affairs

ICNF – *Instituto da Conservação da Natureza e das Florestas* (Institute for the conservation of nature and forests)

ICIO - Inter-Country Input-Output Tables

IDE, IP-RAM - *Instituto de Desenvolvimento Empresarial, IP-RAM* (Institute of Business Development, IP-RAM), Madeira

IDR, IP-RAM - *Instituto de Desenvolvimento Regional, IP-RAM* (Institute for Regional Development, IP_RAM), Madeira

IFAP – *Instituto de Financiamento da Agricultura e Pescas* (Institute of finance for agriculture and fisheries)

Ifremer - French Research Institute for Exploitation of the Sea

IGC ESA -Intersessional Correspondence Group on Economic and Social analyses, OSPAR

IMP – Integrated Maritime Policy

IMPIC, I.P. - *Instituto dos Mercados Públicos, do Imobiliário e da Construção, I.P*. (Institute of public markets, real estate and construction)

INEM - National Medical Emergency Institute, IP

IOC - Intergovernmental Oceanographic Commission (UNESCO)

IOT – Input-Output Tables

IPCTN – Survey on National Scientific and Technological Potential

Instituto para a Qualificação, I.P. (Institute for Qualification, I.P.), Madeira

IPTR - Survey on Tourist Demand of Residents

ISCO - International Standard Classification of Occupations

ISIC Rev. 4 - International Standard Industrial Classification of All Economic Activities Revision 4 (UN)

ITI - Survey on International Tourism

ITIMAR - Integrated Territorial Investment at the Ocean (ITI Mar), that is the instrument that ensures the articulation of European Structural Investment Funds (ESIF) and the Portuguese public policies for the ocean

ITS - International Trade Statistics

JUP - Port Single Window

KAU – Kind-of-Activity Unit

LAU – Local Administrative Units

LFS - Labour Force Survey

LNEC - National Civil Engineering Laboratory

LNEG – National Laboratory of Energy and Geology

LBOGEM – Basic Law for the Maritime Spatial Planning and Management

MA – Millennium Ecosystem Assessment

MPP – Mar-Portugal Plan

MS - Member States

MSFD - Marine Strategy Framework Directive

MSP - Maritime Spatial Planning

NA - National Accounts

NACE Rev. 1.1 – Statistical Classification of Economic Activities in the European Community, Revision 1.1

NACE Rev. 2 – Statistical Classification of Economic Activities in the European Community, Revision 2

NAS - Normalization Accounting System

NEAES 2010-2020 - North-East Atlantic Environment Strategy 2010-2020

NGOE – Non-Governmental Organizations for the Environment

NOS 2013-2020 – National Ocean Strategy 2013-2020

NOS 2021-2030 – National Ocean Strategy 2021-2030

NPCN - National Accounts Product Classification

NPI - Non-Profit Institutions

NPISH - Non-Profit Institutions Serving Households

NRCN - National Accounts Industry Classification

NSS - National Statistical System

NUTS - Nomenclature of Territorial Units for Statistics

NUTS 1 – Nomenclature of Territorial Units for Statistics, Level 1

NUTS 3 - Nomenclature of Territorial Units for Statistics, Level 3

OCIP - Budgets and Accounts of Private Institutions of Social Solidarity

OECD – Organisation for Economic Cooperation and Development

OOM - Oceanic Observatory of Madeira

OOP - Public Works Observatory

OP – Operational Programmes

OSA - Ocean Satellite Account

OSPAR - Convention for the Protection of the Northeast Atlantic Marine Environment

P.1 - Output

P.2 - Intermediate consumption

PA – Programmatic Areas of NOS 2013-2020

PIA – Priority Intervention Areas of NOS 2021-2030

PIETRAM - *Plano Integrado e Estratégico dos Transportes da Região Autónoma da Madeira* (Integrated and strategic transport plan for the Autonomous Region of Madeira)

Portugal2020 - Portuguese Multiannual Framework of ESIF for 2014-2020

PM – Market production

PNA - Portuguese National Accounts

PNM – Non-market production

POC - Official Plan of Accounting Standards

PSAI - Portuguese Sea and Atmosphere Institute

PTPC – European Construction Technology Platform

R&D – Research and Development

RAA - Autonomous Region of the Azores

RAM - Autonomous Region of Madeira

RAARA – Regional Accounts of the Autonomous Region of Azores

RAARM – Regional Accounts of the Autonomous Region of Madeira

REBIDES - *Registo Biográfico de Docentes do Ensino Superior (*Biographical Register of Higher Education Teachers)

RIAC - Agency for the Modernisation and Quality of Citizen Service, I.P, Azores

RNAAT – *Registo Nacional dos Agentes de Animação Turística* (National registry of business companies of touristic animation)

ROV - Remote Operated Vehicle

RSC - Regional Sea Conventions

RTSA – Regional Tourism Satellite Account

S.11 – Non-financial corporations

S.12 – Financial corporations

S.13 – General government

S.14 – Households

S.15 – Non-profit institutions serving households (NPISH)

SBI/IES - Simplified Business Information/*Informação Empresarial Simplificada*)

