THE PERUVIAN BLUE ECONOMY: AN INTERREGIONAL APPROACH

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Resumo
Apesar do crescente interesse internacional pela economia azul, um número significativo de países ainda carece de dados sistemáticos sobre a contribuição das atividades relacionadas ao mar para suas economias nacionais. Essa limitação é particularmente evidente na América Latina, onde diversas nações não mensuram a relevância econômica de sua economia azul. O Peru destaca-se como um caso desses casos. Embora possua uma das maiores extensões costeiras do mundo e um grande número de províncias litorâneas, não existem estatísticas oficiais sobre a contribuição do mar para a economia nacional. Este estudo propõe quantificar a Economia Azul do Peru para o ano de 2022 por meio da construção de uma Matriz Insumo-Produto Inter-regional (IIOA), com setores marinhos definidos explicitamente. Trata-se, até onde se pode verificar, do primeiro que quantifica a Economia Azul do Peru. Os resultados estimam que as atividades relacionadas ao mar representaram aproximadamente US$ 33 bilhões ou 3,8% do PIB nacional em 2022. Além disso, os resultados apontam que economia azul do Peru é majoritariamente composta por atividades do setor de serviços.
Palavra-chave: Economia Azul; PIB do Mar do Peru; Modelo Insumo-Produto.

Abstract
Despite growing international interest in the Blue Economy, a significant number of countries still lack systematic data on the contribution of sea-related activities to their national economies. This limitation is particularly evident in Latin America, where several nations do not quantify the economic relevance of their sea-related sectors. Peru stands out as a critical case: although it has one of the longest coastlines in the world and a large number of coastal provinces, there are no official statistics on the contribution of the sea to the national economy. This study proposes to quantify the Peruvian Blue Economy for the year 2022 by constructing an IRIO Matrix with explicitly defined marine sectors. This is, as far as can be verified, the first study to application an input-output model to the measurement of Peru's Blue Economy. The results estimate that marine-related activities accounted for approximately US$ 33 billion, or 3.8% of national GDP in 2022. The findings also indicate that the structure of the Peruvian Marine Economy is dominated by service activities.
Keywords: Blue Economy; Peruvian Marine GDP; Input-Output Model.

1. Introduction

Since the 1980s, numerous international studies have examined the economic contribution of the ocean, that is, the blue economy, across regional, national, and continental scales. The increasing interest in this field reflects a global effort to quantify the various uses of marine resources under the framework of the Blue Economy. This trend is driven by multiple factors, including: (i) the rising demand for marine and coastal resources to support human

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survival, coastal protection, recreation, and climate regulation; (ii) global population and economic growth, which intensify pressure on coastal environments; (iii) the need to ensure marine ecosystem conservation; and (iv) the governance of resource use within Exclusive Economic Zones.

Kildow and McIlgorm (2010) point out that studies of the economic contribution of oceans to the national economy enable governments to plan actions that aim at protecting environmental areas. They state that researches aim at evaluating the total of marine economy use their results to highlight the importance of the sea to a country's economy. According to Zhao et al. (2014) China is a one of the countries that best recognized this target. They have, established in 2006 the Ocean Economy Accounting System and, in 2011, elected for the first time the developing ocean economy as part of the Five-Year plan's goals.

However, a significant number of countries still do not quantify the sea-related activities for this economy. This is particularly evident in Latin America, where several nations lack systematic data. Among them, Peru stands out as a relevant case for further examination.

Peru covers an area of approximately 1.2 million Km^2 and is located on the western coast of South America, bordered by the Pacific Ocean. The country is divided into three natural regions with distinct characteristics that affect the structure and dynamics of its economy: (i) the Coast, where the capital city Lima is located, concentrates most of the country's industrial, commercial, and agricultural activities; (ii) the Highlands, corresponding to the Andean region, face significant logistical challenges due to the mountainous terrain; and (iii) the Amazon[4] region, which accounts for the largest portion of the national territory and has low population density.

Regarding the coastal region, data from the National Institute of Statistics and Informatics (INEI, 2017) indicate a high concentration of economic activities, particularly in the departments of Lima and Callao. This region also concentrates most of the country's micro and small enterprises, playing a central role in employment and income generation. Moreover, the fishing sector, both artisanal and industrial, makes a significant contribution to the national GDP, demonstrating the importance of ocean-based activities in the structure of the national economy.

The Ocean Decade and SDG 14 have intensified the demand for national assessments of sea-related economies. In Peru, this agenda is particularly relevant given the country's strong maritime profile and the absence of systematic data on the economic role of the ocean, underscoring the need for dedicated studies on its blue economy. This paper contributes to fill this gap, by estimating an Interregional Input-Output matrix that enables measuring the contributions of blue economy in 2022. This is the first effort of measuring blue economy for Peru. Therefore, we present an overview of the Peruvian marine economy, proposing its quantification for 2022 and evaluating the linkages and coast-dependent industries economic impacts to the national and regional economy. The biggest contribution of the present article lies in the quantification of a specific geographic and environment segment of Peruvian economy in connection with the sea. The specific research questions are:

(i) What is the blue economy's contribution to Peru's GDP, and what is its most prevalent activity?
(ii) What are the indirect effects of the Peruvian blue economy?

Economic impacts can be evaluated by measuring economic activities development, improvement of technology production for sustainable development and ocean conservation, job creation income generation, and the number of public policies enforced. Furthermore, it is

[4] The Amazon Rainforest covers approximately 60% of Peru's territory.

very important to identify the Gross Domestic Product of the Sea as a relevant indicator of economic growth that can support the formulation of public policies and investments. As a result, we expect to stress the relevance of the Peruvian sea related economy suggesting a category of analysis with an analytical-methodological tool-aid development and its implementation for specific public policies that can be adopted by coastal states and cities.

The paper is divided into four sections. Next section reviews studies that applied the Input-Output model to estimate the size of either marine or coastal economy in their countries. The third section describes the theoretical structure of the Input-Output model. Fourth section presents the results and discusses them in the context of the Peruvian blue economy. The fifth and the last section present the final remarks of the article.

2. Blue economy in the world and the Input Output model

The delimitation of the definition of the marine or coastal economy varies across countries and economic zones, each adopting its own methodology to define the relevant sectors and estimate their contribution to national output (KILDOW AND MCILGORM, 2010; WORLD BANK, 2017; COLGAN, 2003). In this regard, Carvalho and Moraes (2021) propose a broad understanding of marine related economy as economic activities that are directly influenced by the sea, including the ones which raw material do not necessarily comes from the sea, but that are carried out in its surroundings. The World Bank (2017) conceptualizes the blue economy as the set of oceanic economic activities and their sustainable uses. It includes both traditional sectors such as fishing, tourism, and maritime transport, and emerging activities like renewable energy, aquaculture, deep-sea mining, marine biotechnology, and bioprospecting. The systematization of information on marine economy is crucial for understanding the role of ocean-based activities in national and regional development strategies. As highlighted by Kildow et al. (2001), such data are essential to quantify the economic importance of maritime sectors, while Graziano et al. (2019) emphasize the renewed relevance of coastal and marine territories in discussions of regional development. In some cases, these regions, once considered economically stagnant, are now seen as areas of potential growth (Graziano et al., 2018). Methodologically, Colgan (2013) points out that regional econometric models have been applied to estimate production levels in marine sectors. However, the author argues that input-output models are more precise, as they capture intersectoral linkages and allow the calculation of economic multipliers associated with ocean-based activities.

In their study of the role played by marine economy in South Korea, Kwak et al., (2005) used five national input-output Matrices (1975-1998). Sectors Marine Transport Industries, Ports, Fishing and Marine Products, Naval and other marine Industries were identified as marine sectors. They concluded that the gross value production (GPV) of Korean Marine Economy was 3% of the national industry in 1998.

Morrissey and O'Donoghue used the same input-output tool and analyzed the contribution of Marine Economy in Ireland at national and regional levels. In the Input-Output Matrix for 2007, ten sectors were disaggregated (Fishing, Oil and Gas, Seafood Processing, Naval Construction, Water Construction, Water Transport, Marine Engineering, Marine Retail Activities, Water-based Activities and Auxiliary Transport Activities). Results showed that the GVA of the Marine Economy corresponds to one per cent of the national GVA. The sectoral disaggregation was based on secondary information from social and economic statistics.

