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Study on the Economic Impact of Spanish Aquaculture through the Development of a Capacity Map

OVERVIEW OF THE INTERNATIONALIZATION OF THE AQUACULTURE VALUE CHAIN

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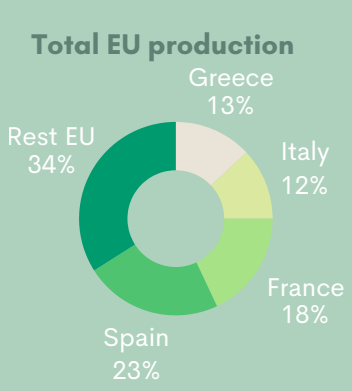
1. INTRODUCTION

1.1. CONTEXTUALIZATION OF AQUACULTURE IN SPAIN AND THE NEED FOR THIS STUDY

Spain is the European Union Member State with the highest aquaculture production volume, reaching 268,564 tonnes in 2024 and a first-sale value of 856.5 million euros. This positions the country as a European benchmark (accounting for 23% of EU production in 2023) in terms of production volume and as a key driver of socio-economic development in coastal and rural areas. However, when analyzing the economic value generated, Spain ranks second within the EU. Despite being the largest producer, France is the undisputed leader in economic value terms, highlighting the need for a deeper analysis of how value is distributed within the aquaculture sector in order to optimize the value chain and generate higher returns.
Likewise, Spain stands out as the second-largest consumer of aquaculture and fishery products in the EU, with a per capita consumption of 40.58 kg per person per year in fresh weight in 2024 (EUMOFA, 2025). This underscores the strength of domestic demand and its potential as a lever to further enhance the value of national production.

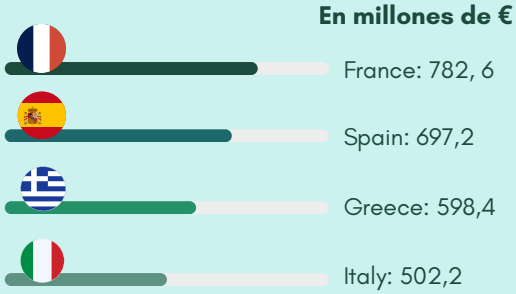
23% OF THE EU

Spain is the European Union member state with the highest aquaculture harvest, which in 2023 amounted to 268,564 tonnes. This represents 23% of the EU production.

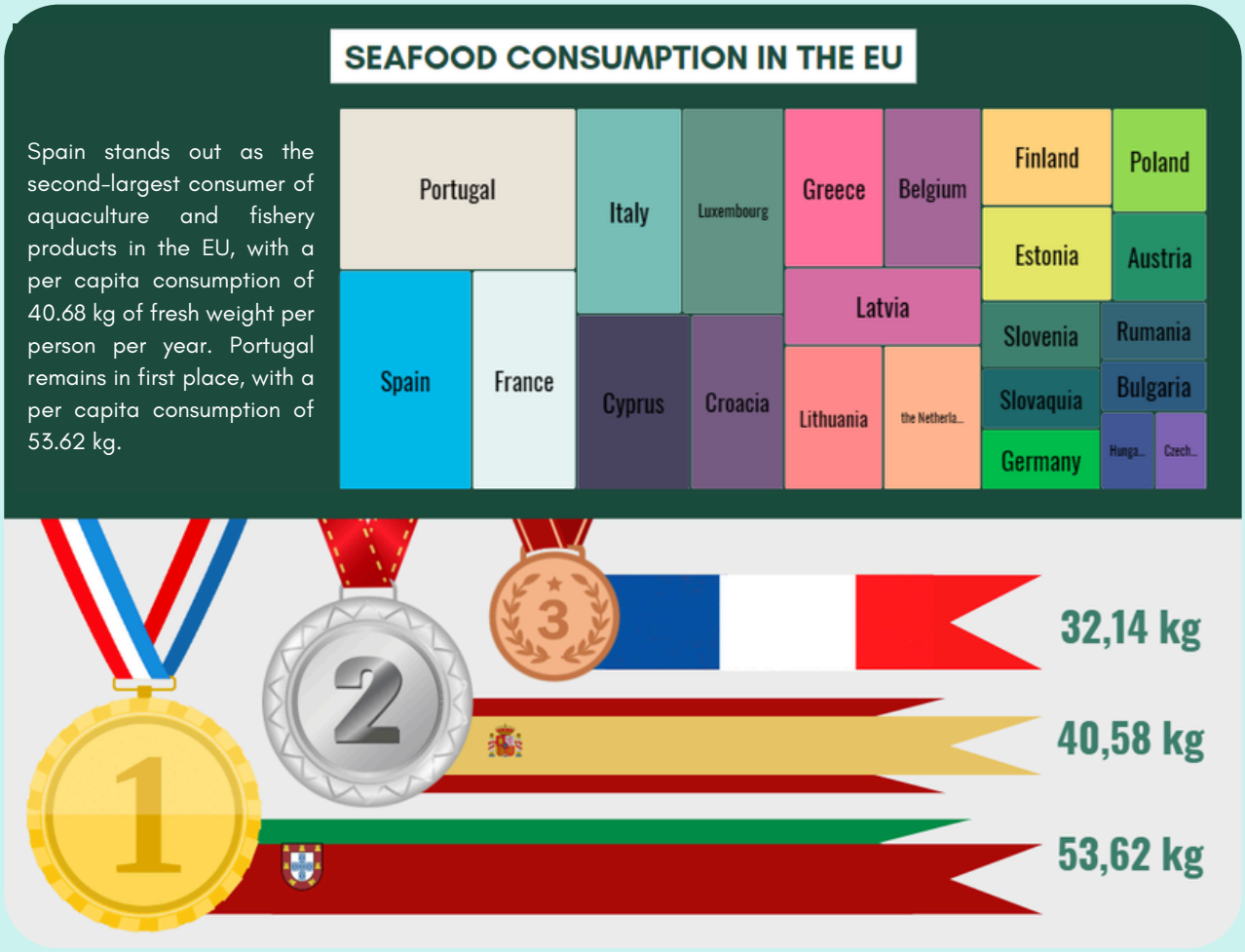


ECONOMIC PRODUCTION

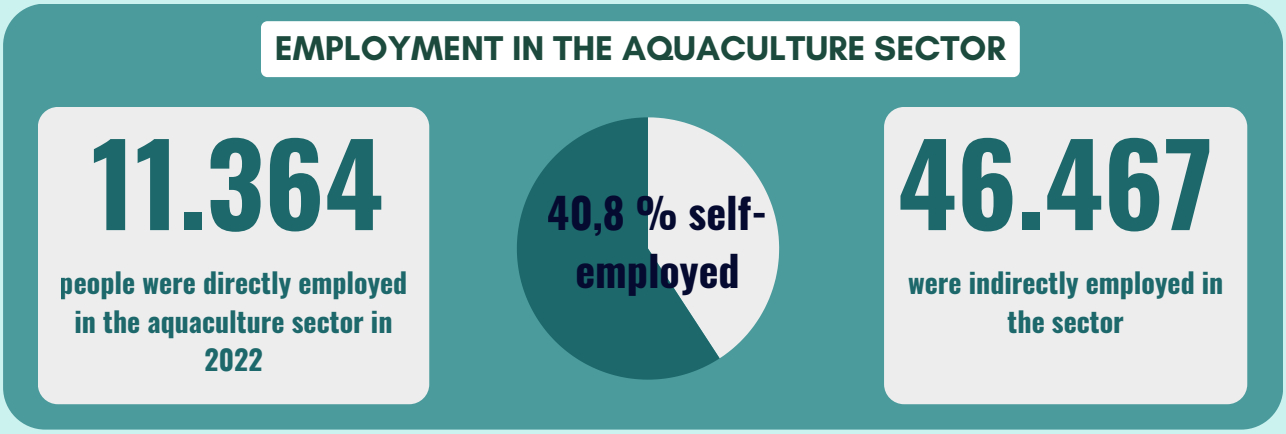
Despite producing more, Spain is not the leading country in economic performance, a position held by France.



There is a clear imbalance in the distribution of economic value within European aquaculture, with a marked concentration of activity in Mediterranean countries.

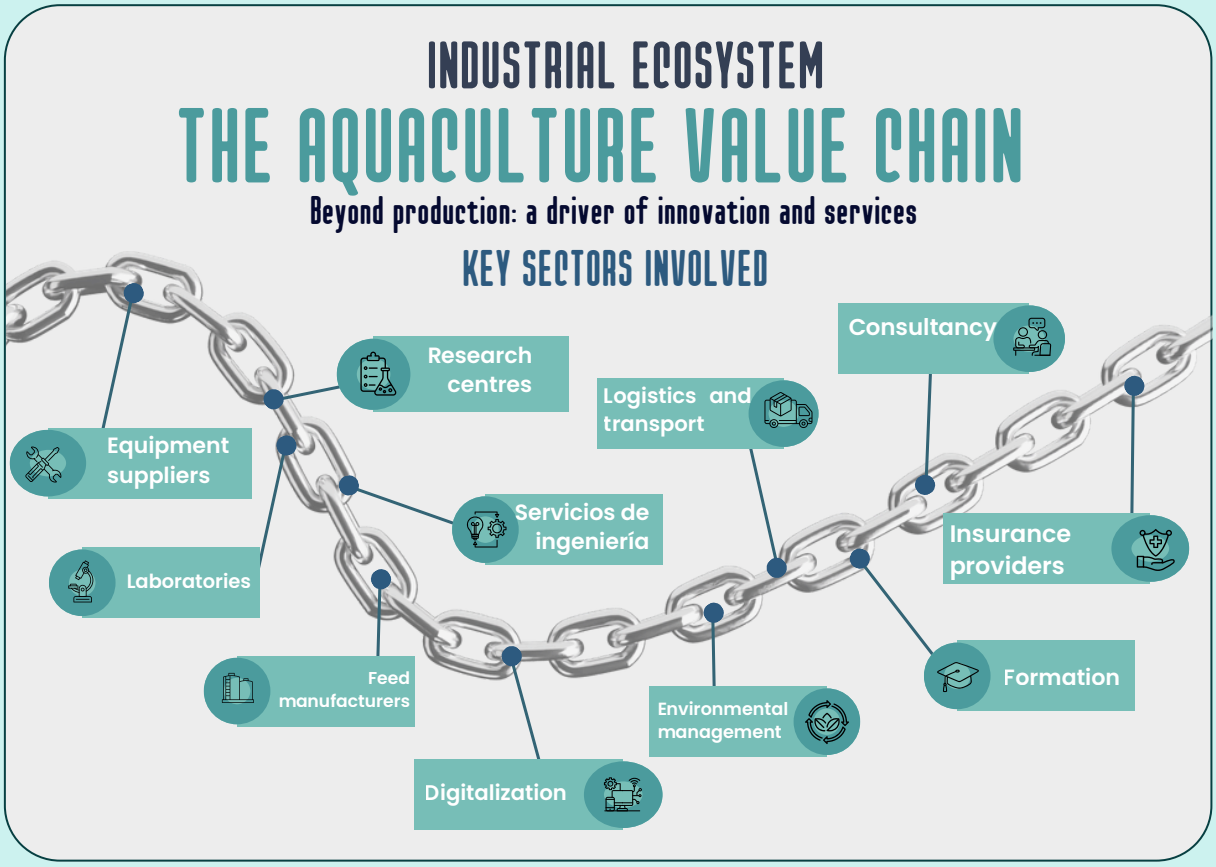


The number of annual work units (AWU) in aquaculture in Spain in 2022 amounted to 5,878, equivalent to 11,364 people, among whom self-employed workers account for 40.8% (APROMAR, 2024). In addition, 46,467 indirect jobs are generated in activities linked to aquaculture, although it is necessary to obtain more detailed information on the nature of these activities, their economic impact, and the growth potential they represent.



Traditionally, the measurement of aquaculture's impact has focused exclusively on variables associated with production, direct employment, and the turnover of producing companies.

However, this perspective leaves out a fundamental part of the system: the broad network of professional activities that make up the value chain. These include equipment suppliers, laboratories, research centers, feed manufacturers, engineering services, digitalization, environmental management, insurance, training, logistics, and consultancy, many of which are highly dependent on exports and have a strong degree of internationalization. The value chain is a key actor, on the same level as production itself. This is reflected in various aquaculture industry reports, such as the State of World Fisheries and Aquaculture (SOFIA), published by the FAO in 2024, which highlights it as a priority area for the FAO.