SCNP - Portuguese System of National Accounts

SEAMInd – Monitoring and Indicators

SEEA-EA - System of Environmental Economic Accounting - Ecosystem Accounting

SESA - Social Economy Satellite Account and Volunteer Work

SG – Strategic Goals of NOS 2021-2030

SICAE - Information system of the data records regarding the Portuguese Economic Activities Classification

SNA - United Nations System of National Accounts

SREA - Statistics Azores

SRPC - Serviço Regional de Proteção Civil, I.P. (Regional Civil Protection Service, I.p.), Madeira

SRPCBA - Regional Civil Protection and Fire Service of Azores

SUT - Supply and Use Tables

TSA - Tourism Satellite Account

UN – United Nations

UNESCO - United Nations Educational, Scientific and Cultural Organization

UNEP – MAP - The Convention for the Protection of Marine Environment and the Coastal Region of the Mediterranean (Barcelona Convention)

UNGA - United Nations General Assembly

VAT – Value added type taxes

WG ESA - Working Group on Economic and Social Assessment

WG POMESA – Working Group on Programmes of Measures and Economic and Social Assessment

WOA - World Ocean Assessment

ANNEXES

Annex I – List of contacted entities and meetings to build OSA

Table 9 – Technical meetings under the OSA 2016-2018 building process

Date	Entities involved	Meetings and visits	People involved (number)	Time (hours)
23.04.2018	Statistics Portugal DREM SREA	Exploratory meeting required by the Autonomous Regions, to express their interest in OSA NUTS 1 disaggregation	Statistics Portugal - 2 DREM – 1 SREA - 1	1
24.09.2018	Statistics Portugal DGPM	1st Technical meeting – Kickoff meeting	Statistics Portugal - 2 DGPM – 2	1
10.10.2018	Statistics Portugal DREM SREA	1st Technical meeting – Kickoff meeting	Statistics Portugal - 2 DREM – 4 SREA - 3	1,5
09.02.2019	Statistics Portugal DREM SREA	2nd Technical meeting	Statistics Portugal - 2 DREM – 3 SREA - 3	1,5
01.03.2019	Statistics Portugal DREM SREA	3rd Technical meeting	Statistics Portugal - 2 DREM – 3 SREA - 3	1,75
04.04.2019	Statistics Portugal DREM SREA	4th Technical meeting	Statistics Portugal - 3 DREM – 4 SREA - 3	1,5
28.05.2019	Statistics Portugal DREM SREA	5th Technical meeting	Statistics Portugal - 3 DREM – 3 SREA - 2	1,5
18.06.2019	Statistics Portugal DGPM	2nd Technical meeting	Statistics Portugal - 3 DGPM – 3	2,25
07.10.2019	Statistics Portugal DREM SREA	6th Technical meeting	Statistics Portugal - 3 DREM – 4 SREA - 3	1,5
16.01.2020	Statistics Portugal DREM SREA	7th Technical meeting	Statistics Portugal - 5 DREM – 4 SREA - 3	2,75
31.01.2020	Statistics Portugal DGPM	3rd Technical meeting	Statistics Portugal - 2 DGPM – 1	1,15
19.02.2020	Statistics Portugal DREM SREA DGPM	8th Technical meeting	Statistics Portugal - 4 DREM – 4 SREA – 3 DGPM - 1	2,75
27.03.2020	Statistics Portugal DGPM	4th Technical meeting	Statistics Portugal - 1 DGPM – 1	0,5
04.05.2020	Statistics Portugal FCT DGPM - 1	Technical meeting	Statistics Portugal - 3 FCT – 1 DGPM - 1	1

(continues)

(continuation)

Date	Entities involved	Meetings and visits	People involved (number)	Time (hours)
04.06.2020	Statistics Portugal DREM SREA	9th Technical meeting	Statistics Portugal - 5 DREM – 4 SREA - 3	0,75
09.06.2020	Statistics Portugal FCT	Technical meeting	Statistics Portugal – 2 FCT - 3	1
23.10.2020	Statistics Portugal DREM SREA	10th Technical meeting	Statistics Portugal - 5 DREM – 4 SREA - 3	1,75

Legend:

Team technical meetings INE_DREM_SREA

Team technical meetings INE_DGPM

Technical meetings with other entities

List of meetings' entities:

DGPM – Directorate-General for Maritime Policy

DREM - Regional Directorate of Statistics of Madeira

FCT – *Fundação para a Ciência e a Tecnologia* (Portuguese science and technology authority)

SREA - Statistics Azores

Other contacts and collaboration under the OSA reference population definition and coefficient's estimation:

ANEPC – *Autoridade Nacional de Emergência e Proteção Civil* (National emergency and civil protection authority)

DGEEC - Directorate-General for Education and Science Statistics

DGEG - Directorate-General for Energy and Geology

DGMR - Directorate-General for Natural Resources, Safety and Maritime Services

DRAP Algarve - *Direção-Regional de Agricultura e Pescas do Algarve* (Regional directorate for agriculture and fisheries of Algarve)

DRAP Lisboa e Vale do Tejo - *Direção-Regional de Agricultura e Pescas de Lisboa e Vale do Tejo* (Regional directorate for agriculture and fisheries of Lisboa e Vale do Tejo)

DRAP Norte - *Direção-Regional de Agricultura e do Norte* (Regional directorate for agriculture and fisheries of the North)