Zhao et al., (2014) point out that when the Chinese government acknowledged the importance of evaluating Marine Economy, they decided to create an exclusive department to collect data and carry out analyses in the area. Even though four accounts were established, this paper highlights only the Elementary Account because it is responsible for developing Input-Output Matrices. The results depicts that Chinese marine economy, consisting of Marine Fishing, Offshore Oil and Gas, Mining, Sea Salt Industry, Naval Construction, Chemical Industry, Marine Biomedicine, Marine Engineering and Construction, Marine Electrical

Energy, Use of Sea Water, Marine Communication and Transport and Coastal Tourism, has a GVA which represents 4% of the GDP.

The National Ocean Economics Program (NOEP)[5] has developed a methodology to distinguish and quantify United States sea-related economy in coastal and ocean economies. In this sense, coastal economy was represented as an all economic activity carried out in water coastal states, whereas the oceanic economy consists of all economic activity that comes, even if partially, from the seas (KILDOW et al., 2016). NOEP proposed a definition of oceanic economy, which includes aspects of industry and geography simultaneously. For 2014 figures, NOEP accounts 84% of American GDP is associated with the coastal economy, while only 2.2% of 2013 American GDP would be oceanic economy comprehended by six major sectors: Construction, Living Resources, Minerals, Naval Industry, Recreation and Tourism and Transportation (KILDOW et al., 2016).

In Australia, Allen Consulting (Allen 2005) estimated oceanic economy for the 2002-2003 period. Ocean economics is understood here as the relationship between industry and ocean, in several ways: 1) employment of ocean resources; 2) offer services that are ocean dependent; 3) obtain advantage from oceanic resources or environment. There are six sectors, or twenty activities, that comprehends Australia's oceanic economy: Marine Tourism, Oil and Offshore Gas, Fishing and Seafood, Marine Transport, Naval Industry and Port Activities. The sum of Australian oceanic industry within these sets amounts to 3.6% of total industrial output (ALLEN, 2005).

Carvalho and Moraes (20210 and Carvalho (2023) quantified the Brazilian Marine and Coastal Economy for the years 2015 and 2018, estimating contributions of 2.6% and 3.0% of GDP, respectively. An important innovation in this field was introduced by Haddad and Araujo (2025), who quantified the Brazilian sea-related economy from a regional perspective, finding a contribution of 2.9% of national GDP

Within this framework, Peru has about 3080 km corresponding to the territory of maritime coastal zone distributed along 11 coastal states and 32 coastal provinces as show Table 1.

Maritime departments	**Number of provinces located in front of the sea**	**Coast Population (1,000)**
Ancash	3	1 083 519
Arequipa	4	1 382 730
Callao	1	994 494
Ica	4	850 765
La Libertad	4	1 778 080
Lambayeque	2	1 197 260
Lima Province	3	8 574 974
Lima Metropolitan	1	910 431
Moquegua	2	55 213
Piura	3	1 856 809
Tacna	2	329 332

[5]Part of the Center of Blue Economy (CBE) at the Middlebury Institute of International Studies at Monterey.

Tumbes	3	224 863
TOTAL	**32**	

Table 1 – Overview of Peruvian maritime departments in 2017 (INEI, 2017).

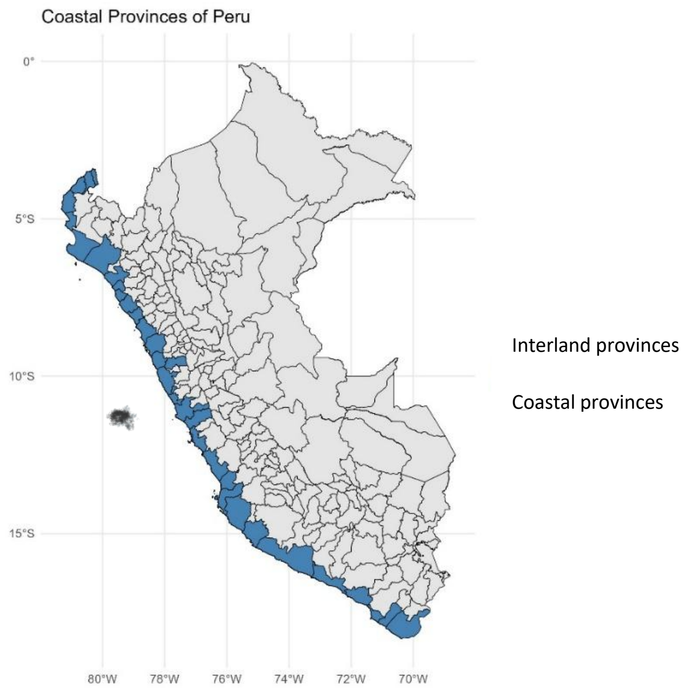


Figure 1 – Coastal Provinces of Peru.

3. Materials, Methods and Interregional Input-Output Matrix

3.1 Input-Output fundamentals

The Input-Output Table Compilation and Analysis Handbook, published by the United Nations (1999), references the work of Wassily Leontief, Nobel laureate in 1973, who developed the Input-Output tables in 1936 using data from the United States economy between 1919 and 1929. In Leontief's formulation the input-output model is conceived as a systematic representation of the economic structure, integrated into the national accounting framework, in which total output is decomposed into a set of interdependent sectors linked by the flows of intermediate goods and services (Leontief, 1987).

The analysis method uses an Input-Output model. Miller and Blair (2009) state that the Input-Output models are based on the observation of data in the economy of a region, state or country.

In this context, this research uses a Peruvian IRIO building by Haddad and Araujo (2024). We consider a country spatially organized into regions, such as departments. In the stylized framework presented in Figure 2, the national territory is divided into four regions (R1, R2, R3, and R4), two of which are landlocked (R1 and R3) and two coastal (R2 and R4). Each region can, in turn, be subdivided into smaller administrative units, such as provinces. For example, region R2 comprises 25 subregions, five of which have direct access to the sea. Due to data constraints, the availability and quality of information are greater at the regional level than at the subregional level. Similarly, data are more detailed at higher levels of economic activity classification. This generates a dual challenge. First, it is necessary to define and isolate the contribution of sea-related activities, which are identified at a lower level of sectoral disaggregation and, in our framework, are spatially located in coastal subregions adjacent to the shoreline. This disaggregation makes it possible to quantify the magnitude of the blue economy within each subregion and region. In this context, we define direct marine-related activities as those either carried out at sea or responsible for producing goods destined for use in maritime environments.

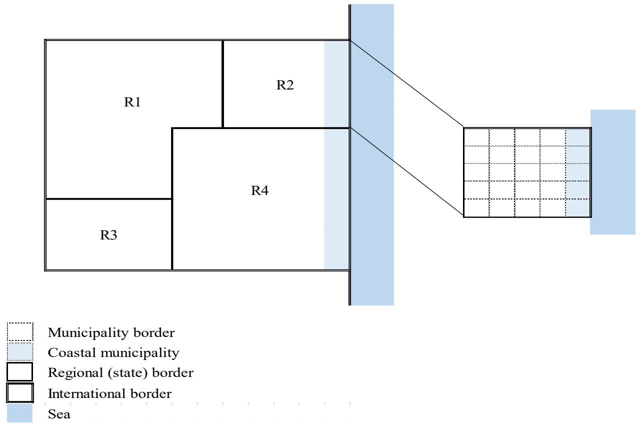


Figure 2 - Schematic representation of the multi-level geographical setting.

3.1.1 Regional setting: Consider there are R regions, r = 1, ... R, which exhausts the space of a country's economy. Each region is further divided into a finite number of sub-regions, M^r, m^r = 1, …, M^r, for all r = 1, ..., R. It is important to highlight that the number of sub-regions can vary across regions.

3.1.2 Production setting: There are C firms in the country, c = 1, ... C, allocated to J sectors, j = 1, ..., J. Firms are characterized by a production set Y^c contained in the sectoral production set Y^j they belong to, and they are spatially distributed in M^r sub-regions in each of the R regions. Moreover, firms can be allocated to a sub-sector within j based on its main output characteristics. Thus, within a given sector j, there may be Q^j different sub-sectors, $q^j = 1, \dots, Q^j$, for all j = 1, ..., J. Each firm produces one unit of output irrespective of its sub-sector and location.

3.1.3 Blue economy setting: We consider two perspectives associated with the blue economy: geographical and industrial. For the geographical perspective, are identifying the subset of sub-regions facing the sea. We define $\breve{M}^r$ as a subset of coastal sub-regions in r, $\breve{m}^r = 1, \dots, \breve{M}^r$, therefore the industrial is assumed that activities and products related to the blue economy are located only in coastal areas. Thus, we define $\breve{Q}^j$ as a subset of sub-sectors (located in $\breve{m}^r$), that are directly associated with the presence of the sea, with $\breve{q}^j = 1, \dots, \breve{Q}^j$, for all j = 1, ..., J.