Spanish aquaculture is a highly technologized sector, with a growing role of innovation and strong collaboration between companies, technology centers, universities, and public administrations. This ecosystem has fostered the provision of specialized formal training and the professionalization of the sector, consolidating an environment capable of generating knowledge, skilled employment, and exportable technological solutions.

Despite its economic, social, and technological importance, there is no comprehensive analysis in Spain that quantifies the overall contribution of the entire aquaculture value chain, which limits the sector's ability to position itself in international markets, attract investment, and guide public policies based on real data. In this context, it is necessary to develop an exhaustive overview of the sector that allows for a clear understanding of its real scope, its growth potential, and its alignment with the objectives of the 2030 Agenda, the European Green Deal, and global food sustainability strategies.

1.2. OVERVIEW OF THE AQUACULTURE VALUE CHAIN IN SPAIN

Aquaculture production is formally integrated within the Spanish food sector, consolidating itself as one of the main sources of high-quality animal protein and as a strategic pillar for the transition towards more sustainable and resilient food systems. In the official economic classification, this activity is mainly included under the CNAE codes related to primary food production (mainly CNAE 03 – Fishing and aquaculture), which conditions both its statistical treatment and the design of public policies and support schemes. However, this sectoral approach is clearly insufficient to reflect the real complexity of modern aquaculture, whose value chain extends far beyond the strictly production phase, as many activities within the sector are not exclusively focused on production.

In a context of growing global food demand, pressure on fishery resources, and the need to reduce environmental impact, aquaculture plays a strategic role not only due to its productive capacity, but also because of the articulation of an extended value chain, where farming is just one link within a much broader network of supporting, technological, and service-based activities. Engineering firms, equipment suppliers, animal nutrition and health companies, environmental analysis services, digitalization and automation providers, specialized logistics, certification bodies, and technical consultancy are all essential components of the aquaculture value chain, even though many of them are classified under NACE codes outside the food sector or even outside the agri-food domain. This administrative and statistical gap risks overlooking a substantial part of the economic value, skilled employment, and innovative capacity generated by the sector, and limits a comprehensive understanding of its real contribution to the Spanish economy.

REGULATORY MISALIGNMENT

Statistical and administrative invisibility

Many key companies that are part of the aquaculture value chain are classified under CNAE codes outside the food or agri-food sector, preventing them from accessing sector-specific support, or from benefiting from programs or tax exemptions that are available to exclusively production-focused entities.

"This lack of alignment limits a comprehensive understanding of aquaculture's real contribution to the Spanish economy."

Furthermore, aquaculture makes a significant contribution to the development of the blue economy, aligning with major European and international strategic frameworks such as the European Green Deal, the Biodiversity Strategy 2030, the Farm to Fork Strategy, and the FAO's Blue Transformation initiative (2024). Its ability to integrate environmental sustainability, technological innovation, while also creating quality employment, positions it as a key activity in the ecological and digital transition. However, this potential can only be properly assessed if all the links involved in value generation are analyzed together, rather than focusing solely on final biomass production.

The Spanish aquaculture sector also stands out for its strong R&D&I component, reflected through consistent improvement in areas such as specialized nutrition, genetics, animal health, process digitalization, automation of production systems, and circular economy practices. These capabilities have enabled many Spanish companies to export not only final products but also knowledge, technology, and high value-added solutions, establishing themselves as relevant players in European, Mediterranean, and Latin American markets. However, a large part of these activities is not adequately captured within traditional sectoral analysis frameworks nor in support schemes focused exclusively on primary production.

For all these reasons, it is necessary to undertake a specific study of the aquaculture value chain in Spain that goes beyond the limited perspective associated with food-sector CNAE classifications and provides a more comprehensive view of the sector. Analyzing the value chain as a whole makes it possible to identify where economic value is truly generated, how benefits are distributed across different stages, which activities concentrate innovation and skilled employment, and which segments are currently overlooked by public policies. This approach is essential to support the need to adapt support instruments and public funding schemes (traditionally oriented toward production) to a sectoral reality that is far broader, more complex, and strategically important for the country's economic, territorial, and sustainable development.

1.3. OBJECTIVE OF THE STUDY

The aim of this study is to initiate an analysis of the orientation of the value chain and to make its impact on the aquaculture industry more visible, through the development of a capacity map that captures all the activities, stakeholders, and relationships that make up the national aquaculture system.

This exercise will provide a knowledge base on how economic, social, and environmental value is generated and distributed within the sector, as well as help identify opportunities for development and internationalization.

The specific objectives are:

- To identify and classify the main professional activities that form part of the aquaculture value chain in Spain, both direct and indirect.
- To develop a stakeholder map including private entities, public administrations, technology centers, universities, training institutions, and sectoral associations.
- To conduct a preliminary survey as part of the process of collecting quantifiable and reliable data through economic, social, and environmental indicators, enabling subsequent analysis of the sector's contribution to national development.
- To carry out a preliminary analysis of trends related to the export and internationalization impact of the different activities within the value chain.
- To identify the main contributions of aquaculture to sustainability, territorial cohesion, and technological innovation.
- To provide a solid information base to support the development of further in-depth studies, sectoral strategies, public policy guidance, and the strengthening of the sector's international presence.

OBJECTIVES

ACTIVITIES

Identifying and classifying the **key activities** of aquaculture in Spain is essential for its development.

TRENDS

Impact on the export and internationalization of the different activities within the value chain

ACTORS

Developing a map of **relevant entities** that support and regulate aquaculture in the country is crucial..

CONTRIBUTIONS

IInfluence of the value chain on sustainability, territorial cohesion, and technological innovation

DATA

Conducting a preliminary survey to obtain **quantifiable information** to assess the sector's impact is essential.

INFORM

To establish a **solid foundation** for guiding policies, strategies, and the international projection of the sector.

1.4. SCOPE OF THE ANALYSIS

The process of developing an overview of the aquaculture sector requires the participation and collaboration of all stakeholders involved across the entire value chain. The approach of the following study is defined through the following scope:

TECHNICAL

The study will be carried out using an analytical methodology, based on the consultation of primary and secondary information sources. Likewise, a participatory methodology will be employed, engaging with individuals and entities that can provide information to strengthen the proposed study.

SECTORAL

All professional sectors directly or indirectly linked to the Spanish aquaculture value chain will be taken into consideration. The information collected through questionnaires will come from public and/or private institutions of official and rigorous origin, as well as from civil or cultural organizations, or any other relevant stakeholder that may have any type of direct or indirect link to the aquaculture value chain.

GEOGRAPHIC

The study area will cover the Spanish territory, although international socio-economic relationships that may have any type of impact on the results will also be taken into account.

1.5. METHODOLOGY

For the preparation of this document, a methodological strategy has been designed based on the integration of primary and secondary information sources, complemented by the active participation of stakeholders across the entire value chain of the sector, ensuring a comprehensive, up-to-date, and representative overview of the structure, capabilities, and potential of the Spanish aquaculture sector focused on internationalization.

- **Primary information sources**

A consultation was conducted with the different stakeholders that make up the aquaculture value chain in Spain. For this purpose, a structured questionnaire was developed and distributed electronically among companies, entities, and organizations identified in a sector-specific database created specifically for this study.

The database includes verified contacts belonging to production and marketing companies, input suppliers, technology centers, universities, public administrations, business associations, training centers, and clusters, covering all autonomous communities in Spain with aquaculture activity.

This questionnaire aims to collect quantitative and qualitative information on:

- The position of each entity within the value chain (production, processing, distribution, auxiliary services, research, training, etc.).
- Their level of economic dependence on aquaculture.
- Economic impact and internationalization indicators (turnover, exports, employment).
- Degree of investment in R&D&I, digitalization, and cooperation with technology centers.
- Main challenges and opportunities perceived by sector stakeholders.
- Growth and sustainability prospects in the medium term.

- **Secondary information sources**

In addition, documentary and statistical sources of both national and international scope are used, providing context, comparative references, and quantitative data for the analysis of the value chain.
These include:

- FAO (Food and Agriculture Organization of the United Nations): The State of World Fisheries and Aquaculture (2020, 2024), global reports on production, sustainability, and innovation in aquaculture.
- APROMAR (Spanish Aquaculture Business Association): Aquaculture in Spain 2024, the main source of updated economic and social data on the national sector.
- EUMOFA (European Market Observatory for Fisheries and Aquaculture Products): The EU Fish Market 2023, providing statistics on trade, consumption, and added value within the European Union.

- Spanish Institute of Oceanography (IEO-CSIC) and Technology Centers, for technical information on research, innovation, and technological development.
- Ministry of Agriculture, Fisheries and Food (MAPA).
- European Aquaculture Technology and Innovation Platform (EATiP).

- **Stakeholders involved**

Stakeholders have been selected to represent all links in the aquaculture value chain, including:

- Aquaculture production and processing companies, cooperatives, and associations.
- Feed, equipment, genetics, health, and technology suppliers.
- Technology centers and universities.
- Regional and national public administrations.
- Consultancy, training, financing, and insurance providers.
- Business associations, clusters, and sectoral platforms.

METHODOLOGY:

For the preparation of this document, a strategy has been designed based on the integration of primary and secondary information sources, complemented by the active participation of stakeholders across the entire value chain of the sector.

1

PRIMARY SOURCES OF INFORMATION

A consultation was carried out with stakeholders in the aquaculture value chain in Spain through a structured sectoral questionnaire, in order to gather information on their role within the sector, as well as on the main challenges, opportunities, and growth and sustainability prospects.

2

SECONDARY SOURCES OF INFORMATION

The analysis is supported by national and international documentary and statistical sources, such as FAO, APROMAR, and EUMOFA reports, as well as technical information from the IEO-CSIC, technology centers, the Ministry of Agriculture, Fisheries and Food, and European aquaculture innovation platforms.

3

STAKEHOLDERS INVOLVED

Stakeholders have been selected to represent all links in the aquaculture value chain, including companies and sector associations, suppliers, technology centers and universities, public administrations, support and financing services, as well as clusters and sectoral platforms.

1.6. MAIN PHASES

The process will take place in four main phases: identification of stakeholders and diagnosis; participatory analysis; validation of results; and a sector overview. This approach combines quantitative and qualitative methods and integrates international standards for value chain analysis (FAO, IFC, World Bank), ensuring a comprehensive and up-to-date view of the Spanish aquaculture system.

Phase 1. Identification of stakeholders and diagnosis

As already mentioned in the methodology, an initial identification of all relevant stakeholders in the Spanish value chain has been carried out through the development of a specific database. Designed within the framework of this study, this database includes contacts from production companies, processing and marketing entities, input suppliers, technology centers, universities, public administrations, sectoral associations, training centers, and other auxiliary services linked to aquaculture in Spain.

Phase 2. Participatory analysis

The development of a structured sectoral questionnaire is established as an essential tool to address the need to systematize and integrate the perceptions and realities of the stakeholders that make up the Spanish aquaculture value chain. To this end, and in order to incorporate an aggregated and representative view of the sector—including economic, operational, technological, and strategic dimensions—more than 200 representative entities from the different links of the aquaculture value chain were invited to participate in the process, ensuring broad and diverse coverage of the sectoral ecosystem.

The questionnaire is structured into thematic blocks aligned with the main business areas, including the characterization of the surveyed entities, the economic impact of aquaculture activity, participation across the different stages of the value chain, levels of innovation and digitalization, priority investment areas, main challenges and opportunities, as well as the sector's future development outlook.

Based on the responses obtained from 74 entities, the analysis will enable the construction of a coherent diagnostic framework aimed at identifying both current structural limitations and the development potential of Spanish aquaculture, serving as a basis for the formulation of future studies, conclusions, recommendations, and strategic lines of action.

Phase 3. Validation of results

Once the questionnaire data and secondary sources had been collected and analyzed, a validation process was carried out in order to correct possible biases, confirm the representativeness of the data and adjust interpretations, and strengthen the robustness of the conclusions.

Phase 4. Sector overview

In this final phase, all results were integrated to develop the capacity map of the Spanish aquaculture value chain. This document captures the vertical and horizontal relationships between stakeholders, identifies synergies, strategic dependencies, and internationalization opportunities, and also synthesizes the economic, social, and environmental impact of the sector. In addition, the drawn conclusions can be used as a basis for a new, more in-depth diagnosis.