GNR - National Republican Guard

ICNF – *Instituto da Conservação da Natureza e das Florestas* (Institute for the conservation of nature and forests)

IFAP – *Instituto de Financiamento da Agricultura e Pescas* (Institute of finance for agriculture and fisheries)

LNEC - National Civil Engineering Laboratory

LNEG – National Laboratory of Energy and Geology
Marinha (Portuguese Navy)
PSAI - Portuguese Sea and Atmosphere Institute

Autonomous Region of Azores:

FRCT - Regional Fund for Science and Technology, Azores
Regional Directorate for Culture, Azores
Regional Directorate for Sport, Azores
Regional Directorate for Vocational Training and Employment, Azores
Regional Directorate for Transport, Azores
Regional Directorate of Tourism, Azores
Regional Inspectorate of Fisheries, Azores
RIAC - Agency for the Modernisation and Quality of Citizen Service, I.P, Azores
SRPCBA - Regional Civil Protection and Fire Service of Azores

Autonomous Region of Madeira:

APRAM – Administration of Madeira´s Ports
ARAE - Regional Authority of Economic Activities, Madeira
ARDITI - Regional Agency of Research, Technology and Innovation Development, Madeira
Caniçal Primary and Secondary School, Madeira
Department of Science and Natural Resources of the Municipality of Funchal – Marine Biological Station of Funchal (Departamento de Ciência e Recursos Naturais da Câmara Municipal do Funchal - Estação de Biologia Marinha do Funchal)
Madeira Development Companies (Sociedades de Desenvolvimento da Madeira)
DRAPS - Porto Santo Regional Directorate of Public Administration, Madeira
DROTA - Regional Directorate of Spatial Planning and Environment, Madeira
DRPRGOP - Regional Directorate of Planning, Resources and Public Works Management, Madeira
ICNF, IP-RAM - Institute of Forests and Nature Conservation, Madeira (Instituto das Florestas e Conservação da Natureza, IP RAM)
IDE, IP-RAM - Institute of Business Development, IP-RAM
IDR, IP-RAM - Institute of Regional Development, IP-RAM
Institute for Qualification, I.P., Madeira
IFAP - Institute of Finance for Agriculture and Fisheries, Madeira
Madeira Whale Museum / Municipality of Machico, Madeira
OOM - Madeira Oceanic Observatory
Parish of Santa Maria Maior (Funchal), Madeira
Parish of Madalena do Mar (Ponta do Sol), Madeira

Parish of Santa Cruz (Santa Cruz), Madeira
Parish of São Martinho (Funchal), Madeira
Portuguese National Commission for UNESCO
Regional Delegation of Portuguese Sea and Atmosphere Institute, I.P. (Delegação Regional do Instituto Português do Mar e da Atmosfera, I.P.)
Regional Directorate of Economy and Transport (Direção Regional de Economia e Transportes)
Regional Directorate of European Affairs and External cooperation (Direção Regional de Assuntos Europeus e Cooperação Externa)
Regional Directorate of Fisheries
Regional Directorate of Justice Administration (Direção Regional da Administração da Justiça)
Regional Directorate of Tourism (Direção Regional do Turismo)
Regional Directorate of Youth and Sport (Direção Regional de Juventude e Desporto)
Regional Financial Inspectorate, Madeira
Regional Civil Engineering Laboratory (Laboratório Regional de Engenharia Civil)
Regional Municipalities with beach areas (Municípios regionais com área de praia)
Regional Police Command of Madeira (Comando Regional de Polícia da Madeira)
SRPC - Regional Civil Protection Service, I.P., Madeira

Contacted entities regarding the ocean training, high level education and R&D:

Ocean high level education and R&D:

DGEEC - Directorate-General for Education and Science Statistics
DGPM – Directorate-General for Maritime Policy
FCT – *Fundação para a Ciência e a Tecnologia* (Portuguese science and technology authority)
University of Madeira

Annex II – The OSA reference population

In years 2016 and 2017, in a total average of 52,589 entities in Portugal, the private sector (non–financial corporations plus households) accounted for 98,7%, of which 68,7% assigned to Coastal tourism, included in the Recreation, sports, culture and tourism group. It was followed by institutional sectors S.13 General government (0.8%), S.15 Non-profit institutions serving households (0.5%), and S.12 Financial corporations (0.06%).

The Autonomous Regions of Madeira and of the Azores contributed with 6,8% and 6,2% of the total average entities of the ocean economy, in 2016 and 2017. While in the Autonomous Region of Madeira the Coastal tourism represented 90% of the private sector entities, in the Autonomous Region of Azores, that figure accomplished 15,3%.