3.1.4 Multi-level aggregation: In each sub-region m^r, a firm related to sub-sector q^j is denoted by $C^{(m^r)}_{(q^j)}$, so that $0 \le C^{(m^r)}_{(q^j)} \ll C$ and $\sum_{q^j=1}^{Q^j} \sum_{m^r=1}^{M^r} C^{(m^r)}_{(q^j)} = C$. Note that in the multi-level aggregation five specification are necessary: (i) $\sum_{m^r=1}^{M^r} C^{(m^r)}_{(q^j)} = C^{(\cdot r)}_{(q^j)}$ defines the total number of firms in sub-sector q^j located in region r, for all $q^j = 1, \dots, Q^j$, j = 1, ... J, and r = 1, ..., R; (ii) $\sum_{m^r=1}^{M^r} \sum_{q^j=1}^{Q^j} C^{(m^r)}_{(q^j)} = C^{(\cdot r)}_{(\cdot j)}$ defines the total number of firms in sector j located in region r, for j = 1, ..., J and r = 1, ..., R; (iii) $\sum_{\breve{q}^j=1}^{\breve{Q}^j} C^{(\breve{m}^r)}_{(q^j)} = \breve{C}^{(\breve{m}^r)}_{(\cdot j)}$ defines the total number of firms related to the blue economy in sector j located in coastal sub-region $\breve{m}^r$ in region r, for all j = 1, ... J, $\breve{m}^r = 1, \dots, \breve{M}^r$, and r = 1, ..., R; (iv) $\sum_{\breve{m}^r=1}^{\breve{M}^r} C^{(\breve{m}^r)}_{(q^j)} = \breve{C}^{(\cdot r)}_{(q^j)}$ defines the total number of firms in sub-sector q^j located in coastal sub-region $\breve{m}^r$, for all $q^j = 1., \dots, Q^j$, j = 1,

$$\boldsymbol{BLUESH^r_j} = \frac{\breve{\boldsymbol{C}}^{(\cdot r)}_{(\cdot j)}}{\boldsymbol{C}^{(\cdot r)}_{(\cdot j)}},$$

..., J, and r = 1, ..., R; (v) $\sum_{\breve{m}^r=1}^{\breve{M}^r} \breve{C}_{(\cdot j)}^{(\breve{m}^r)} = \breve{C}_{(\cdot j)}^{(\cdot r)}$ defines the total number of firms related to the blue economy operating in sector j in region r, for all j = 1, ..., J, and r = 1, ..., R

3.1.5 Blue economy: The share of the blue economy in sector j in region r is given by:

3.1.6 Systemic effects: Are consider an interregional input-output flow-table for a J-sector economy with R regions. Interregional spillovers through trade are fully considered through the explicit specification of interregional trade linkages. We assume we can identify the share of the blue economy in total sectoral output in each region, such that $BLUESH_j^r * x_j^r$, for all j=1,…,J and r=1,…,R, is the total sectoral output related to the sea in region r.

3.1.7 F-factors – intermediate demand: The jxs factors (F_j^s) where $0<F\_j^s<1$, specifying the share of output in each sector in each region that is not directly related to the sea economy. So, $\forall\, z_{ij}^{rs}, i, j = 1, \dots, J$ and $r, s = 1, \dots, R$ we compute a corresponding restricted flow, $\overline{z_{ij}^{rs}}$, such that: $\overline{z_{ij}^{rs}} = \begin{cases} F_i^r z_{ij}^{rs}, \text{if } F_i^r < F_j^s \\ F_j^s z_{ij}^{rs}, \text{if } F_i^r > F_j^s \end{cases}$. For F_j^s close to 0 are stronger relation with the sea; F_j^s equal to 1 are no relation with the sea.

3.1.8 F-factors – final demand: In addition to supply-side restrictions, associated with the factor (F_i^r), additional demand-side constraints can be added to complete the decision rule. For each final demand user, a demand-side factor, F_u^s, u=c, i, g, e, and s=1,…,R can be specified. F_c^s is calculated based on total aggregate earnings in region s, excluding earnings by workers in region s employed in those activities related to the sea economy. Total labor income earned by informal and formal workers in blue economy activities is, thus, deduced from total labor income in the region, such that F_c^s defines the share of income that is not directly related to the sea (we then assume aggregate labor income is proportionally translated into household demand changes); F_i^s: is calculated based on the **s**hare of total regional gross operational surplus that is not related to blue economy activities; F_g^s: is calculated based on the allocation of net indirect taxes and production taxes that is not related to the sea. Thus, considering each component of final demand, f_{iu}^{rs}, the following rule was applied: $\forall\, f_{iu}^{rs}, i = 1, \dots, J, u = c, i, g, e$ and $r, s = 1, \dots, R$ we compute a corresponding restricted flow, $\overline{f_{iu}^{rs}}$, such that:

$$\overline{f_{iu}^{rs}} = \begin{cases} F_i^r f_{iu}^{rs}, \text{if } F_i^r < F_u^s \\ F_u^s f_{iu}^{rs}, \text{if } F_i^r > F_u^s \end{cases}$$

3.1.9 Partial hypothetical extraction: Using the information from the original and the diminished sectoral flows, we have now two matrices of interindustry flows, **Z** and ¯**Z**, and two vectors of final demand, **f** and ¯**f**. For a given vector of sectoral output, x, we can also derive two matrices of technical coefficients, A and ¯A. In the complete interregional IO model with the original sectoral flows the output of the economy is given by: $x = (I - A)^{-1} f$. Using ¯A as the matrix associated with restricted intersectoral trade flows due to the exclusion of the various blue economy activities and ¯f the sea-related final demand, gross output in the economy would be given by: $\bar{x} = (I - \bar{A})^{-1} \bar{f}$. Therefore, after the partial extraction: $T = i'x - i'\bar{x}$.

3.2 The Peruvian Blue Economy Input-Output matrix 2022

The Peruvian I-O 2022, which consist of 101 activities enables the construction of the Peruvian Blue economy Input-Output Matrix. Carvalho and Moraes (2021) stands out that the first challenge to define blue economy GDP methodology is to choose which approach will be studied: either the marine or the coastal one. After, the economy sectors can be chosen. Thus, the marine approach is adopted, that is, this approach involves aspects of marine economic activities (directly related to the sea) developed in seafront[6] Peruvian provinces. Table 2 clarifies studies that support the conceptualization of Peruvian blue economy.

Approach	Reference Study	Justification
Direct relation with sea	Australia[7], USA[8], Brazil[9]	Use marine resources; offer services that depend on the sea; get economic advantages resulting from the marine environment, only a marine approach is adopted

Table 2 – Overview of Peruvian blue economy concept approach

Colgan (2013) distinguishes between activities included independently of location, such as fishing and fish processing, and others, like tourism and hospitality, which are only considered when situated in coastal areas. Furthermore, the World Bank (2017) selects the components of the blue economy according to the type of relationship it has with: (i) Harvesting and trade of marine; (ii) Extraction and use of marine non-living resources (non-renewable); (iii) Use of renewable non-exhaustible natural forces (wind, wave, and tidal energy); (iv) Commerce and trade in and around the oceans; (v) Indirect contribution to economic activities and environment. This paper and the World Bank study converge on the same types of activities except that due to the national economic structure our set of activities is more inclusive.

Activities selected for the Peruvian blue economy are available in Table 3.

Code	ISIC Rev. 4 Description
0311	Marine fishing
0321	Marine aquaculture
0610	Extraction of crude petroleum
0620	Extraction of natural gas
0893	Salt mining and quarrying
0910	Support activities for petroleum and natural-gas extraction
1020	Processing and preserving of fish, crustaceans and shellfish
2599	Manufacture of other fabricated metal products n.e.c.
2740	Manufacture of electric lighting equipment
2811	Manufacture of engines and turbines, except aircraft, vehicle and motorcycle engines
3011	Building of ships and floating structures
3012	Building of pleasure and sporting boats
3315	Repair of transport equipment, except motor vehicles
4630	Wholesale food, beverages and tobacco
4659	Wholesale of other machinery and equipment
4721	Retail sale of food in specialized stores
5011	Sea and coastal passenger water transport
5012	Sea and coastal freight water transport
5222	Service activities incidental to water transportation
5224	Cargo handling
5229	Other supporting transport activities
5510	Short-stay accommodation activities
5520	Camping grounds, recreational-vehicle parks and trailer parks

[6] Is extremely important highlight that departments and districts which are not contiguous with the ocean have been excluded from the analysis.