1.7. EXPECTED RESULTS

Through the completion of this analysis, the aim is to obtain an initial overview of the aquaculture value chain in Spain, contributing to a better understanding of the aquaculture value chain and its international comparison, shedding light on an area where there is currently a significant lack of data. More specifically, it is expected to:

identify and classify...
the most relevant professional activities that form part of the aquaculture value chain, including those operating both directly and indirectly.

obtain concrete data...
on the contribution of each economic activity to the growth of the aquaculture sector and, in turn, on how aquaculture activity drives the development of these supporting segments.

begin quantifying the economic, social, and environmental impact...
of the entire aquaculture value chain in the development of our country.

highlight the contribution of exports and internationalization...
in the different activities that make up the value chain, identifying links with potential for expansion in foreign markets.

identify opportunities for growth, diversification, and internationalization,
as well as the challenges and barriers that constrain the sector's competitive development under different future scenarios.

understand the contribution of aquaculture to global socio-economic development
with special attention to its role in the blue economy, the ecological transition, and innovation.

assess the real weight of the sector within the Spanish business landscape,
identifying patterns of entrepreneurship, new business models, and employment trends.

determine the contribution of the value chain to sustainable development,
considering the economic, social, and environmental dimensions, and its alignment with the Sustainable Development Goals and European policies.

2. CONCEPTUAL AND METHODOLOGICAL FRAMEWORK

Figure 1. Methodological conceptual framework of the Spanish value chain.

2.1. DEFINITION AND SCOPE OF THE AQUACULTURE VALUE CHAIN

Since the early 1990s, value chains have gained prominence both as an analytical framework and as a subject of study among academics and practitioners across a wide range of disciplines and fields.

Value chains are considered a form of industrial organization that enables the acquisition and transformation of inputs into products, as well as their distribution and use in other production or consumption sites. Therefore, they are typically analyzed in terms of their structure (geographical location of actors, size, and degree of connectivity between them at each stage of the chain), conduct (behavior of actors throughout each stage of the production process), and performance (process efficiency, product quality, etc.) (Bush et al., 2019).

"Value chains are conceived as global networks that regulate coordination within and between transnational corporations, as well as with other actors, in order to facilitate the production, trade, and international consumption of goods and services." (Bush et al., 2019)

The aquaculture value chain comprises the set of interrelated activities that enable the transformation of aquatic resources (both inland and marine) into consumer products, generating economic, social, and environmental value at each stage. According to the Food and Agriculture Organization of the United Nations (FAO), this chain integrates all stages from primary production to final marketing and consumption, including support services and flows of information, innovation, and capital (FAO, 2020).
In the Spanish and European context, the aquaculture value chain is characterized by a high degree of diversification and by the interconnection between its different links (infrastructure, administration, technological development, supply, logistics, operations, marketing, services, etc.), and its scope can be structured into three main levels:

- Primary or core production activities, which include the cultivation, farming, and harvesting of aquatic species (fish, molluscs, crustaceans, and algae).
- Support and processing activities, which include feed and additive production, genetics, technological equipment, animal health, processing, logistics, and distribution.
- Indirect activities, linked to engineering services, equipment supply, research, training, digitalization, consultancy, insurance, and other services.

Based on this basic structuring of activities, and in order to ensure the coherence of the analysis and guarantee a homogeneous classification of all entities within the value chain, three essential criteria—used in reference studies by FAO (2024), APROMAR (2024), and EUMOFA (2023)—are established. These criteria make it possible to distinguish the role of each stakeholder within the aquaculture system:

- **Functional criterion**

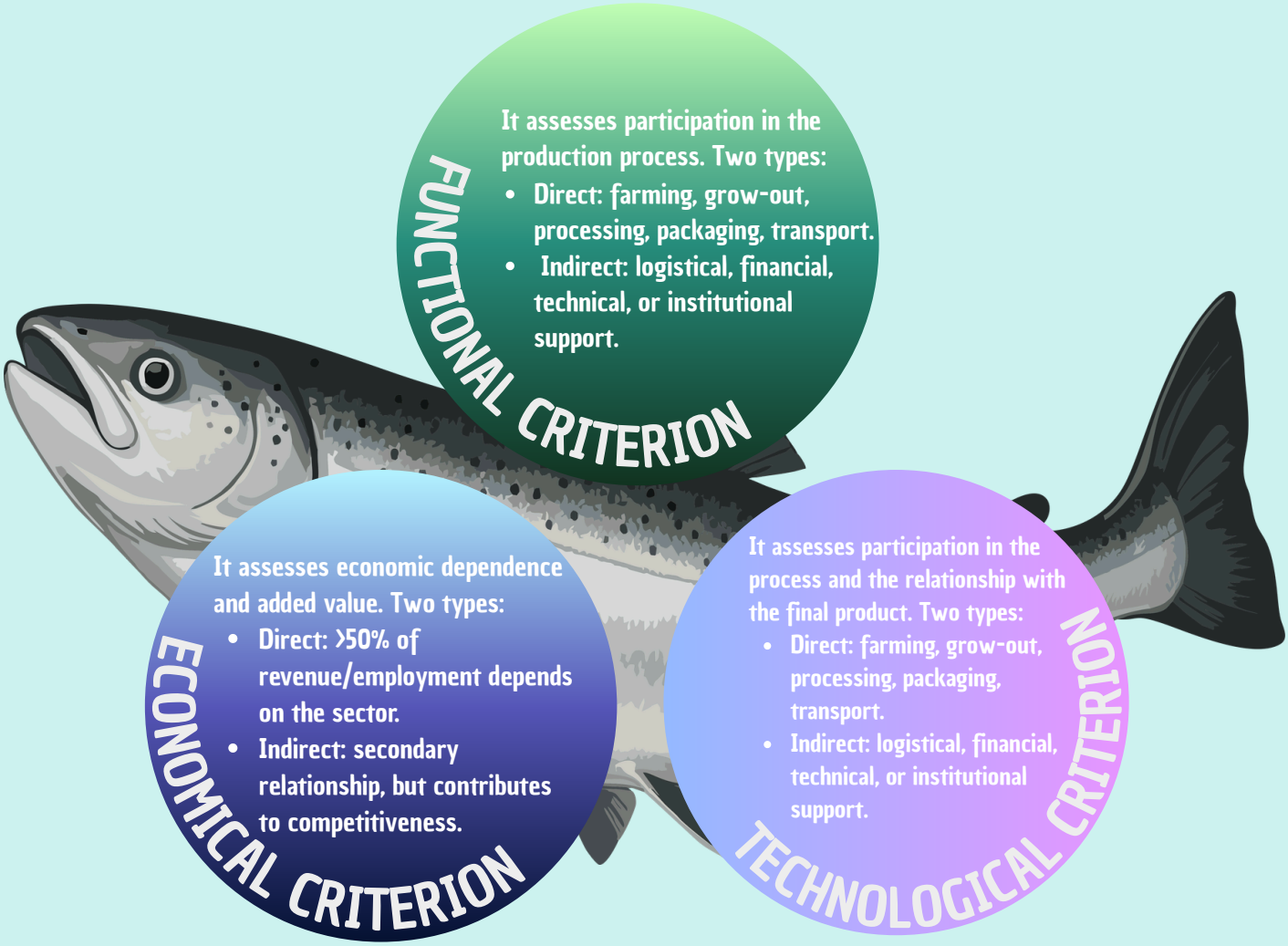
It assesses the degree of participation in the production process and its relationship with the final product. Within this criterion, a distinction can be made between direct activities, which are part of the production cycle or transformation and commercialization processes (hatchery, grow-out, processing, packaging, and primary transport), and indirect activities, which provide logistical, training, financial, technological, or institutional support without directly intervening in production (research, consultancy, engineering, nutrition, animal health, etc.).

- **Economic criterion**

It analyzes the economic dependence of each activity on aquaculture and its contribution to the sector's added value. In this way, an activity is considered direct when more than 50% of its turnover or employment depends on the aquaculture sector, and indirect when its economic relationship is secondary but still makes a significant contribution to the competitiveness of the system.

- **Technological criterion**

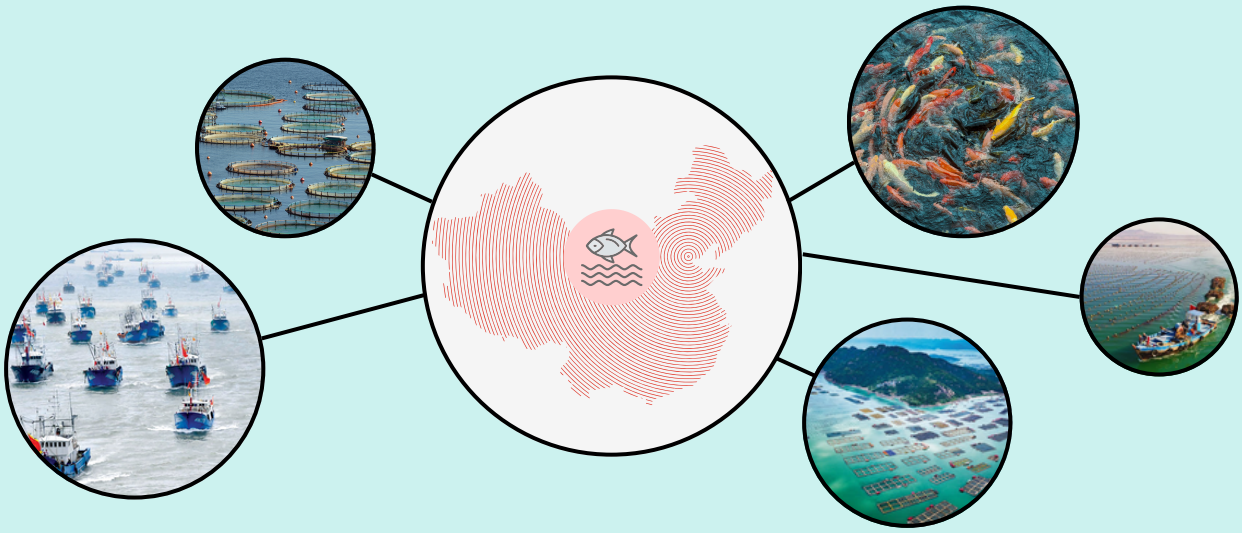
It assesses the level of technical specialization and the degree of innovation associated with the activity. Direct activities involve applied knowledge in aquaculture biology, nutrition, health, or production systems, while indirect activities apply cross-cutting technologies (biotechnology, digitalization, renewable energy, automation, etc.) that enhance the efficiency of the entire chain (Ababouch et al., 2022).



3. GENERAL OVERVIEW OF AQUACULTURE

3.1. INTERNATIONAL

Global aquaculture is currently undergoing a phase of expansion and profound reconfiguration of its value chains. Today, aquaculture production already exceeds capture fisheries in volume and accounts for more than half of all aquatic animals destined for human consumption worldwide, with a very marked concentration in Asia. China remains the leading global producer, followed by India, Indonesia, Vietnam, and Bangladesh, meaning that the Asian continent accounts for nearly 90% of global aquaculture production, both in volume and recent growth (FAO, 2024). This pattern confirms the consolidation of the Global South as a central axis of production and consumption, driven by population growth, rising average incomes, and the expansion of domestic and regional markets, leading to increasingly South–South trade dynamics (Bush et al., 2019).



This structural shift has been accompanied by greater complexity and diversification of aquaculture value chains. Beyond the traditional North–South trade focused on a limited number of species, global aquaculture now presents a multipolar structure, with a wide variety of species, production systems, and end markets. In this context, access to international markets increasingly depends on compliance with regulatory, sanitary, environmental, and traceability requirements, which shifts part of the value towards the knowledge, service, and technology-intensive segments (Ababouch et

al., 2023). Thus, competitiveness is based not only on production volume, but also on the ability to integrate innovation, sanitary control, certification, and logistical efficiency across the entire value chain.

Finally, FAO frames this evolution within the concept of Blue Transformation, which seeks to reconcile aquaculture growth with environmental sustainability, food security, and socio-economic development (FAO, 2024). This approach highlights that the future of the sector will be shaped not only by increased production, but also by the modernization of value chains, technological adoption, and market governance. These aspects are particularly relevant for countries such as Spain, whose international positioning is increasingly based on the export of services, technology, and advanced solutions rather than solely on primary production.

3.2. NATIONAL

Spanish aquaculture has evolved significantly over recent decades, moving from artisanal or semi-intensive models to more technologically advanced systems connected to research, engineering, and processing services. This progress has positioned Spain as the leading aquaculture producer in the European Union by volume, with 266,066 tonnes in 2023 (23% of the EU total). However, its position declines when analyzing the economic value of production, highlighting the need to examine how value is distributed across the entire chain.