Table 10 - OSA Kind-of-activity units by observation level and by NUTS 1 (average 2016-2017)

	OSA Universe by NUTS 1 (KAU number – average 2016-2017)			
Observation level	**Portugal**	**Mainland Portugal**	**Autonomous Region of Madeira**	**Autonomous Region of Azores**
Characteristic activities (*Fisheries, aquaculture, processing, wholesale and retail of its products, Non-living marine resources, Ports, transports and logistics, Recreation, sports, culture and tourism (except tourism in coastal areas), Shipbuilding, maintenance and repair, Infrastructures and maritime works and New uses and resources of the ocean*)	14,734	11,641	389	2,704
Crosscutting activities *(Maritime equipment and services)*	2,177	1,991	86	101
Activities favored by the proximity of the ocean *(Coastal tourism)*	35,679	32,087	3,112	480
TOTAL	**52,589**	**45,719**	**3,586**	**3,285**

Table 11 - OSA Kind-of-activity units by group and by NUTS 1 (average 2016-2017)

Group	OSA Reference population by NUTS 1 (KAU number – average 2016-2017)			
	Portugal	Mainland Portugal	Autonomous Region of Madeira	Autonomous Region of Azores
1. Fisheries, aquaculture, processing, wholesale and retail of its products	8,531	7,717	132	682
2. Non-living marine resources	115	110	3	2
3. Ports, transports and logistics	1,052	953	48	51
4. Recreation, sports, culture and tourism	39,487	33,799	3,281	2,407
5. Shipbuilding, maintenance and repair	411	376	13	23
6. Maritime equipment	422	416	2	5
7. Infrastructures and maritime works	738	700	21	17
8. Maritime services	1,755	1,575	85	96
9. New uses and resources of the ocean	81	74	4	3
TOTAL	**52,589**	**45,719**	**3,586**	**3,285**

Table 12 - OSA Kind-of-units by institutional sector and by NUTS 1 (average 2016-2017)

Institucional sector		OSA Reference population by NUTS 1 (KAU number – average 2016-2017)			
Code	Name	Portugal	Mainland Portugal	Autonomous Region of Madeira	Autonomous Region of Azores
S.11 and S.14	Non –financial corporations and Households	51,898	45,293	3,458	3,148
S.12	Financial corporations	33	32	0	1
S.13	General government	396	260	66	70
S.15	Non-profit institutions serving households	262	134	62	66
TOTAL		**52,589**	**45,719**	**3,586**	**3,285**

Annex III – Industries (NACE Rev. 2/CAE Rev. 3) correspondence with OSA by inclusion level, group and observation level

Table 13 - OSA industries (sequential NACE Rev. 2/CAE Rev. 3 class codes)

OSA-Table13_NACE_Sequential_EN.xlsx

Table 14 - OSA industries by group (NACE Rev. 2/CAE Rev. 3 class codes)

OSA-Table14_NACE_Goup_EN.xlsx

Annex IV – Ocean products selected for OSA. CPA 2008 and National Accounts Products Classification (NPCN) correspondence with OSA by inclusion level, group and observation level

Table 15 - OSA products (CPA 2008 codes)

Annex V – Main aggregates and variables definition – ESA 2010

Table 16 - OSA main aggregates and variables definition - ESA 2010

Code	Variable	Definition	ESA 2010 Manual page/ §
Gross value added			
P.1	Output	"3.14 *Definition: output is the total of products created during the accounting period.* *Examples of output include the following:* *(a) the goods and services which one local KAU provides to a different local KAU belonging to the same institutional unit;* *(b) the goods produced by a local KAU that remain in inventories at the end of the period in which they are produced, whatever their subsequent use. Goods and services produced and consumed within the same accounting period and within the same local KAU are not separately identified. They are not recorded as part of the output or intermediate consumption of that local KAU."*	55 / §3.14
P.11	Market output	"3.17 *Definition: market output consists of output that is disposed of on the market or intended to be disposed of on the market."*	56 / §3.17
P.12	Output for own final use	"3.20 *Definition: output produced for own final use consists of goods or services that are retained either for own final consumption or for capital formation by the same institutional unit."*	57 / §3.20
P.13	Non-market output	"3.23 *Definition: non-market output is output that is provided to other units for free, or at prices that are not economically significant."*	57 / §3.23
P.131	Payments for non-market output (partial payments)	*"Non-market output is produced for the following reasons.* *(a) It may be technically impossible to make individuals pay for collective services because their consumption of such services cannot be monitored and controlled. The production of collective services is organised by government units and financed out of funds other than receipts from sales, namely taxation or other government incomes.* *(b) Government units and NPISHs may also produce and supply goods or services to individual households for which they could charge but choose not to do so as a matter of social or economic policy. Examples are the provision of education or health services, for free or at prices that are not economically significant."*	57 / §3.23
P.132	Non-market products others	*"Output provided for free."*	57 / §3.23
P.2	Intermediate consumption	"3.88 *Definition: intermediate consumption consists of goods and services consumed as inputs by a process of production, excluding fixed assets whose consumption is recorded as consumption of fixed capital. The goods and services are either transformed or used up by the production process."*	68 / §3.88
B.1g	Gross value added at basic prices	Gross-value added is a result from a statistical operation and it can be obtained by several ways. In the production approach, "*gross value-added is the difference between output and intermediate consumption by industry*." It is identical to the sum of the incomes generated. In the income approach the "*gross value-added equals the sum of compensation of employees, consumption of fixed capital, net operating surplus/mixed income, and other taxes less subsidies on production*. " This enables the consistency of the income approach to measuring GVA and GDP to be checked with the production approach.	53 / §3.88 276 / 9.06