[7] ALLEN CONSULTING GROUP. The Economic Contribution of Australia's Marine Industries. June, pp. 1–66, 2005. 15

[8] KILDOW, J. T.; COLGAN, C.; JOHNSTON, J.; NICHOLS, M. State of the U. S. Ocean and Coastal Economies 2014. Cent. Blue Econ. Monterey Inst. Int. Stud., pp. 1–84, 2016.

[9] CARVALHO, A.; MORAES, G.I. The Brazilian coastal and marine economies: Quantifying and measuring marine economic flow by input-output matrix analysis. Ocean and Coastal Management 213 (2021) 105885, and HADDAD, Eduardo A.; ARAÚJO, Inácio F. Shades of blue: the regional structure of the ocean economy in Brazil. npj Ocean Sustainability, v. 4, n. 1, p. 15, 23 abr. 2025

5610	Restaurants and mobile food-service activities
5630	Beverage-serving activities
6810	Real-estate activities with own or leased property
6820	Real-estate activities on a fee or contract basis
7721	Rental and leasing of recreational and sports goods
7730	Rental and leasing of other machinery, equipment and tangible goods
7911	Travel-agency activities
7912	Tour-operator activities
7990	Other reservation service and related activities
8422	Defense activities
9319	Other sports activities
9329	Other amusement and recreation activities n.e.c.

Table 3 – ISIC activities classified in the Peruvian Blue Economy.

Table 3 shows thirty-five blue economy activities. These activities were grouped into twenty-three Peruvian IRIO sectors with originally 26 departments and 101 sectors, building by Haddad and Araújo (2024).

4. Results

Table 4 indicates the sectors of blue economy respective GDPs, occupations and participation in national economy. According to OECD (2019) the Gross Value Added (VA) as the primary metric for measuring the sea related economy as VA provides greater capacity for comparisons among sea related sectors. Therefore, this study assumes the same approach and presents the VA as the Peruvian blue economy GDP.

Sector[10]	BE GDP	BE GDP (%)	BE GDP/ National GDP (%)	BE Occupation	BE Occupation (%)	BE Occ/National Occupation (%)
S005	4,769.90	14.40	1.60	75247	13.70	79.20
S006	425.10	1.30	0.10	60	0.00	2.10
S007	20.97	0.10	0.00	103	0.00	5.00
S009	57.56	0.20	0.00	266	0.00	0.80
S012	1,759.05	5.30	0.60	16225	3.00	92.90
S013	3,327.11	10.10	1.10	17358	3.20	92.90
S052	103.72	0.30	0.00	1888	0.30	2.50
S054	0.85	0.00	0.00	7	0.00	0.10
S055	1,696.18	5.10	0.60	22381	4.10	76.90
S056	4.95	0.00	0.00	25	0.00	0.10
S058	4.54	0.00	0.00	38	0.00	0.00
S062	2,848.43	8.60	1.00	78140	14.30	2.50
S065	387.14	1.20	0.10	7688	1.40	55.90
S067	248.17	0.70	0.10	3452	0.60	11.40
S068	5,617.83	17.00	1.90	31047	5.70	52.00
S070	1,110.42	3.40	0.40	43533	7.90	42.30
S071	7,293.94	22.00	2.50	241996	44.20	20.10
S081	557.50	1.70	0.20	2063	0.40	8.10
S082	2,501.64	7.60	0.90	0	0.00	0.00
S087	121.75	0.40	0.00	2347	0.40	15.10
S088	43.08	0.10	0.00	1163	0.20	4.70

[10]:S005: Fishing and aquaculture; S006: Crude oil and natural gas extraction; S007: Support activities for crude oil and natural gas extraction; S009: Non-metallic mineral and coal mining; S012: Processing and preservation of fish; S013: Production of fish meal and fish oil; S052: Manufacture of other miscellaneous metal products; S054: Manufacture of machinery and electrical equipment; S055: Manufacture of other machinery and equipment; S056: Construction of transportation equipment; S058: Other manufacturing industries; S062: Trade; S065: Water transport; S067: Warehousing; S068: Transportation support services; S070: Accommodation; S071: Restaurants; S081: Real-estate services; S082: Residential rental; S087: Other renting and leasing; S088: Travel agencies and tour operators; S093: Public administration and defense; S099: Arts, entertainment and recreation.

S093	13.83	0.00	0.00	202	0.00	0.00
S099	182.34	0.60	0.10	2485	0.50	2.90
BE	**33,096.00**	**100.00**	**3.80**	**547,716**	**100.00**	**3.00**
PERU	**867,440.00**	**-**	**33.9**	**18,294,978**	**-**	**32.7**

Table 4 - Overview of Peruvian blue economy by sector.

In 2022, the estimate value of the blue economy GDP in Peru was S/. 33 billion, which corresponded to 3.8% of the country's annual GDP (S/. 867 billion). Occupations in the sea-related sectors include both formal and informal workers totaled 547,716 million. Figure 3 displays the Peruvian blue economy GDP participation in national economia.

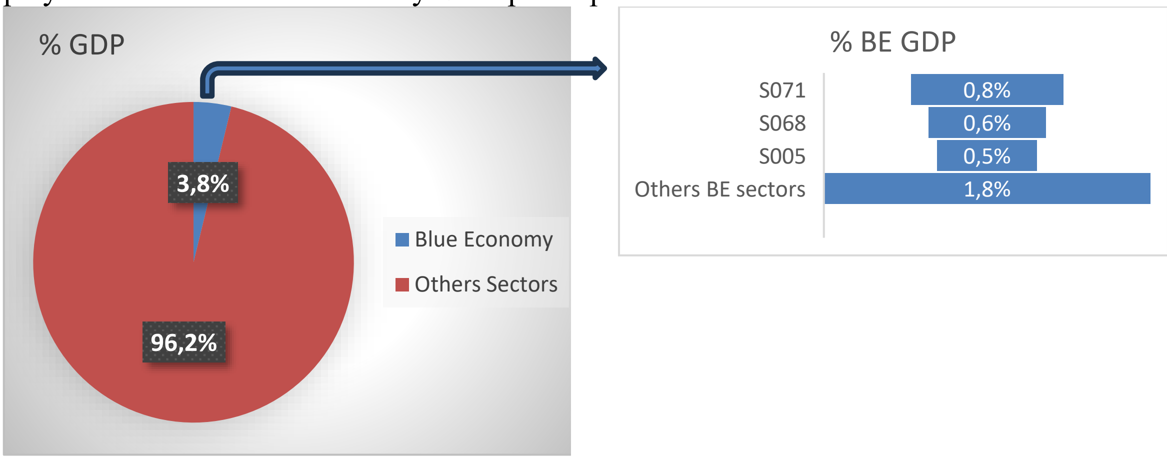


Figure 3. Marine GDP by comparison with national GDP.

Table 4 shows that the top five sectors in the Peruvian blue economy, as follow: (i) restaurants (S071: 22%); (ii) transport services (S068: 17%); (iii) fisheries and aquaculture (S005: 14.4%); (iv) production of fish meal and fish oil (S013: 10%); (v) trade (S062: 8.6%). An analysis of GDP BE suggests that the sectors related to services and fishing constitute the primary drivers of Peru's blue economy.

Kildow and McIlgorm (2010) suggest that the share of marine sectors in the national economy can be understood as a potential indicator of a country's economic dependence on the sea. In this regard, the authors point out that countries with diversified industries and large populations tend to have smaller shares of the sea-related economy, whereas less developed economies or small countries generally exhibit a greater contribution from sea related activities. In this context, Peru appears to fall into the latter category, as approximately 4% of its national economy is attributed to the blue economy, particularly considering that the country's main metropolitan regions are located along the coastal zone.

Figure 4 displays the participation of Peruvian blue economy occupations in the national economy for the year of 2022.