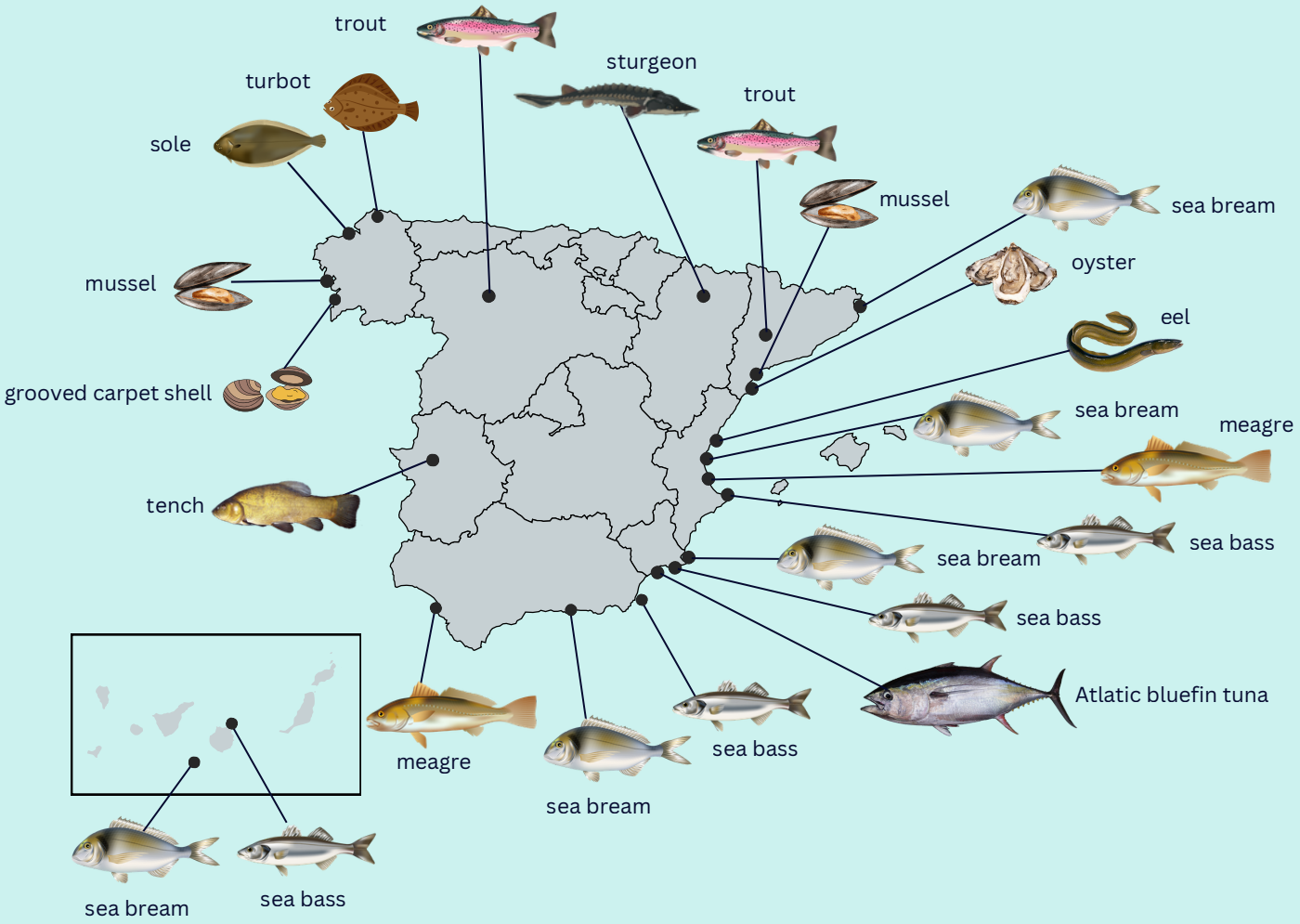
- **Evolution and current structure**

The development of the modern sector began in the 1960s and 1970s with inland aquaculture, expanding in the 1980s and 1990s towards marine aquaculture of species such as sea bass, sea bream, turbot, and mussels. Spain's accession to the EU was key in driving professionalization, traceability, and sustainability through the Common Fisheries Policy.

Today, the sector is highly technologically advanced, driven by genetic improvement, specialized nutrition, recirculating aquaculture systems, digitalization, and the development of offshore technologies. In parallel, the link between industry and research centers has been strengthened, consolidating an innovative ecosystem that supports sector competitiveness.

The production structure is characterized by the coexistence of large companies, SMEs, and cooperatives, alongside a network of laboratories, technology centers, universities, and specialized suppliers that form a broad and diversified value chain.

- **Production regions and main species**



Spain has more than 5,000 km of coastline and oceanographic and climatic conditions that allow the cultivation of more than 50 species of aquatic organisms. This diversity has led to regionally differentiated production models that together create a heterogeneous but complementary aquaculture system.

The main production regions are Galicia, the Comunidad de Valencia, the Región de Murcia, Cataluña, Andalucía and the Canary Islands, although other regions such as Castilla y León or Aragón also play a relevant role in inland aquaculture (APROMAR, 2023 and 2024).

Galicia is the leading aquaculture region in Spain and in the European Union in terms of volume, accounting for more than 80% of total national production. Activity is dominated by mussel farming (*Mytilus galloprovincialis*), with more than 3,000 bateas in operation. In addition, Galicia also hosts farming facilities for turbot (*Scophthalmus maximus*), sole (*Solea senegalensis*), carpet shell clam (*Ruditapes decussatus*), as well as innovation projects focused on new species and multi-trophic aquaculture.

The **Comunidad de Valencia** combines marine and inland aquaculture, including eel (*Anguilla anguilla*) farming. The most important marine species are sea bream (*Sparus aurata*) and sea bass (*Dicentrarchus labrax*), as well as meagre (*Argyrosomus regius*), with a particularly significant role in national leadership in the production of the former.

The **Región de Murcia** is one of the leading areas in intensive marine production, especially of sea bream and sea bass, using floating structures in open Mediterranean waters. It also hosts a strong and growing industry related to the partial farming of Atlantic bluefin tuna (*Thunnus thynnus*).

In **Cataluña**, trout (*Oncorhynchus mykiss*) production is notable, reflecting a significant inland aquaculture activity. In the marine sector, mussels and sea bream stand out, along with other species such as tuna and the Pacific oyster (*Magallana gigas*).

Andalucía represents the main hub of marine and inland aquaculture in southern Spain, with the farming of sea bass, sea bream, and meagre, both in floating marine structures and in ponds and tidal marsh systems. In addition, the region is experiencing growth driven by technological improvement and the integration of companies into the processing and marketing value chain.

The **Canary Islands** are one of the areas with the greatest expansion potential, thanks to their stable oceanographic conditions and constant water temperature. Production is mainly focused on sea bream and sea bass.

Other regions include Castilla y León, with a strong tradition in inland rainbow trout aquaculture; Aragon, a leading region in sturgeon (*Acipenser baerii* and *Acipenser naccarii*) farming for caviar production; and Extremadura, where tench (*Tinca tinca*) is cultivated.

- **A connected, diversified sector with international projection**

The production sector generates more than 11,000 direct jobs and over 46,000 indirect jobs, with a sustained increase in skill levels and in the weight of technological and scientific activities. In addition, Spanish aquaculture has consolidated its international presence not only through product exports, but also through high value-added services and equipment, such as specialized nutrition, engineering, automation, genetics, biotechnology, and environmental consultancy.

This general overview helps contextualize the questionnaire results and serves as a starting point for the development of the capacity map, where the interactions among sector stakeholders are analyzed in detail and value generation across the entire chain is examined.

3.3. CURRENT STRUCTURE OF THE SECTOR'S VALUE CHAIN

The Spanish aquaculture value chain constitutes a complex, interconnected, and multidimensional ecosystem where production, technological, institutional, and service-oriented actors converge.

According to Ababouch et al. (2023), value chain analysis has become, over the last two decades, a fundamental tool for understanding how economic value is distributed, how agents interact, and how to identify opportunities for improvement and strategic intervention in the aquaculture sector.

The Spanish aquaculture value chain is structured not only around functional links but also through a continuous flow of value creation and added value, transforming inputs, knowledge, and processes into products with greater economic, social, and environmental relevance. This value increases progressively at each node: from the supply of feed, technology, and specialized services that enhance efficiency and reduce risks, to production, processing, and certification, which enable higher prices, market expansion, and stronger competitiveness. Product transformation and differentiation (traceability, sustainability, certifications, origin, technological innovation) generate additional value by enhancing attributes increasingly demanded by international markets.

Likewise, the chain generates social value through skilled employment, strengthening of the business fabric, and greater production security, as well as environmental value through improved sustainability, reduced impacts, and the adoption of cleaner technologies. Overall, value creation in Spanish aquaculture depends both on the interactions among stakeholders (companies, technology centers, laboratories, universities, equipment suppliers, and service providers) and on the system's capacity to transform resources into differentiated, safe, and competitive products, thus forming an ecosystem in which value flows, multiplies, and is redistributed along the entire chain.

In the Spanish case, the value chain is organized around the following functional links, which interact through material, economic, and knowledge flows:

- **Associations of producers**

Aquaculture producer associations and organizations act as a core element of sector governance, facilitating collective planning, institutional representation, and coordination of common practices. In Spain, organizations such as FEPROMODEL (Marisc del Delta de l'Ebre) play a key role in traceability, production planning, and access to European programs, as well as in promoting sustainability efforts and best practices. These entities help articulate business interests and improve regulatory coherence between autonomous communities.

It is in this coordination role where the importance of associations within the value flow perspective lies, as they function as coordination nodes that organize production, standardize practices, and reduce transaction costs. This allows upstream-generated value to flow more efficiently towards the production phase, while economic and reputational value returns to producers through a stronger negotiating position within the chain.

- **Laboratories and pharmaceutical companies**

Laboratories underpin the chain through their role in health diagnostics, quality control, environmental analysis, genetics, and biotechnology. Ababouch et al. (2023) note that upstream and downstream activities such as animal health, diagnostic services, and inspection represent a substantial share of employment and economic value in aquaculture, particularly in diversified and technologically advanced value chains. In Spain, public laboratories (IEO-CSIC, universities, regional research centers) and private actors collaborate with industry in vaccine development programs, animal welfare, disease control, and sanitary certification, constituting one of the most technologically intensive areas of the chain.

As an example within the value chain, research centers help ensure the sanitary quality required to access more demanding markets. Their activity acts as a critical filter that ensures value created in early stages is not lost due to sanitary failures or regulatory non-compliance, thereby enhancing the competitiveness of the final product. Examples within the chain include vaccine manufacturing company AQUATRECK and pharmaceutical laboratory CENAVISA.

- **Feed, nutrition and additives**

The production of feed, functional additives, probiotics, and nutritional solutions has become one of the most strategic and technologically advanced segments. The transition towards more sustainable feeds with a lower environmental footprint, aligned with circular economy objectives, is driving significant growth in the sector. Spanish companies export formulations and additives to European and Mediterranean countries, reinforcing Spain's role as an international supplier of high value-added inputs.

Actors within this segment determine a substantial part of production performance, as nutrition directly influences feed conversion efficiency, growth, and final product quality. Higher-quality feeds and additives generate value from the very beginning of the production process and help consolidate and amplify that value throughout the chain, especially in markets where sustainability and nutritional traceability are key differentiating attributes. Companies such as TecnoVit, Dibaq Aquaculture and Tebrio focus on the design, manufacture, and commercialization of feed supplements and aquaculture nutrition products, while others, such as HTBA, are present across multiple stages of the value chain.

- **Business management and technical services**

This segment includes engineering, environmental monitoring, infrastructure maintenance, digitalization, automation, information systems, and remote control. Spanish aquaculture includes companies operating advanced systems (RAS, cage automation, inspection robots), exporting technological solutions abroad. Services such as consultancy and logistics generate a significant volume of employment and added value in modern aquaculture chains, optimizing processes and minimizing risks. This enables the value generated at each stage to be preserved and enhanced, acting as a support system that maintains continuity and quality in the production flow. Companies within this segment include BLAT Seguros, Ipac Acuicultura, and LAMOR.

- **Information, advisory, and certification**

It includes consultancy firms, investors, insurance companies, environmental certification bodies, business training organizations, regulatory and financial advisory services, and sector-specific communication and marketing services. Although they are not part of the core productive sector, companies such as ICSEM, which provide these types of services, transform standard products into differentiated ones through certifications, sustainability verification, communication, insurance, and brand positioning. Their role is key in ensuring that the value created during production is translated into higher prices, better market access, and a strengthened consumer perception. This also makes companies such as Atlantic BTF Farm, focused on investment, a strategic link for the internationalization of Spanish aquaculture.