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Code	Variable	Definition	ESA 2010 Manual page/ §
Expenditure side of gross domestic product			
P.3	Total final consumption expenditure	"3.94 *Definition: final consumption expenditure consists of expenditure incurred by resident institutional units on goods or services that are used for the direct satisfaction of individual needs or wants or the collective needs of members of the community."*	70 / §3.94
P.3	(a) Household final consumption expenditure	*"3.95 Household final consumption expenditure includes the following examples:* *(a) services of owner-occupied dwellings;* *(b) income in kind, such as:* *(1) goods and services received as income in kind by employees;* *(2) goods or services produced as outputs of unincorporated enterprises owned by households that are retained for consumption by members of the household. Examples are food and other agricultural goods, housing services by owner-occupiers and household services produced by employing paid staff (servants, cooks, gardeners, chauffeurs, etc.);* *(c) items not treated as intermediate consumption, such as:* *(1) materials for small repairs to and interior decoration of dwellings of a kind carried out by tenants as well as owners;* *(2) materials for repairs and maintenance to consumer durables, including vehicles;* *(d) items not treated as capital formation, in particular consumer durables, that continue to perform their function in several accounting periods; this includes the transfer of ownership of some durables from an enterprise to a household;* *(e) financial services directly charged and the part of FISIM used for final consumption purposes by households;* *(f) insurance services by the amount of the implicit service charge;* *(g) pension funding services by the amount of the implicit service charge;* *(h) payments by households for licenses, permits, etc. which are regarded as purchases of services (see paragraphs 4.79 and 4.80);* *(i) the purchase of output at not economically significant prices, e.g. entrance fees for a museum."*	70 / §3.95
P.3	Final consumption expenditure of NPISH	*"3.97 Final consumption expenditure of NPISHs includes two separate categories:* *(a) the value of the goods and services produced by NPISHs other than own-account capital formation and other than expenditure made by households and other units;* *(b) expenditures by NPISHs on goods or services produced by market producers that are supplied — without any transformation — to households for their consumption as social transfers in kind."*	71 / §3.97
P.3	Government final consumption expenditure	*"3.98 Final consumption expenditure (P.3) by government includes two categories of expenditures, similar to those by NPISHs:* *(a) the value of the goods and services produced by general government itself (P.1) other than own-account capital formation (corresponding to P.12), market output (P.11) and payments for non-market output (P.131);* *(b) purchases by general government of goods and services produced by market producers that are supplied to households, without any transformation, as social transfers in kind (D.632). General government pays for these goods and services that the sellers provide to households."*	71 / §3.98

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Code	Variable	Definition	ESA 2010 Manual page/ §
Expenditure side of gross domestic product			
P.31	(a) Individual consumption expenditure	*"3.105 Alternatively individual consumption expenditure of general government corresponds to division 14 of the classification of individual consumption by purpose (COICOP), which includes the following groups:* *14.1 Housing (equivalent to COFOG group 10.6)* *14.2 Health (equivalent to COFOG groups 7.1 to 7.4)* *14.3 Recreation and culture (equivalent to COFOG groups 8.1 and 8.2)* *14.4 Education (equivalent to COFOG groups 9.1 to 9.6)* *14.5 Social protection (equivalent to COFOG groups 10.1 to 10.5 and group 10.7)."*	72 / §3.105
P.32	b) Collective consumption expenditure	*"3.106 Collective consumption expenditure is the remainder of the government final consumption expenditure.* *It consists of the following COFOG groups:* *(a) general public services (division 1);* *(b) defence (division 2);* *(c) public order and safety (division 3);* *(d) economic affairs (division 4);* *(e) environmental protection (division 5);* *(f) housing and community amenities (division 6);* *(g) general administration, regulation, dissemination of general information and statistics (all divisions);* *(h) research and development (all divisions).*	72 / §3.106
P.4	Actual final consumption	"3.100 *Definition: actual final consumption consists of the goods or services that are acquired by resident institutional units for the direct satisfaction of human needs, whether individual or collective."*	71 / §3.100
P.5	Gross capital formation	*"3.122 Gross capital formation consists of:* *(a) gross fixed capital formation (P.51g):* *(1) consumption of fixed capital (P.51c);* *(2) net fixed capital formation (P.51n);* *(b) changes in inventories (P.52);* *(c) acquisitions less disposals of valuables (P.53).*	73 /
P.51g	(a) Gross fixed capital formation	"3.124 *Definition: gross fixed capital formation (P.51) consists of resident producers' acquisitions, less disposals, of fixed assets during a given period plus certain additions to the value of non-produced assets realized by the productive activity of producer or institutional units. Fixed assets are produced assets used in production for more than one year."*	73 / §3.124
P.51c	(a) (1) Consumption of fixed capital	"3.139 *Definition: consumption of fixed capital (P.51c) is the decline in value of fixed assets owned, as a result of normal wear and tear and obsolescence. The estimate of decline in value includes a provision for losses of fixed assets as a result of accidental damage which can be insured against. Consumption of fixed capital covers anticipated terminal costs, such as the decommissioning costs of nuclear power stations or oil rigs or the cleanup costs of landfill sites. Such terminal costs are recorded as consumption of fixed capital at the end of the service life, when the terminal costs are recorded as gross fixed capital formation."*	76 / §3.139
P.52	(b) Changes in inventories	"3.146 *Definition: changes in inventories are measured by the value of the entries into inventories less the value of withdrawals and the value of any recurrent losses of goods held in inventories."*	77 / §3.146
P.53	(c) Acquisitions less disposals of valuables	"3.154 *Definition: valuables are non-financial goods that are not used primarily for production or consumption, do not deteriorate (physically) over time under normal conditions and are acquired and held primarily as stores of value."*	78 / §3.154