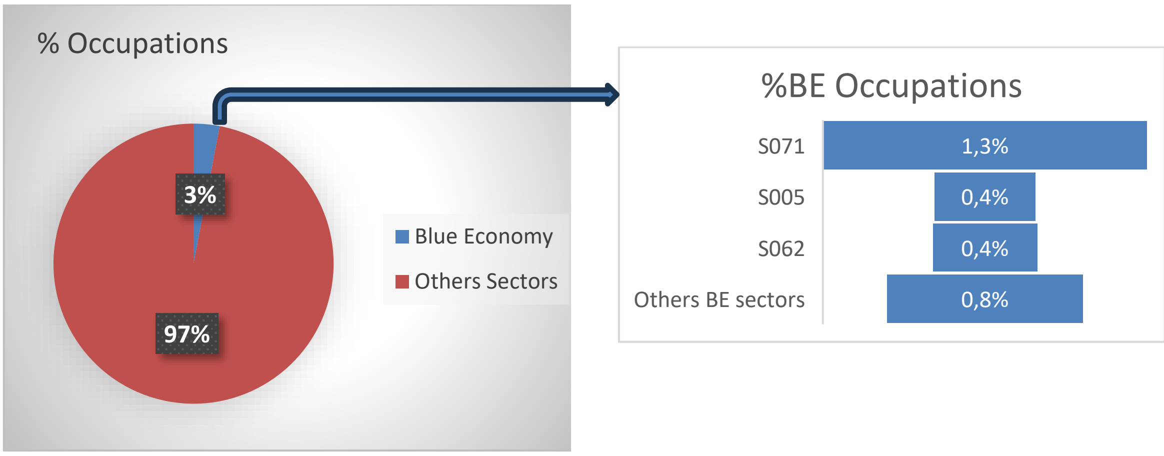


Figure 4. Occupations in BE sectors by comparison with occupations in Peru.

As shown in Table 4 the restaurants sector (S071: 44.2%) holds the largest share of employment within Peru's blue economy. As previously noted, the restaurant sector reflects the influence of the tourism industry. Colgan (2013) highlights the challenges of comparing the sea-related economy to the national economy, particularly when the sectors under comparison are highly seasonal – as is the case of tourism. Moreover, Colgan (2013) points out another important consideration regarding employment in sea-related sectors, that is overestimations in the tourism and recreation sector occur because not all spending in restaurants or hotels is ocean-related. Accurately identifying the ocean-linked share requires detailed tourist and resident expenditure data. This includes distinguishing, for example, spending on coastal attractions from unrelated urban activities. Table 5 presented the blue economy gross output.

Sector[11]	BE GO	BE GO (%)	BE GO/Sectoral GO (%)
S005	7549,50	11.5	1.5
S006	588,93	0.9	0.1
S007	79,18	0.1	0.0
S009	73,67	0.1	0.0
S012	6517,65	9.9	1.3
S013	8497,30	12.9	1.7
S052	269,21	0.4	0.1
S054	3,99	0.0	0.0
S055	4820,62	7.3	1.0
S056	10,27	0.0	0.0
S058	10,49	0.0	0.0
S062	4244,81	6.5	0.9
S065	1196,49	1.8	0.2
S067	686,26	1.0	0.1
S068	11014,90	16.7	2.3
S070	2153,80	3.3	0.4
S071	14033,06	21.3	2.9
S081	751,47	1.1	0.2

[11] S005: Fishing and aquaculture; S006: Crude oil and natural gas extraction; S007: Support activities for crude oil and natural gas extraction; S009: Non-metallic mineral and coal mining; S012: Processing and preservation of fish; S013: Production of fish meal and fish oil; S052: Manufacture of other miscellaneous metal products; S054: Manufacture of machinery and electrical equipment; S055: Manufacture of other machinery and equipment; S056: Construction of transportation equipment; S058: Other manufacturing industries; S062: Trade; S065: Water transport; S067: Warehousing; S068: Transportation support services; S070: Accommodation; S071: Restaurants; S081: Real-estate services; S082: Residential rental; S087: Other renting and leasing; S088: Travel agencies and tour operators; S093: Public administration and defense; S099: Arts, entertainment and recreation.

S082	2715,66	4.1	0.6
S087	169,61	0.3	0.0
S088	63,14	0.1	0.0
S093	24,31	0.0	0.0
S099	309,90	0.5	0.1
BE	**65,784.22**	**100.00**	
PERU	**1,625,224.99**		**4.05**

Table 5 –Peruvian blue economy by gross output.

Figure 5. Gross Output in BE sectors by comparison with gross output in Peru.

In 2022, Peru's Blue Economy reached approximately US$ 65.8 billion, corresponding to 4.05% of national gross output. Its composition is highly concentrated on five sectors (S071, S068, S013, S005, and S012) were responsible for more than 70% of total blue economy related production (last column of table 5).

The analysis of the results presented throughout this section points to a core-periphery structure within the Blue Economy, in which a small group of sectors concentrate the highest levels of production, while a broader range of peripheral activities remains only marginally integrated.

4.1 Systemic Effects

Table 6 presents the GDP systemic effects for each Peruvian department, with coastal departments highlighted in green. The results indicate that departments R07 (Callao), R25 (Tumbes), and R21 (Piura) exhibit the highest direct and indirect GDP effects from the Blue Economy (as shown in the % Regional column).

		Effects			% BE			% Regional		
Region[12]	**Regional GDP**	**Direct**	**Indirect**	**Total**	**Direct**	**Indirect**	**Total**	**Direct**	**Indirect**	**Total**
R01	5,786.81	0.00	119.44	119.44	0.0	0.3	0.2	0.0	2.1	2.1
R02	37,568.01	2,844.51	1,681.45	4,525.95	8.6	4.2	6.2	7.6	4.5	12.0
R03	14,509.52	0.00	97.29	97.29	0.0	0.2	0.1	0.0	0.7	0.7
R04	51,028.63	1,069.76	1,052.04	2,121.80	3.2	2.6	2.9	2.1	2.1	4.2
R05	10,782.52	0.00	185.12	185.12	0.0	0.5	0.3	0.0	1.7	1.7
R06	21,638.44	0.00	211.41	211.41	0.0	0.5	0.3	0.0	1.0	1.0
R07	43,013.28	5,094.19	4,280.98	9,375.17	15.4	10.6	12.7	11.8	10.0	21.8
R08	43,310.22	0.00	788.22	788.22	0.0	1.9	1.1	0.0	1.8	1.8
R09	6,377.94	0.00	145.05	145.05	0.0	0.4	0.2	0.0	2.3	2.3
R10	11,317.05	0.00	337.45	337.45	0.0	0.8	0.5	0.0	3.0	3.0

[12] R01: Amazonas; R02: Áncash; R03: Apurímac; R04: Arequipa; R05: Ayacucho; R06: Cajamarca; R07: Callao; R08: Cusco; R09: Huancavelica; R10: Huánuco; R11: Ica; R12: Junín; R13: La Libertad; R14: Lambayeque; R15: Lima Province; R16: Lima Metropolitan; R17: Loreto; R18: Madre de Dios; R19: Moquegua; R20: Pasco; R21: Piura; R22: Puno; R23: San Martín; R24: Tacna; R25: Tumbes; R26: Ucayali.

R11	41,958.75	1,227.85	1,771.64	2,999.48	3.7	4.4	4.1	2.9	4.2	7.1
R12	26,825.24	0.00	277.23	277.23	0.0	0.7	0.4	0.0	1.0	1.0
R13	40,023.318	1,375.99	1,705.02	3,081.01	4.2	4.2	4.2	3.4	4.3	7.7
R14	21,726.22	501.28	831.03	1,332.31	1.5	2.1	1.8	2.3	3.8	6.1
R15	28,408.738	704.44	1,381.84	2,086.28	2.1	3.4	2.8	2.5	4.9	7.3
R16	325,105.44	15,319.45	19,226.73	34,546.18	46.3	47.5	47.0	4.7	5.9	10.6
R17	14,739.24	0.00	476.40	476.40	0.0	1.2	0.6	0.0	3.2	3.2
R18	3,098.91	0.00	43.13	43.13	0.0	0.1	0.1	0.0	1.4	1.4
R19	16,056.94	386.71	225.10	611.82	1.2	0.6	0.8	2.4	1.4	3.8
R20	9,163.63	0.00	281.92	281.92	0.0	0.7	0.4	0.0	3.1	3.1
R21	39,695.07	3,318.04	3,405.81	6,723.84	10.0	8.4	9.1	8.4	8.6	16.9
R22	19,010.01	0.00	478.20	478.20	0.0	1.2	0.7	0.0	2.5	2.5
R23	10,780.21	0.00	312.65	312.65	0.0	0.8	0.4	0.0	2.9	2.9
R24	12,204.65	444.86	347.12	791.98	1.3	0.9	1.1	3.6	2.8	6.5
R25	5,055.55	808.94	498.81	1,307.75	2.4	1.2	1.8	16.0	9.9	25.9
R26	8,255.58	0.00	301.97	301.97	0.0	0.7	0.4	0.0	3.7	3.7
BE		**33,096.00**	**40,463.05**	**73,559.06**	**100.0**	**100.0**	**100.0**			
PERU	**867,440.00**							**3.8**	**4.7**	**8.5**

Table 6 - Systemic effects on Peruvian blue economy by GDP.