- **Equipment and technology**

The equipment industry includes manufacturers of cages, nets, mooring lines, pumps, specialized vessels, automated feeding systems, offshore modules, and environmental control devices. Within the value flow, this segment acts as the provider of tools that enable production scaling, efficiency improvements, and structural cost reduction. Many Spanish companies such as AKVA GROUP SPAIN, ARGOS AI, Astilleros Nicolau, Blanchadell, BTM Iberia, JJChicolino, Mega Fortris, MORENOT, SMARTWATER, SPyA, and GOLDFISH have consolidated international markets thanks to their design and innovation capabilities. Global analysis shows that the highest margins in the aquaculture chain are often concentrated in segments such as equipment, applied technology, and digitalization (EUMOFA, 2023), making this link critical for competitiveness and international positioning.

- **Technology centers**

Technology centers (CETGA, AZTI, IRTA, IFAPA, etc.) act as platforms for applied innovation. They conduct research related to nutrition, genetics, animal welfare, biosecurity, sustainability, automation, algae farming, and circular economy. They are essential actors in knowledge transfer to companies, participating in European projects and public-private collaborations. Their role in the value flow materializes by turning research into applied solutions, reducing the time between innovation and industrial adoption. This transfer mechanism accelerates value creation, improves competitiveness, and prevents technological bottlenecks that would otherwise limit chain efficiency.

Their role is especially relevant when they are publicly funded, as this enables them to develop strategic research programs that would be difficult for the private sector to assume, either due to high costs, long time horizons, or the need for highly specialized teams. The aggregation of qualified researchers—as in BlueNetCat, the I4A of the University of Murcia, the Phytofish team (University of Vigo), the Institute for Aquatic Research for Global Health (iARCUS), or INNOVAPESCA—combined with relative independence from short-term profitability, allows them to address structural challenges (such as new production models, genetic improvement, sustainability, or advanced automation) that are fundamental for the sector's competitive development. However, in Spain there is still room for improvement in consolidating this capacity, particularly in terms of stable funding and sufficient resources to sustain long-term research.

- **Universities and training centers**

Universities and training centers provide essential value to the aquaculture chain by generating qualified human capital capable of operating within an increasingly technological sector. Through updated programs in biotechnology, genetics, nutrition, sustainability, and advanced farming systems, these institutions train professionals prepared to address productive, environmental, and regulatory challenges. In addition, their connection with technology centers and companies facilitates knowledge transfer and applied specialization, fostering innovation, the adoption of new technologies, and continuous sector improvement. Overall, they make a decisive contribution to both the current and future competitiveness of aquaculture through the creation and ongoing updating of talent. Qualified professionals increase the system's capacity to absorb knowledge, operate complex infrastructure, and ensure the continuity of value throughout all downstream stages of the chain.

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CURRENT STRUCTURE OF THE AQUACULTURE VALUE CHAIN

ASSOCIATIONS OF PRODUCERS

- SECTORAL GOVERNANCE
- PRODUCTION COORDINATION
- INSTITUTIONAL REPRESENTATION
- TRACEABILITY AND STANDARDS
- COMPETITIVENESS ENHANCEMENT

INFORMATION, ADVISORY, AND CERTIFICATION

- ADVISORY AND CERTIFICATION
- PRODUCT DIFFERENTIATION
- POSITIONING AND BRANDING
- MARKET ACCESS
- INCREASE IN PERCEIVED VALUE

LABORATORIES AND PHARMACEUTICAL COMPANIES

- ANIMAL HEALTH DIAGNOSTICS
- HEALTH CONTROL AND CERTIFICATION
- HIGH TECHNOLOGICAL INTENSITY
- ACCESS TO DEMANDING MARKETS
- COMPETITIVENESS ENHANCEMENT

EQUIPMENT AND TECHNOLOGY

- INFRASTRUCTURE AND EQUIPMENT
- APPLIED TECHNOLOGY
- SCALABILITY AND EFFICIENCY
- COST REDUCTION
- INTERNATIONAL COMPETITIVENESS

FEED, NUTRITION, AND ADDITIVES

- STRATEGIC ANIMAL NUTRITION
- INNOVATION AND SUSTAINABILITY
- PRODUCTION PERFORMANCE
- ADDED VALUE FROM THE ORIGIN
- MARKET DIFFERENTIATION

TECHNOLOGY CENTERS

- APPLIED INNOVATION
- KNOWLEDGE TRANSFER
- STRATEGIC RESEARCH
- REDUCTION OF THE INNOVATION-INDUSTRY GAP
- COMPETITIVENESS ENHANCEMENT

BUSINESS MANAGEMENT AND TECHNICAL SERVICES

- TECHNICAL SUPPORT AND MANAGEMENT
- DIGITALIZATION AND AUTOMATION
- PROCESS OPTIMIZATION
- RISK REDUCTION
- CONTINUITY OF THE PRODUCTION FLOW

UNIVERSITIES AND TRAINING CENTERS

- HUMAN CAPITAL FORMATION
- TECHNICAL SPECIALIZATION
- KNOWLEDGE TRANSFER
- TECHNOLOGY ADOPTION
- LONG-TERM COMPETITIVENESS

4. DATA ANALYSIS

This brief report presents the results of a survey conducted with a representative sample of agents involved in the aquaculture value chain. The main objective is to gain a deeper understanding of the actors participating in the different phases of the sector (public administrations, associations, and companies of diverse profiles) and to understand how they interact, what needs they share, and the dynamics that characterize their activity. A total of 76 entities were interviewed. To facilitate readability and data processing, the results are structured into six categories: (1) Sample characterization; (2) Positioning within the aquaculture value chain; (3) Sectoral weight and temporal analysis; (4) Sector maturity and innovation; (5) Challenges and opportunities; (6) Future perspectives and recommendations.

4.1. SAMPLE CHARACTERIZATION

Regarding the general data of the surveyed entities (Fig. 2), the majority of participating organizations are suppliers of inputs and services (55.3%), followed by production companies (25%) and trading companies (17.1%). The presence of technology or research centers (13.2%) and public administration (3.9%) is also notable, providing a key perspective for understanding the regulatory framework and sectoral support system.

In addition, several entities each account for 1.3% of the sample, including training centers, spin-offs, organizations specialized in aquaculture technologies, producer associations, equipment and specific service suppliers, control laboratories, business and sectoral associations, animal nutrition companies, and technology and consultancy firms. This distribution reflects the wide diversity of stakeholders involved in the aquaculture value chain.

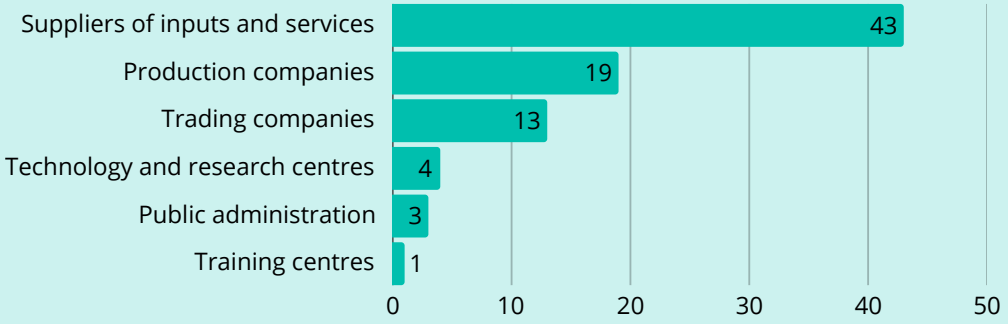


Figure 2. Distribution of the types of entities participating in the survey, showing the relative representation of the different stakeholders that make up the aquaculture value chain.

The survey data show that participating entities began their activity progressively from 1860 to the present day (Fig. 3). Between that starting point and 1980, the creation of new companies was limited, with only about one to three per decade. From the 1980s onwards, an increase is observed, which becomes more pronounced in the 1990s.

However, the strongest growth is concentrated in the 2000s, when the highest percentages of new business formation are recorded, with notable years such as 2007, with 5 new companies, and 2008, with 9. In the 2010s, the trend moderates again, and similar figures are observed in the early 2020s through to 2024. Overall, the results indicate that although entity creation was sporadic in the early decades, the most dynamic period is clearly the 2000s, followed by a new phase of decline in the creation of organizations.

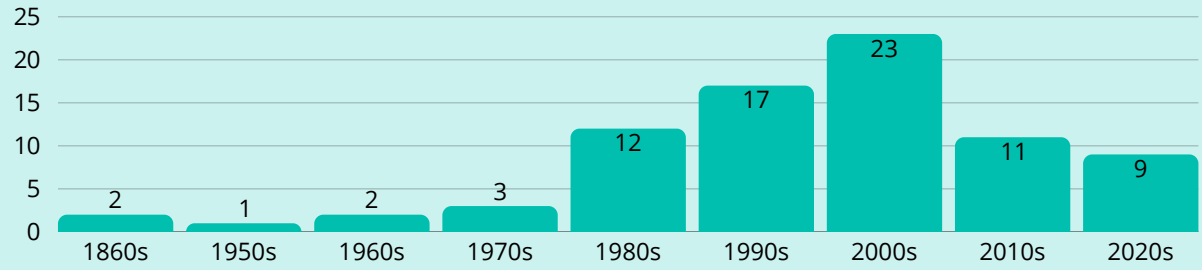


Figure 3. Number of entities created per decade.

Regarding the geographical distribution of entities (Fig. 4), there is a clearly uneven concentration of the sector in Spain, reflecting established territorial patterns within aquaculture activity. Galicia leads by a wide margin in terms of entity presence, occupying first place and highlighting the historical and productive weight of this region in the sector. It is followed by Cataluña and Andalucía, which also show significant representation, confirming their role as major hubs both in terms of production volume and diversity of species and production systems.

At an intermediate level, the Comunidad de Valencia and Madrid show a meaningful but more moderate presence. Subsequently, regions such as the Canary Islands, Aragón, Castilla y León, and the País Vasco maintain a lower but stable participation, reflecting more specific or smaller-scale activity niches. Finally, Cantabria, Murcia, Castilla La Mancha, and Navarra show the lowest presence, indicating a more limited implantation or one linked to isolated initiatives.

Overall, the results show a sector highly concentrated in certain coastal regions with a long aquaculture tradition, alongside a more dispersed distribution across the rest of the territory.

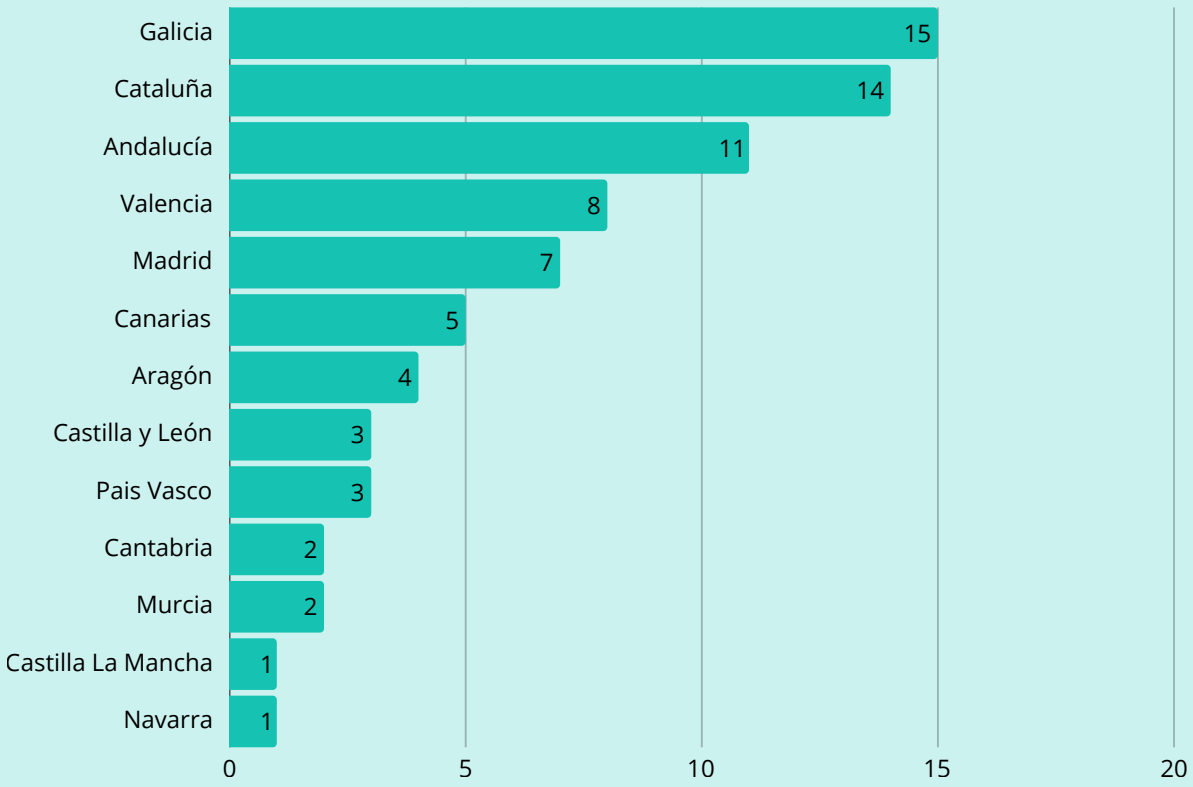


Figure 4. Geographical distribution of sector entities based on the responses collected.