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Code	Variable	Definition	ESA 2010 Manual page/ §
Expenditure side of gross domestic product			
P.6	Exports of goods (fob) and services	"3.158 *Definition: exports of goods and services consist of transactions in goods and services (sales, barter, and gifts) from residents to non-residents."*	78 / §3.158
P.61	(a) Goods	"3.162 *Imports and exports of goods occur when economic ownership of goods changes between residents and non-residents. This applies irrespective of corresponding physical movements of goods across frontiers."*	80 / §3.162
P.62	(b) Services	"3.171 *Definition: exports of services consist of all services rendered by residents to non-residents.* "	81 / §3.171
P.7	Imports of goods (fob) and services	"3.159 *Definition: imports of goods and services consist of transactions in goods and services (purchases, barter, and gifts) from non-residents to residents.*"	78 / §3.159
P.71	(a) Goods	"3.162 *Imports and exports of goods occur when economic ownership of goods changes between residents and non-residents. This applies irrespective of corresponding physical movements of goods across frontiers."*	80 / §3.162
P.72	(b) Services	"3.172 *Definition: imports of services consist of all services rendered by non-residents to residents."*	81 / 3.172
B.11	International balance of goods and services	"8.68 […] *The difference between resources and uses is the balancing item in the account, called 'international balance of goods and services'. If it is positive, there is a surplus for the rest of the world and a deficit for the total economy and vice versa if it is negative."*	251 / §8.68
Gross operating surplus and gross mixed income, taxes on production and imports, subsidies			
B.2g + B.3g	Gross operating surplus and gross mixed income	"4.10.1.*Gross operating surplus is generally a balance and not a heading calculated independently, its value being obtained by means of the following formula:* *Gross Operating Surplus (GOS) = GVA – Compensation of employees (D.1) – Other taxes on production (D.29) + Other subsidies on production (D.39)*	§4.10 PNA, Inventory
D.2	Taxes on production and imports	"4.14 *Definition: taxes on production and imports (D.2) consist of compulsory, unrequited payments, in cash or in kind, which are levied by general government, or by the institutions of the European Union, in respect of the production and importation of goods and services, the employment of labour, the ownership or use of land, buildings or other assets used in production. Such taxes are payable irrespective of profits made.*"	92 / §4.14
D.211	Value added type taxes (VAT)	"4.17 *Definition: a value added type tax (VAT) is a tax on goods or services collected in stages by enterprises and which is ultimately charged in full to the final purchaser."*	92 / §4.17
D.21	Taxes on products	"4.16 *Definition: taxes on products (D.21) are taxes that are payable per unit of a given good or service produced or transacted. The tax may be a specific amount of money per unit of quantity of a good or service, or it may be calculated as a specified percentage of the price per unit or value of the goods and services produced or transacted. Taxes assessed on a product, irrespective of which institutional unit pays the tax, are included in taxes on products, unless specifically included under another heading*".	92 / §4.16
D.3	Subsidies	"4.30 *Definition: subsidies (D.3) are current unrequited payments which general government or the institutions of the European Union make to resident producers.*"	95 / §4.30

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Code	Variable	Definition	ESA 2010 Manual page/ §
Population, employment, compensation of employees			
Employment	Employment in resident production units	"11.11 *Definition: employment covers all persons engaged in productive activity that falls within the production boundary of the national accounts."* "11.32 *Definition: full-time equivalent employment, which equals the number of full-time equivalent jobs, is defined as total hours worked divided by the average annual number of hours worked in full-time jobs within the economic territory."*	307 / §11.11 311 / §11.32
Self-employed	Self employed	"11.15 *Definition: self-employed persons are defined as persons who are the sole owners, or joint owners, of the unincorporated enterprises in which they work, excluding those unincorporated enterprises that are classified as quasi-corporations. Persons having both an employee job and a job as a self-employed person are classified here if the self-employed job constitutes their principle activity by income."*	307-308 / §11.15
Employee	Employees	"11.12 *Definition: employees are defined as persons who, by agreement, work for a resident institutional unit and receive a remuneration recorded as compensation of employees."*	307 / §11.12
D.1	Compensation of employees working in resident production units and compensation of resident employees	"4.02 *Definition: compensation of employees (D.1) is defined as the total remuneration, in cash or in kind, payable by an employer to an employee in return for work done by the latter during an accounting period. "* *"Compensation of employees is made up of the following components:* *(a) wages and salaries (D.11):* *- wages and salaries in cash,* *- wages and salaries in kind;* *(b) employers' social contributions (D.12):* *- employers' actual social contributions (D.121): - employers' actual pension contributions (D.1211),* *- employers' actual non-pension contributions (D.1212),* *- employers' imputed social contributions (D.122): - employers' imputed pension contributions (D.1221),* *- employers' imputed non-pension contributions (D.1222).*	87 / §4.02
D.11	(a) Wages and salaries	" 4.03 ***Wages and salaries in cash*** *include social contributions, income taxes, and other payments payable by the employee, including those withheld by the employer and paid directly to social insurance schemes, tax authorities, etc. on behalf of the employee* " "4.04 *Definition: **wages and salaries in kind** consist of goods and services, or other non-cash benefits, provided free of charge or at reduced prices by employers, that can be used by employees in their own time and at their own discretion, for the satisfaction of their own needs or wants or those of other members of their households."*	87 / §4.03
D.12	(b) Employers' social contributions	"4.08 *Definition: employers' social contributions are social contributions payable by employers to social security schemes or other employment-related social insurance schemes to secure social benefits for their employees."*	89 / §4.08