Table 7 indicates the departments according to employment systemic effects. In the departments of R09 (Huánuco, 4.0%), R20 (San Martín, 3.5%) and R26 (Cusco, 3.3%) are the departments with the highest indirect employment effects among those not directly engaged in marine activities. These findings highlight the role of supply chains and economic interdependencies in transmitting the effects of the blue economy beyond the coastal zone.

	Effects				% BE			% Regional		
Region[13]	**National Employment**	**Direct**	**Indirect**	**Total**	**Direct**	**Indirect**	**Total**	**Direct**	**Indirect**	**Total**
R01	247,138	0	6,290	6,290	0.0	0.8	0.5	0.0	2.5	2.5
R02	674,271	48,986	43,780	92,766	8.9	5.5	6.9	7.3	6.5	13.8
R03	266,536	0	7,448	7,448	0.0	0.9	0.6	0.0	2.8	2.8
R04	786,247	28,317	20,355	48,672	5.2	2.6	3.6	3.6	2.6	6.2
R05	394,134	0	12,200	12,200	0.0	1.5	0.9	0.0	3.1	3.1
R06	888,368	0	15,489	15,489	0.0	1.9	1.2	0.0	1.7	1.7
R07	581,409	40,228	56,342	96,570	7.3	7.1	7.2	6.9	9.7	16.6
R08	845,121	0	17,435	17,435	0.0	2.2	1.3	0.0	2.1	2.1
R09	218,361	0	8,664	8,664	0.0	1.1	0.6	0.0	4.0	4.0
R10	419,961	0	15,672	15,672	0.0	2.0	1.2	0.0	3.7	3.7
R11	506,286	13,507	23,072	36,579	2.5	2.9	2.7	2.7	4.6	7.2
R12	749,653	0	11,878	11,878	0.0	1.5	0.9	0.0	1.6	1.6
R13	1,163,675	30,514	52,283	82,797	5.6	6.6	6.2	2.6	4.5	7.1
R14	700,992	17,749	22,412	40,161	3.2	2.8	3.0	2.5	3.2	5.7
R15	1,231,738	35,151	54,112	89,264	6.4	6.8	6.6	2.9	4.4	7.2
R16	4,482,836	257,425	240,959	498,385	47.0	30.2	37.1	5.7	5.0	11.1
R17	534,610	0	15,312	15,312	0.0	1.9	1.1	0.0	2.9	2.9
R18	106,663	0	1,557	1,557	0.0	0.2	0.1	0.0	1.5	1.5
R19	103,230	5,671	3,013	8,684	1.0	0.4	0.6	5.5	2.9	8.4
R20	161,159	0	5,668	5,668	0.0	0.7	0.4	0.0	3.5	3.5
R21	1,235,844	52,352	90,347	142,699	9.6	11.3	10.6	4.2	7.3	11.5
R22	779,722	0	24,719	24,719	0.0	3.1	1.8	0.0	3.2	3.2
R23	540,531	0	16,879	16,879	0.0	2.1	1.3	0.0	3.1	3.1
R24	213,858	7,757	7,595	15,353	1.4	1.0	1.1	3.6	3.6	7.2
R25	133,490	10,058	12,384	22,443	1.8	1.6	1.7	7.5	9.3	16.8
R26	329,144	0	10,964	10,964	0.0	1.4	0.8	0.0	3.3	3.3
Total	**18,294,978**	**547,716**	**796,831**	**1,344,547**	**100.0**	**100.0**	**100.0**	**3.0**	**4.4**	**7.3**

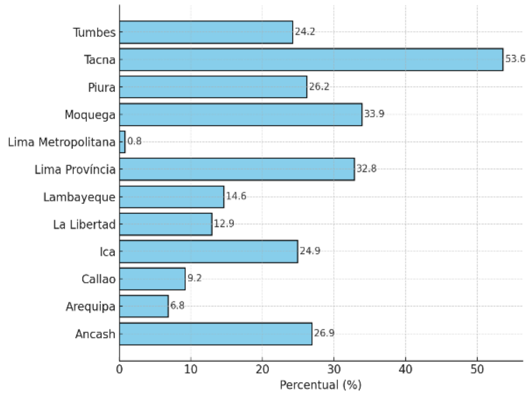
Table 7 – Systemic effects on Peruvian blue economy by Employment.

[13] R01: Amazonas; R02: Áncash; R03: Apurímac; R04: Arequipa; R05: Ayacucho; R06: Cajamarca; R07: Callao; R08: Cusco; R09: Huancavelica; R10: Huánuco; R11: Ica; R12: Junín; R13: La Libertad; R14: Lambayeque; R15: Lima Province; R16: Lima Metropolitan; R17: Loreto; R18: Madre de Dios; R19: Moquegua; R20: Pasco; R21: Piura; R22: Puno; R23: San Martín; R24: Tacna; R25: Tumbes; R26: Ucayali.

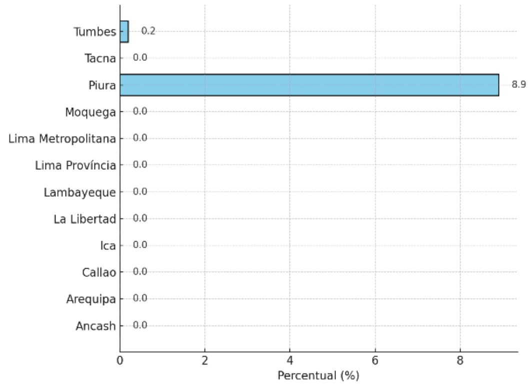
Region [14]	S005	S006	S007	S009	S012	S013	S052	S054	S055	S056	S058	S062	S065	S067	S068	S070	S071	S081	S082	S087	S088	S093	S099	Total
R01	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
R02	26.9	0.0	0.0	0.0	27.6	36.0	0.0	0.0	0.0	0.0	0.0	1.0	0.0	0.1	2.9	0.6	4.8	0.0	0.0	0.0	0.0	0.0	0.0	100.0
R03	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
R04	6.8	0.0	0.0	0.0	1.5	2.0	0.0	0.0	0.0	0.0	0.0	19.8	0.0	0.7	22.3	7.2	34.9	1.7	1.3	1.2	0.1	0.0	0.4	100.0
R05	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
R06	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
R07	9.2	0.0	0.0	0.0	13.0	16.9	0.0	0.0	0.0	0.0	0.0	2.7	1.0	1.3	50.4	0.4	3.5	0.3	0.8	0.2	0.0	0.2	0.1	100.0
R08	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
R09	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
R10	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
R11	24.9	0.0	0.0	2.0	15.3	20.0	0.0	0.0	0.0	0.0	0.0	5.2	0.0	13.2	6.4	2.0	8.7	1.0	0.8	0.2	0.0	0.0	0.3	100.0
R12	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
R13	12.9	0.0	0.0	0.6	21.4	27.9	0.0	0.0	0.0	0.0	0.0	4.4	0.1	1.5	8.9	0.5	19.1	0.5	1.7	0.1	0.0	0.0	0.2	100.0
R14	14.6	0.0	0.0	0.4	0.2	0.2	0.0	0.0	0.0	0.0	0.0	19.7	0.0	11.0	1.9	0.9	40.6	2.3	5.9	0.4	0.1	0.0	1.6	100.0
R15	32.8	0.0	2.3	0.0	6.1	7.9	0.0	0.0	0.0	0.0	0.0	6.1	0.0	0.1	15.0	4.5	22.8	0.3	0.	0.5	0.3	0.0	0.9	100.0
R16	0.8	0.0	0.0	0.0	1.1	1.4	0.9	0.0	16.7	0.0	0.0	9.1	3.7	0.1	11.8	6.0	36.6	2.1	8.2	0.3	0.2	0.0	0.8	100.0
R17	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
R18	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
R19	33.9	0.0	0.0	0.0	19.4	25.2	0.0	0.0	0.0	0.0	0.0	4.1	0.0	0.0	3.3	1.7	11.7	0.1	0.0	0.2	0.0	0.0	0.4	100.0
R20	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
R21	26.2	8.9	0.7	0.0	17.1	22.2	0.0	0.0	0.0	0.0	0.0	3.0	0.0	0.4	12.7	0.6	6.3	0.1	1.5	0.0	0.0	0.0	0.1	100.0
R22	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
R23	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
R24	53.6	0.0	0.0	0.0	5.0	6.5	0.0	0.0	0.0	0.0	0.0	11.0	0.0	0.1	5.6	0.5	16.1	0.2	0.5	0.8	0.1	0.0	0.1	100.0
R25	24.2	0.2	0.0	0.0	29.1	37.9	0.0	0.0	0.0	0.0	0.0	3.0	0.0	0.0	1.8	1.2	2.4	0.0	0.0	0.0	0.0	0.0	0.2	100.0
R26	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
PERU	2.0	5.7	0.5	1.5	1.4	1.8	1.9	1.0	1.2	1.8	4.2	30.4	0.3	1.4	4.0	0.8	12.7	1.8	6.6	0.2	0.2	16.6	1.9	100.0

Table 9 – Structure of the blue economy in Peruvian departments (%).