Most of the surveyed entities operate (Fig. 5A) at the international level (81.6%), while 17.1% operate mainly at the national level and only one company operates at a regional scale. Regarding their size (Fig. 5B), the most common group is entities with 10 to 50 employees (39.5%), followed by those with 1 to 10 employees (23%) and those with more than 100 employees (23.7%). Finally, 11.8% of entities have between 50 and 100 employees, reflecting a diverse business structure in both geographical scope and organizational size.

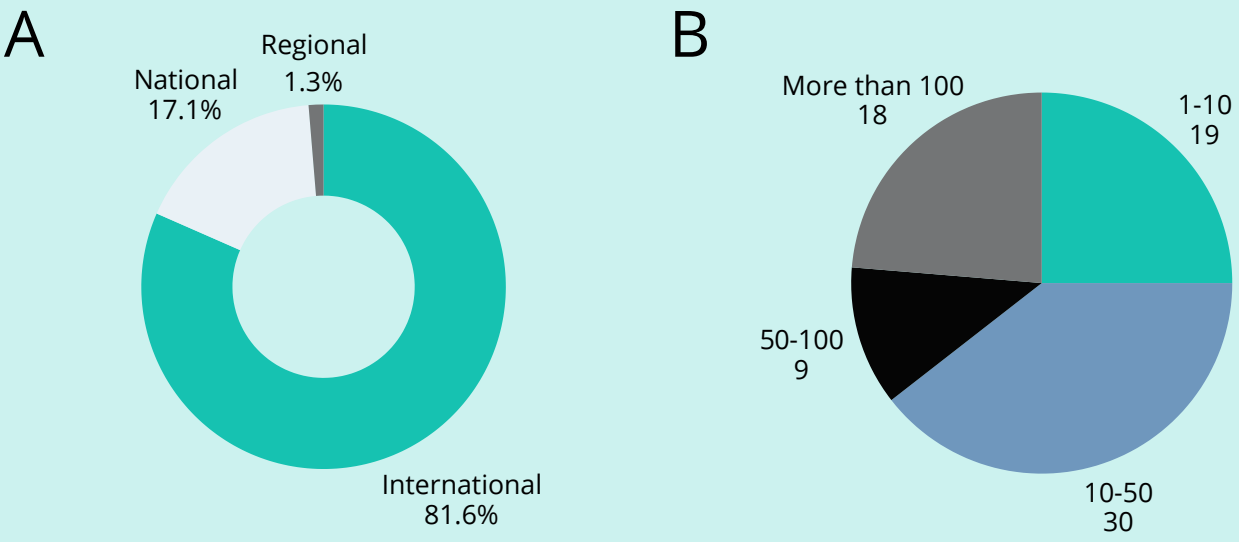


Figure 5. (A) Distribution of entities according to their scope of activity and (B) number of employees.

4.2. POSITIONS WITHIN THE VALUE CHAIN

The activity of entities within the aquaculture value chain is diverse and spans multiple stages of the production process, from research to production and commercialization, including insurance and construction. This category enables the identification of the links each organization works in and how it contributes to the overall functioning of the sector. Based on the data collected in the survey, the role played by the consulted entities, their degree of specialization, and the relative weight of each segment of the chain can be analyzed in greater detail.

The participation of entities in the value chain (Fig. 6) is broad and covers multiple stages. The most represented areas are technology (34) and research (27), highlighting the strong weight of technical and scientific development activities within the sector. Production (21), supplies (20), and feed (17) also stand out, all of which are directly related to the core operational functions of aquaculture. Other relevant stages include auxiliary services (15), infrastructure (13), transformation (13) and distribution (12). Training also shows a significant presence, with 10 entities. Finally, several activities appear with a minor but notable representation, such as health services, shipbuilding, maritime services, environmental consultancy, insurance, certificates and business representation. These data reflect a heterogeneous sector in which traditional operational functions coexist with a strong technological and research base.

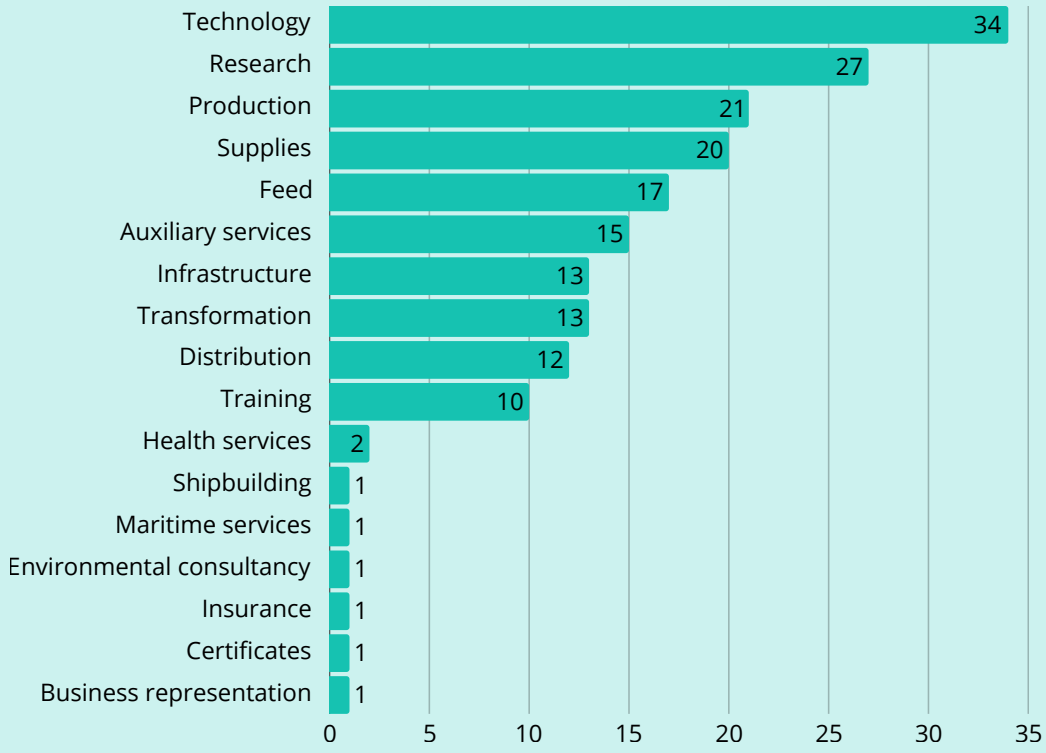


Figure 6. Distribution of entities according to the stages of the aquaculture value chain in which they carry out their activities..

Likewise, when asked about the percentage of their revenue that depends directly on aquaculture (Fig. 7), 52% reported between 0–25%, 25.3% selected the 75–100% range, and 14.7% chose 25–50%.

Only 8% of entities reported a revenue dependence on the aquaculture sector of between 50–75%.

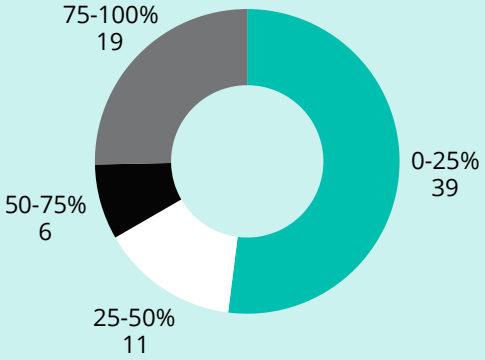


Figure 7. Percentage of entities' revenue directly dependent on the aquaculture sector and their turnover linked to aquaculture.

4.3. TURNOVER AND VALUE CHAIN FIGURES

This section analyzes the economic impact of entities linked to aquaculture, using various key indicators to assess their weight within the sector. On the one hand, it examines the annual turnover directly associated with aquaculture activity and its evolution over the last five years, providing a clear view of growth or stabilization dynamics within the business landscape.

It also addresses the value of exports generated by these entities and identifies the main destination countries or regions, an essential aspect for understanding the sector's international reach and its integration into global markets. Together, these data facilitates an evaluation of the economic contribution of these organizations and their role in the external competitiveness of aquaculture.

The results show significant heterogeneity in annual turnover linked to aquaculture (Fig. 8A), with 31.9% of entities exceeding €1 million, followed by 30.6% reporting between €100,000 and €500,000, 23.6% below €100,000, and 13.9% between €500,000 and €1,000,000. Regarding turnover trends over the past five years (Fig. 8B), most entities (74%) report growth, while 23.3% remain stable and only 2.7% have experienced a decline.

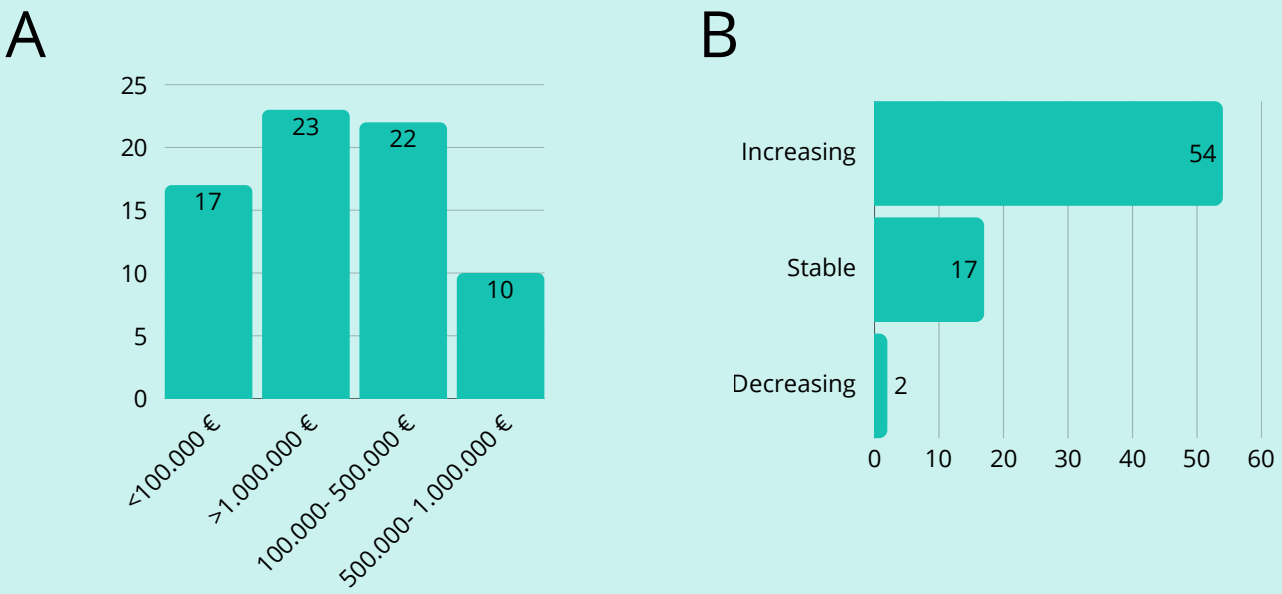


Figure 8. (A) Approximate annual turnover of the entity linked to the aquaculture sector. (B) Evolution of turnover over the last 5 months.

Regarding the economic value of exports (Fig. 9), 42.6% of entities export less than €100,000, 20.6% fall within the €100,000–€500,000 range, and 36.8% exceed €500,000. Overall, the data reflect a sector with a diverse economic base, predominantly growth-oriented in recent years, and with significant export activity among a substantial share of entities.