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Annex VI – Data sources and algorithms used in OSA calculations by institutional sector

Table 17 - OSA main data sources and algorithms, by institutional sector

		S11+S14		S12		S13		S15	
I: Production account		Source	Algorithm	Source	Algorithm	Source	Algorithm	Source	Algorithm
P.1	Output	-	P.111 - P.21 + P.112 + P.113 + P.114 + P.12 + P.13	-	P.111 - P.21 + P.112 + P.113 + P.114 + P.12 + P.13	-	P.11 + P.12 + P.13	-	P.2 + D.1 + P.51c – D.39
P.11	Market output	SBI/IES (Annexes A and D) and OCIP	Sales of goods[1)]- Costs of goods sold[2)]+Sales of products[1)]+ Sales of biological assets[1)]+ Production variations + Provision of services + Supplementary income + Other incomes and earnings + Rentals and other incomes in investment properties – Rents on land	-	-	SBI/IES (Annexes A and D) and detailed Trial balance reports	Sales of goods - Costs of goods sold + Sales of products + Sales of biological assets + Production variations + Provision of services + Supplementary income + Other incomes and earnings + Rentals and other incomes in investment properties – Rents on land	SBI/IES (Annexes A and D), OCIP and IASM	Sales of products + Sales of biological assets + Production variations + Supplementary income + Other incomes and earnings + Rentals and other incomes in investment properties – Rents on land
P.12	Output for own final use	SBI/IES (Annexes A and D) and OCIP IPCTN	Buildings and other constructions + Basic equipment + Transport equipment + Tools and equipment + Office equipment + Returnable containers + Other tangible fixed assets + Assets in progress + Software + Real estate investments	-	-	SBI/IES (Annexes A and D) and detailed Trial balance reports IPCTN	Buildings and other constructions + Basic equipment + Transport equipment + Tools and equipment + Office equipment + Returnable containers + Other tangible fixed assets + Assets in progress + Software + Real estate investments	SBI/IES (Annexes A and D), OCIP and IASM IPCTN	Buildings and other constructions + Basic equipment + Transport equipment + Tools and equipment + Office equipment + Returnable containers + Other tangible fixed assets + Assets in progress + Software + Real estate investment
P.13	Non-market output	-	-	-	-	Estima-tions	P.131 + P.132 Where P.132 = P.2 + D.1 + P.51c + D.29 paid – P.11 – P.12 – P.131 – D.39 received	Estima-tions	P.2 + D.1 - D.39 + P.51c - P.11 - P.12

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I: Production account		S11+S14		S12		S13		S15	
		Source	Algorithm	Source	Algorithm	Source	Algorithm	Source	Algorithm
P.2	Intermediate consumption	SBI/IES (Annexes A and D) and OCIP	Cost of materials consumed and biologic assets [2)] + Supplies and external services [2)] - Rentals on land – Insurances + Levies + Other operating expenses and losses + Working cloths + Training			SBI/IES (Annexes A and D) and detailed Trial balance reports	Cost of materials consumed and biologic assets + Supplies and external services - Rentals on land – Insurances + Levies + Other operating expenses and losses + Working cloths + Training + FISIM	SBI/IES (Annexes A and D), OCIP and IASM	Cost of materials consumed and biologic assets + Supplies and external services - Rentals on land – Insurances + Levies + Other operating expenses and losses + Working cloths + Training
B.1g	Gross Value Added (GVA)		P.1 - P.2		P.1 - P.2		P.1 - P.2		P.1 - P.2
P.51c	Consumption of fixed capital	Estima-tions	P.51c NA * P.51 OSA / P.51 NA			Estima-tions and detailed Trial balance reports	P.51c NA * P.51 OSA / P.51 NA	Estima-tions	P.51c NA * P.51 OSA / P.51 NA

Notes:

IASM - Survey to the Mutual Societies (*Inquérito às associações de socorros mútuos*)

IPCTN – Survey on National Scientific and Technological Potential (*Inquérito ao Potencial Científico e Tecnológico Nacional*)

OCIP - Budgets and Accounts of Private Institutions of Social Solidarity *(Orçamentos e contas de IPSS)*

SBI/IES - Simplified Business Information (*Informação Empresarial Simplificada*)

1) For Annex A information provided to P.111, P.113 and to the sum of Sales of finished products, intermediate products, by-products, waste and scrap and of Sale of biological assets from P.112, it is necessary to subtract the weighting 1 resulting from the division of Financial discounts granted payment and the sum of sale of goods, sale of finished and intermediate products, by-products, waste and scrap, sale of biological assets, Provision of Services and Other income and gains.