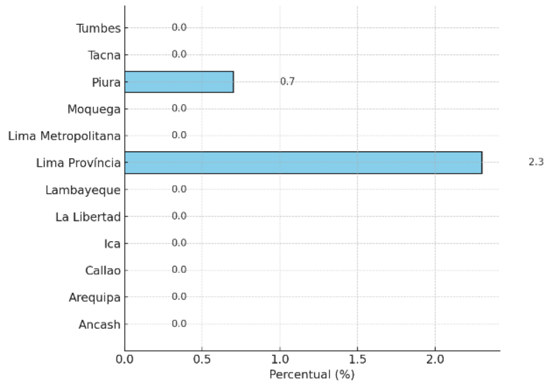
[14] R01: Amazonas; R02: Áncash; R03: Apurímac; R04: Arequipa; R05: Ayacucho; R06: Cajamarca; R07: Callao; R08: Cusco; R09: Huancavelica; R10: Huánuco; R11: Ica; R12: Junín; R13: La Libertad; R14: Lambayeque; R15: Lima Province; R16: Lima Metropolitan; R17: Loreto; R18: Madre de Dios; R19: Moquegua; R20: Pasco; R21: Piura; R22: Puno; R23: San Martín; R24: Tacna; R25: Tumbes; R26: Ucayali.



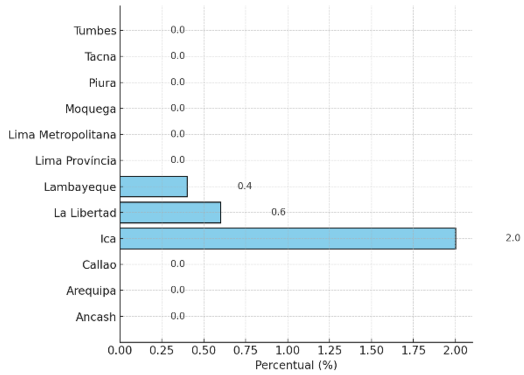
Fishing and aquaculture



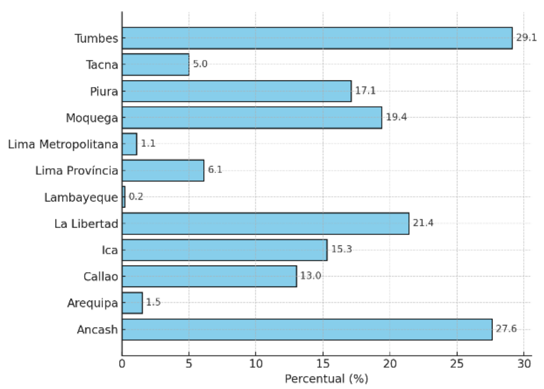
Crude oil and natural gas extraction



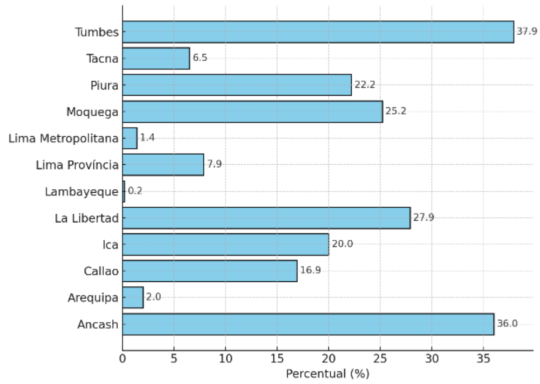
Support activities for crude oil and natural gas extraction