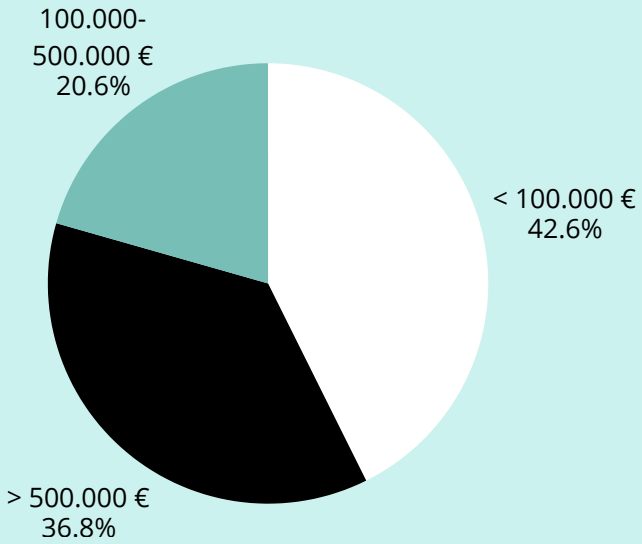


Figure 9. Economic value relative to the total exported product.

The survey on the international projection of entities within the Spanish aquaculture value chain reveals a clearly differentiated geographical pattern, depending on the level of market consolidation and the type of services and products offered.

Europe and the Americas emerge as the main strategic destinations, not only due to the high number of entities operating in these regions, but also because of the strong economic relevance of these exports (Fig. 10). In both cases, exports classified as having notable or very high relevance predominate, indicating stable trade relationships, sustained volumes, and strong integration into mature value chains characterized by high demand for technology, advanced services, equipment, and specialized solutions. This pattern is consistent with regulatory alignment, institutional proximity, and the high capacity for technological absorption in these markets, particularly in Europe and North America.

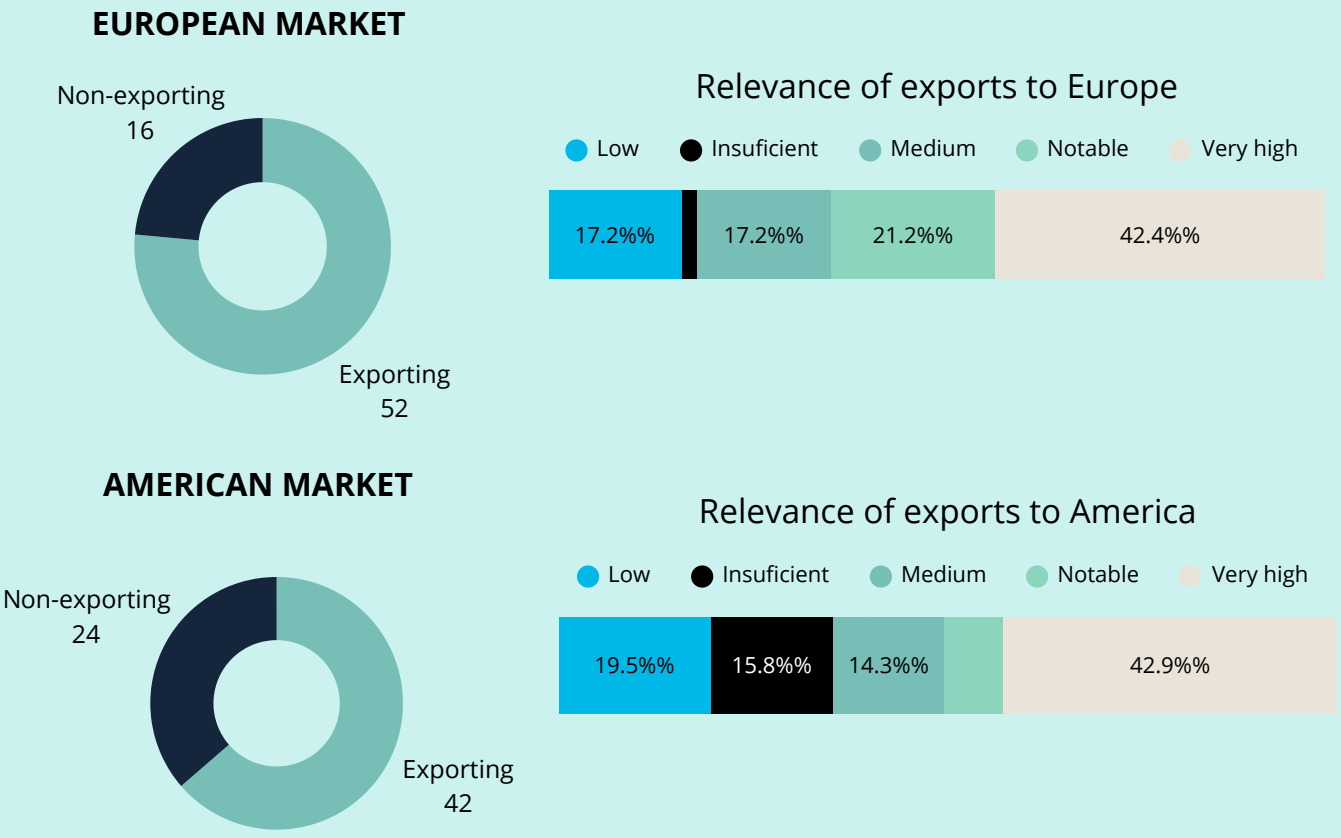


Figure 10. Distribution of the relevance of exports of entities within the Spanish aquaculture value chain in Europe and the Americas, distinguishing between exporting and non-exporting entities (donut charts) and the degree of economic importance of exports (stacked bar charts).

In contrast, **Africa, Asia and Oceania** show a more **incipient and fragmented structure**. In these regions, there is a higher proportion of entities with exports of low or insufficient relevance (Fig. 11), suggesting a more sporadic presence based on specific projects, auxiliary services, or initial market-entry initiatives into emerging markets.

Africa emerges as an opportunity space, particularly in infrastructure services, training, and technical consultancy, although it still lacks a high economic impact.

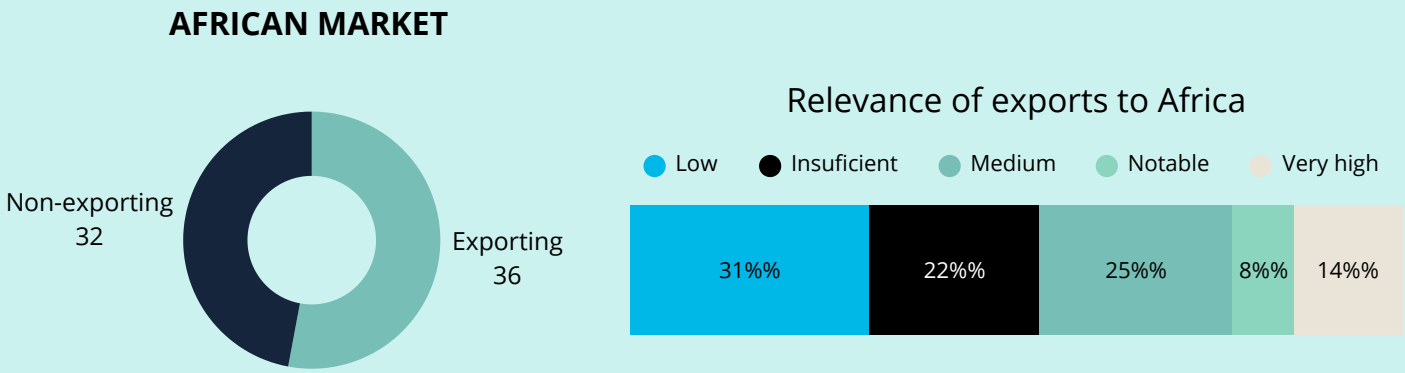


Figure 11. Distribution of the relevance of exports from entities within the Spanish aquaculture value chain in Africa, distinguishing between exporting and non-exporting entities (donut chart) and the level of economic importance of exports (stacked bar chart).

In the case of **Asia**, despite its enormous weight in global aquaculture production, the **lower relevance** of Spanish exports (Fig. 12) reflects both the strong technological and industrial self-sufficiency of many Asian countries and the competition from well-established local suppliers. **Oceania**, finally, shows a clearly **marginal presence**, concentrated in very specific operations (Fig. 12).

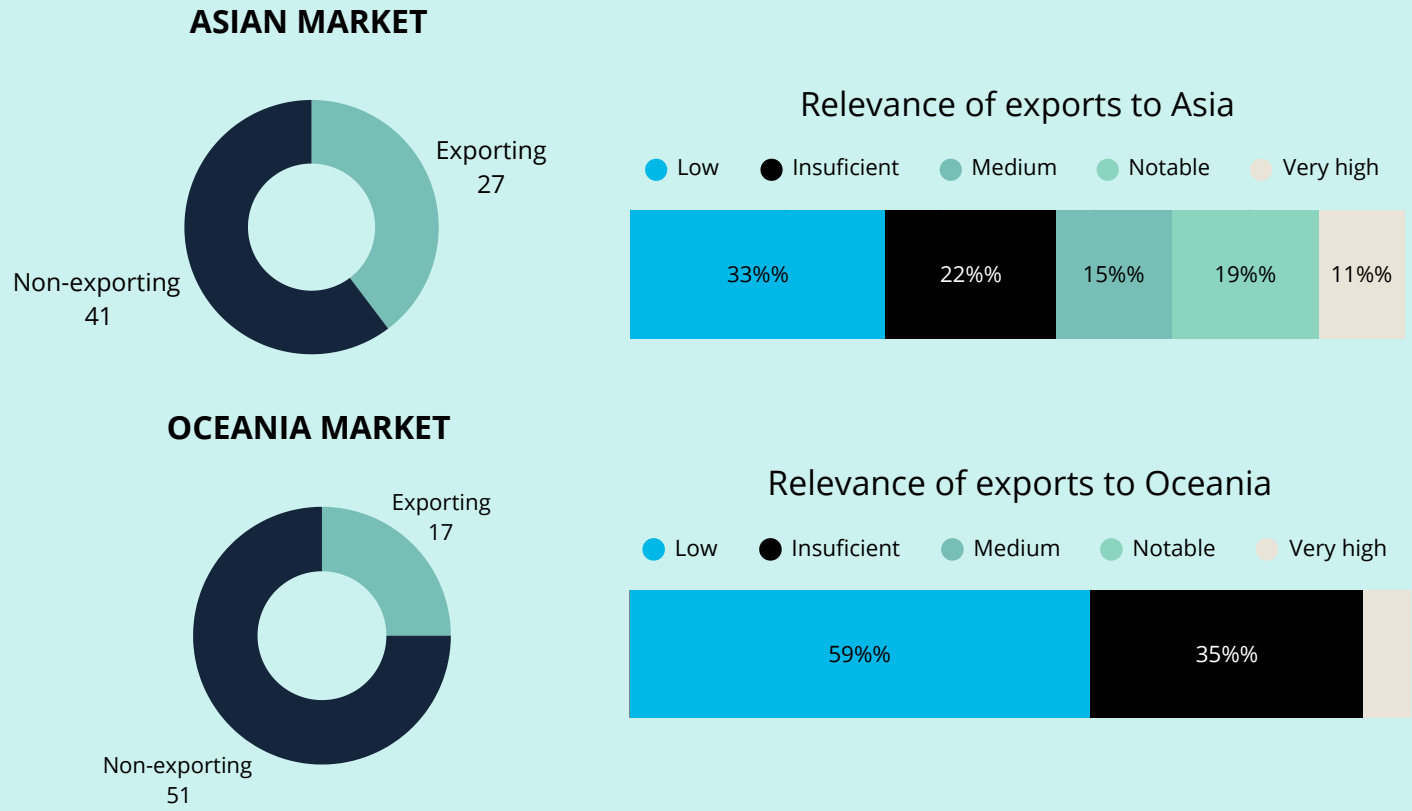


Figure 12. Distribution of the relevance of exports of entities within the Spanish aquaculture value chain in Asia and Oceania, distinguishing between exporting and non-exporting entities (donut charts) and the degree of economic importance of exports (stacked bar charts).

4.4. SECTOR MATURITY AND INNOVATION

The survey includes a section dedicated to digitalization and R&D&I activities, with the aim of characterizing the sector's innovation effort and its level of technological adoption. This section enables the assesment of the proportion of resources that entities allocate to research and development, the priority areas in which they focus their projects, the level of collaboration with scientific and technological actors, as well as the current state of their digital transformation. Together, these indicators provide a structured view of the sector's innovation positioning and its capacity to integrate advanced technologies into its processes.