2) For Annex A information provided to P.21, P.22 and external service delivery component of P.23, it is necessary to subtract the weighting of the division between Cash discounts obtained and the sum of Cost of goods sold, Cost of materials consumed, Cost of biological assets, External supplies and services and Other expenses and losses.

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		S11+S14		S12		S13		S15	
II.1.1: Generation of income account		**Source**	**Algorithm**	**Source**	**Algorithm**	**Source**	**Algorithm**	**Source**	**Algorithm**
B.1g	Gross Value Added (GVA)		B.1g		B.1g		B.1g		B.1g
D.1	Compensation of employees		D.11 + D.12		D.11 + D.12		D.11 + D121 + D.122		D.11 + D.12
D.11	Wages and salaries	SBI/IES (Annexes A and D) and OCIP	Corporate bodies salaries + Employees salaries + Social contributions + Bonus with managers and staff			SBI/IES (Annexes A and D) and detailed Trial balance reports	Corporate bodies salaries + Employees salaries + Social contributions	SBI/IES (Annexes A and D), OCIP and IASM	Corporate bodies salaries + Employees salaries + Social contributions + Bonus with managers and staff
D.12	Employers' social contributions	SBI/IES (Annexes A and D) and OCIP	Pension premiums + Social charges + Insurance schemes for accidents at work and occupational diseases + Compensations + Other personal expenses – Working cloths – Training			SBI/IES (Annexes A and D) and detailed Trial balance reports	Pension premiums + Social charges + Insurance schemes for accidents at work and occupational diseases + Compensations + Other personal expenses – Working cloths – Training	SBI/IES (Annexes A and D), OCIP and IASM	Pension premiums + Social charges + Insurance schemes for accidents at work and occupational diseases + Compensations + Other personal expenses – Working cloths – Training
D.121	Employer's actual social contribution					IES/SBI (Annexes A and D)	Employers' actual pension contributions (D.1211) + Employers' actual non-pension contributions (D.1212)		
D.122	Employer's imputed social contribution					Govern-ment transfer to CGA [3)]	Employers' imputed pension contributions (D.1221) + Employers' imputed non-pension contributions (D.1222)		

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II.1.1: Generation of income account		S11+S14		S12		S13		S15	
		Source	Algorithm	Source	Algorithm	Source	Algorithm	Source	Algorithm
D.29	Other taxes on production	SBI/IES (Annexes A and D) and OCIP[4)]	D.29 NA * P1 OSA / P1 NA	-	-	-	-	SBI/IES (Annexes A and D), OCIP and IASM	D.29 NA * P1 OSA / P1 NA
D.39	Other subsidies on production	IEFP, ESF, SS, IFAP and *Turismo de Portugal, I.P.*[5)]	-	-	-	IEFP, ESF, SS, IFAP[3)]	-	IEFP, ESF, SS, IFAP and *Turismo de Portugal, I.P.*[3)]	-
B.2g	Operating surplus, gross	-	B.1g - D.1 - D.29 + D.39	-	B.1g - D.1 - D.29 + D.39	-	B.1g - D.1 - D.29 + D.39	-	B.1g - D.1 - D.29 + D.39

Notes:

1) CGA - *Caixa Geral de Aposentações* (General Retirement Fund)

2) Annex A: Direct Taxes; Annex D: weight of other expenses and losses; OCIP: share of Total taxes.

3) IEFP - Employment and Vocational Training Institute; ESF - European Social Fund ; SS - Social Security; IFAP – *Instituto de Financiamento da Agricultura e Pescas* (Institute of finance for agriculture and fisheries).

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		S11+S14		S12		S13		S15	
III.1.2: Acquisition of non-financial assets account		**Source**	**Algorithm**	**Source**	**Algorithm**	**Source**	**Algorithm**	**Source**	**Algorithm**
P.5	Gross capital formation	SBI/IES (Annexes A and D) and OCIP and others	P.51 + P.52 + P.53		P.51 + P.52 + P.53		P.51 + P.52 + P.53		P.51 + P.52 + P.53
P.51	Gross fixed capital formation	SBI/IES (Annexes A and D) and OCIP IPCTN	*Intangible and tangible assets (First Hand Aquis. + Other Aquis.+. + TPE + Other) + Investment Property + Non-current assets held for sale-Disposals*			SBI/IES Detailed Trial balance reports IPCTN	P.51	SBI/IES (Annexes A and D) and OCIP IPCTN	Gains-Disposals: Software + Buildings and Other Constructions + Basic Equipment + Transport Equipment +Tools and Features + Adm. Equipment + Returnable Containers + Other Tangible Fixed Assets + On-going Works
P.52	Changes in inventories	SBI/IES (Annexes A and D) and OCIP	*Goods Balance + Raw Materials + Products*			Detailed Trial balance reports	P.52		-
P.53	Acquisitions less disposals of valuables (ACOV)	International Trade	-			Detailed Trial balance reports	P.53		-
P.51c	Consumption of fixed capital	Estimations	-			Estimations	-	Estimations	-

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METHODOLOGY AND DECISION-MAKING SUPPORT

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SREA
Serviço Regional
de Estatística dos Açores