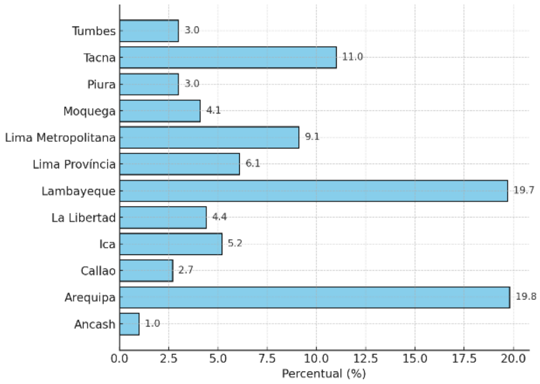
Non-metallic mineral and coal mining



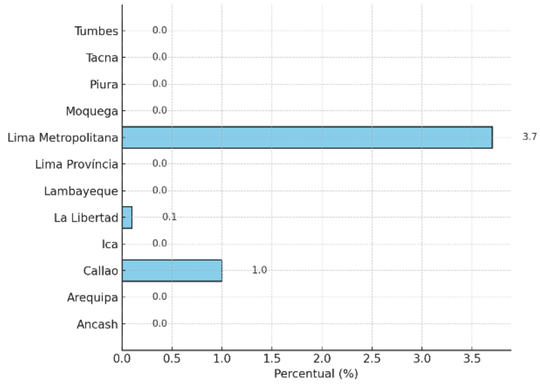
Processing and preservation of fish



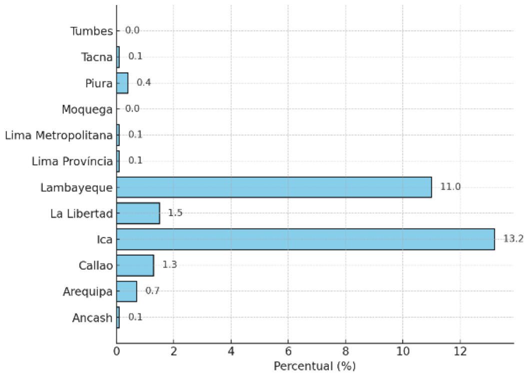
Production of fish meal and fish oil



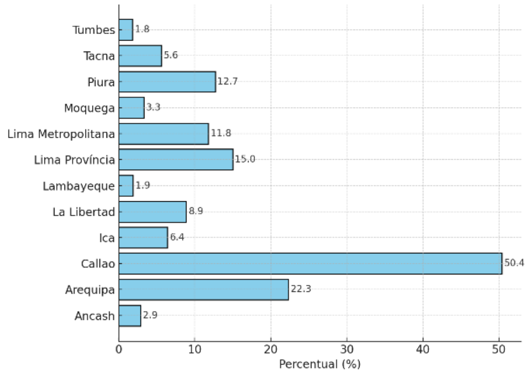
Trade



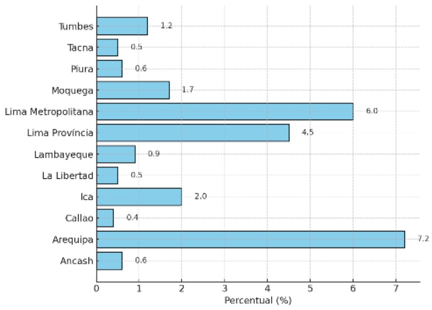
Water transport



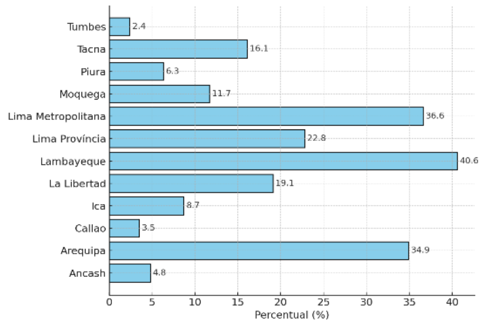
Warehousing



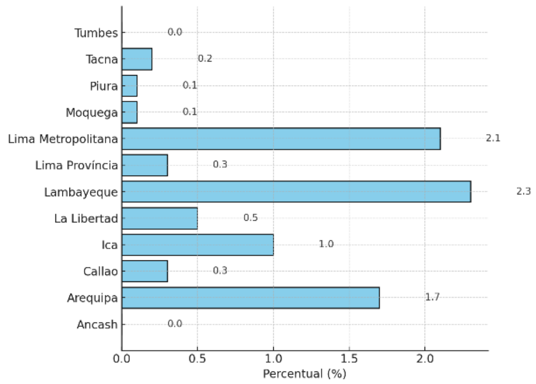
Transportation support services



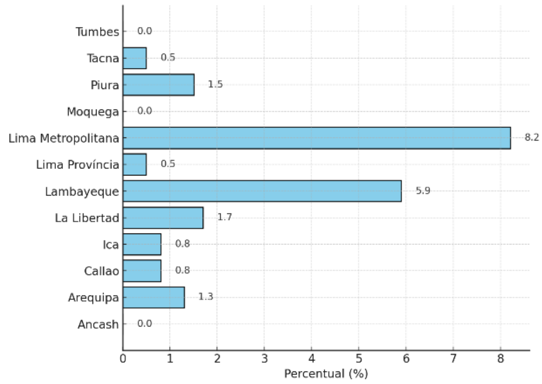
Accomodation



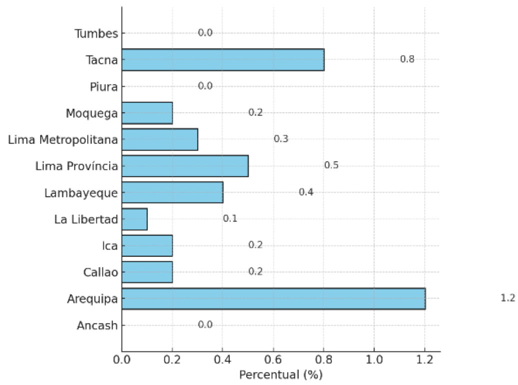
Restaurants



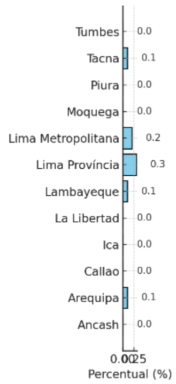
Real-estate services



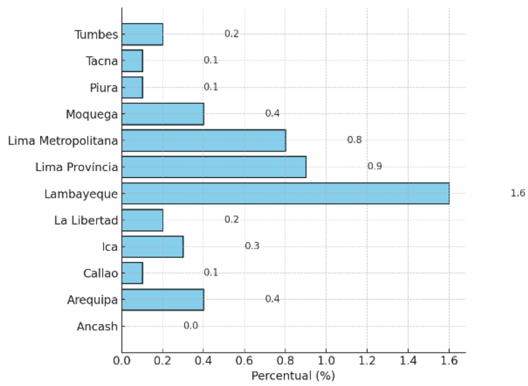
Residential rental



Other renting and leasing



Travel agencies and tour operators



Arts, entertainment and recreation

Figure 6. Regional Distribution of blue economy activities (gross output).

Figure 7 shows the regional distribution of impacts of the blue economy in Peru.

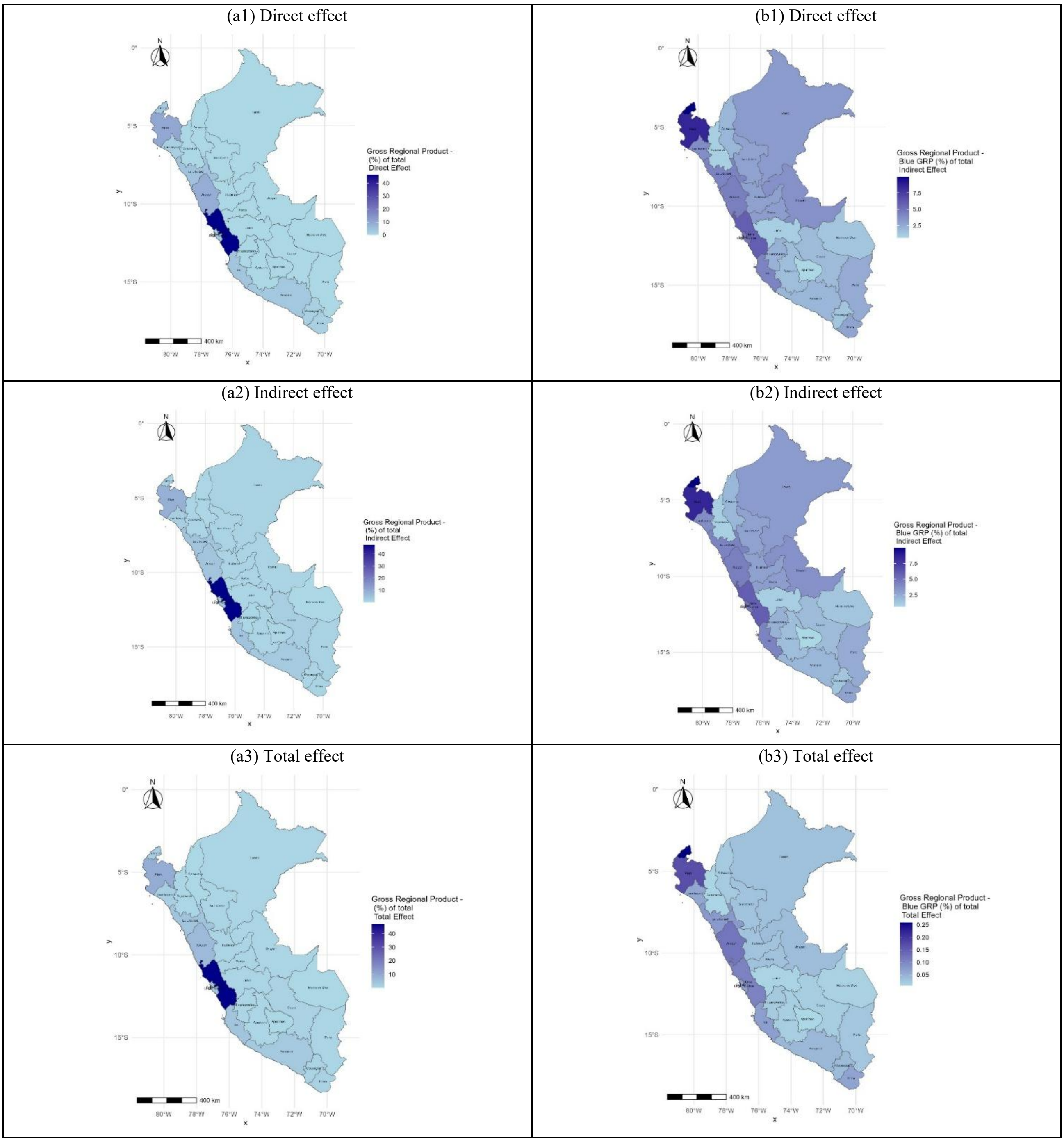


Figure 7. Decomposition of the systemic impacts of the Peruvian blue economy.

Considering the regional distribution of the blue economy's impacts in Peru, the results indicate significant heterogeneity between direct and indirect effects. maps (a1) and (b1) display the direct effects: map (a1) presents each department's contribution as a share of the national blue economy, while map (b1) shows these effects relative to the total output of each department. The same logic applies to the remaining maps: (a2) and (b2) represent indirect effects, and (c1) and (c2) present the total effects. The results highlight a strong concentration of both direct and indirect effects in the Lima Metropolitan area, followed by moderate impacts in other coastal departments such as Áncash and Piura. This pattern reflects a structure of spatial interdependence among regions, where marine-based activities in key coastal areas generate spillover effects into neighboring territories. When the impacts are assessed relative to the total output of each department, the influence of the blue economy becomes more spatially diffuse, reaching a wider range of regions, including inland departments. Nevertheless, the intensity of these effects remains highest in coastal and adjacent areas, particularly in departments such as Tumbes and Piura, which exhibit strong concentration in fishing and offshore oil production.

As an overall result, it is notable that the sea impacts most Peruvian departments, even those without a coastline, despite the strong spatial dependence on coastal departments, especially the Lima Metropolitan area; fishing and oil producing regions Tumbes and Piura.

5. Conclusion

This study presented a quantitative assessment of the blue economy in Peru for the year 2022, employing an interregional input-output model specifically structured to identify marine-related sectors. The results show that the blue economy accounts for a significant share of national GDP (3.8%) and employment (3.0%), with a notable spatial concentration in coastal departments, particularly the Lima Metropolitan and Callao. Simultaneously, a considerable number of inland departments derive indirect benefits from the blue economy through intersectoral linkages, supply chains, and the provision of related services. These findings highlight the importance of integrated regional policies that acknowledge the extended economic influence of marine-based activities beyond coastal zones. By distinguishing both direct and indirect effects across the territory, the study advances a more comprehensive understanding of the ocean's role in national and subnational economic structures. Furthermore, the methodological approach developed. Furthermore, the methodological approach developed in this study offers a replicable framework for other countries seeking to quantify and manage their blue economy through regionally detailed and analytically consistent methods.

Acknowledgments

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