When asked about the percentage of annual turnover allocated to research, development, and innovation (R&D&I) (Fig. 13), two clear patterns emerge: 40.8% of entities invest between 1–5%, while another 38.2% allocate more than 10% of their annual turnover to this area. A moderate 18.4% invest between 5–10%, and only a small minority (2.6%) report no investment in R&D&I.

The results also show that entities concentrate their innovation efforts (Fig. 14) primarily in technology, identified as a priority by 60.5% of respondents. This is followed by digitalization (44.7%), sustainability (42.1%), production processes (40.8%), and feed and nutrition (36.8%), which ranks above animal health and genetics and reproduction (both 10.5%). Other areas receive clearly marginal investment, with values around 1.3%, including efficiency, aquatic health, pathology and toxicology, and vessel optimization, among other highly specialized fields.

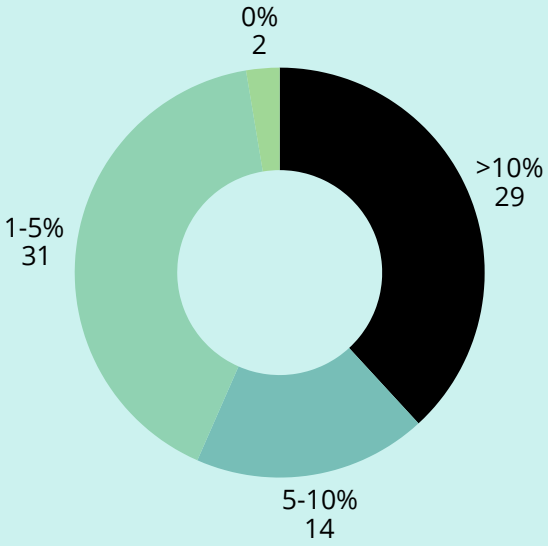


Figure 13. Level of investment in research, development, and innovation by entities according to their annual turnover.

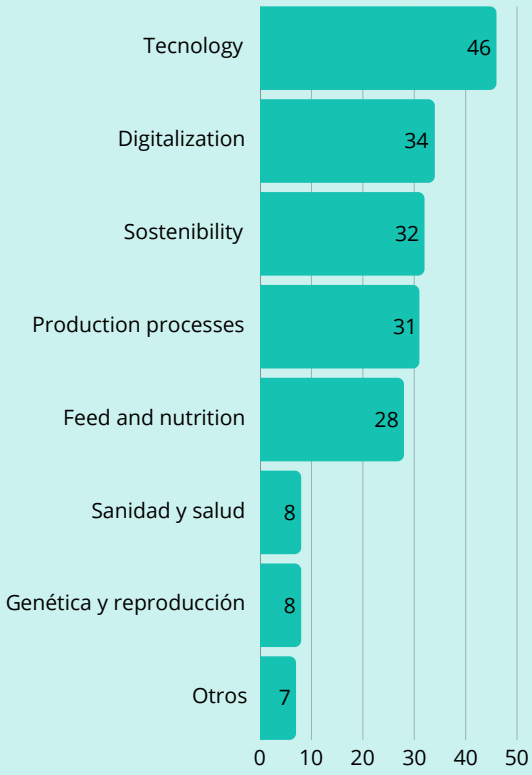


Figure 14. Distribution of the main innovation areas reported by the surveyed entities.

Regarding the level of digitalization (Fig. 15A), a medium–high level predominates: 38.2% of organizations are at a notable level, followed by 27.6% at a medium level and 21.1% at a very advanced level. This indicates that more than four out of five entities are already in advanced stages of digital transformation. Low levels are marginal, with 9.2% at a low level and only 3.9% reporting no digitalization.

Most of the surveyed entities maintain links with the scientific and technological ecosystem (Fig. 15B). Notably, 63.6% collaborate actively with research centers, universities, technology centers, or clusters, while 28.6% do so occasionally, and only 7.8% report having no collaboration at all.

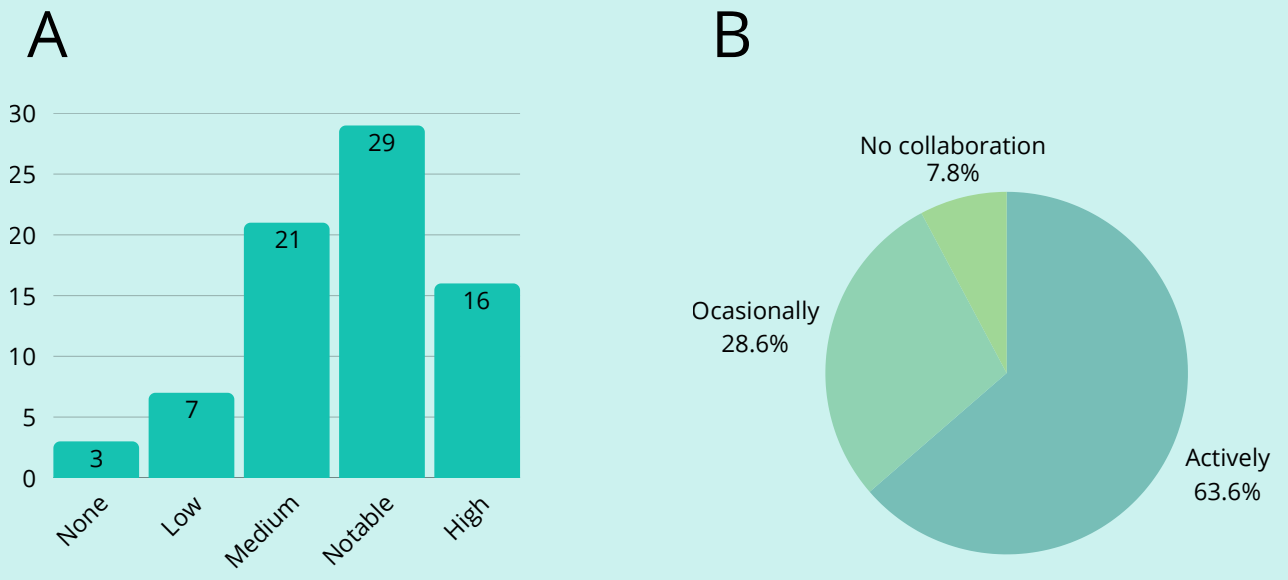


Figure 15. (A) Level of digitalization reported by the surveyed entities. (B) Distribution of the degree of collaboration of the surveyed entities with research centers, universities, technology centers, and clusters, distinguishing between active, occasional, or no collaboration.

4.5. CHALLENGES AND OPPORTUNITIES

The "Challenges and Opportunities" category provides a synthetic overview of the strategic factors shaping the sector's evolution. On the one hand, it captures the most relevant challenges identified by the surveyed entities, linked both to operational constraints and external conditions. On the other hand, it integrates perceived growth opportunities, whether technological, market-driven, or related to strategic collaborations. Together, this information helps identify where the most critical pressures are concentrated and where the greatest development potential is projected.

MAIN CHALLENGES

The main challenges of the entities in the surveyed value chain can be identified in Figure 16 and have been ranked according to their importance:

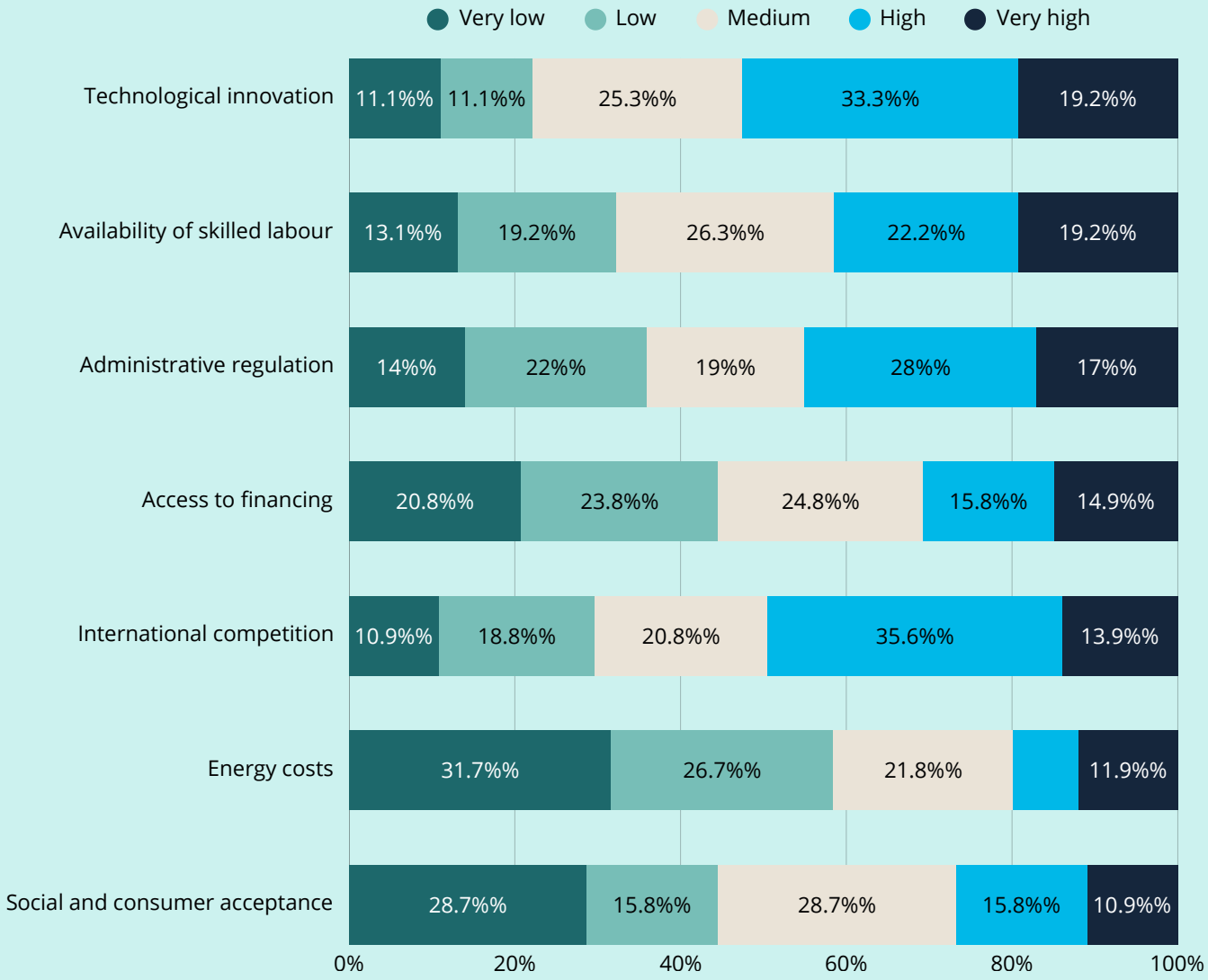


Figure 16. Percentage distribution of responses from entities in the aquaculture value chain according to the level of importance assigned to different strategic challenges (technological innovation, availability of skilled labour, administrative regulation, access to financing, international competition, energy costs, and social/consumer acceptance), classified into five intensity levels: very low, low, medium, high, and very high.

1.Technological innovation

It is positioned as one of the most critical challenges, concentrating a high proportion of "high" and "very high" ratings. It reflects the pressure to adopt advanced technologies (digitalization, automation, environmental control, traceability) in a context of rapid technological change and international competition.

2.International competition

It stands out as the challenge with the greatest weight in the "high" rating categories, highlighting the strong pressure exerted by countries with lower structural costs or larger economies of scale. It forces companies to differentiate themselves through quality, innovation, and high value-added services.

3.Administrative regulation

It shows a high level of importance as a relevant barrier, indicating that regulatory complexity, territorial fragmentation, and long administrative procedures condition investment and sector growth.

4.Availability of skilled labour

It appears as a structural challenge of medium–high importance, especially linked to the growing need for technical and highly specialized profiles. The shortage of talent limits the adoption of new technologies and the expansion of knowledge-intensive activities.

5.Access to financing

It shows a more balanced distribution between medium and low ratings, suggesting that its impact varies depending on the type of entity and the segment of the value chain.

6.Energy costs

Although relevant for certain production segments, they are generally perceived as a secondary challenge compared to more structural factors such as innovation or regulation.

7.Social and consumer acceptance

It presents a moderate rating, indicating that while it is not an immediate constraint for many entities, it remains a factor to consider in the implementation and expansion of activities.

MAIN OPPORTUNITIES

The main opportunities of the entities in the surveyed value chain can be identified in Figure 17 and have been ranked according to their importance:

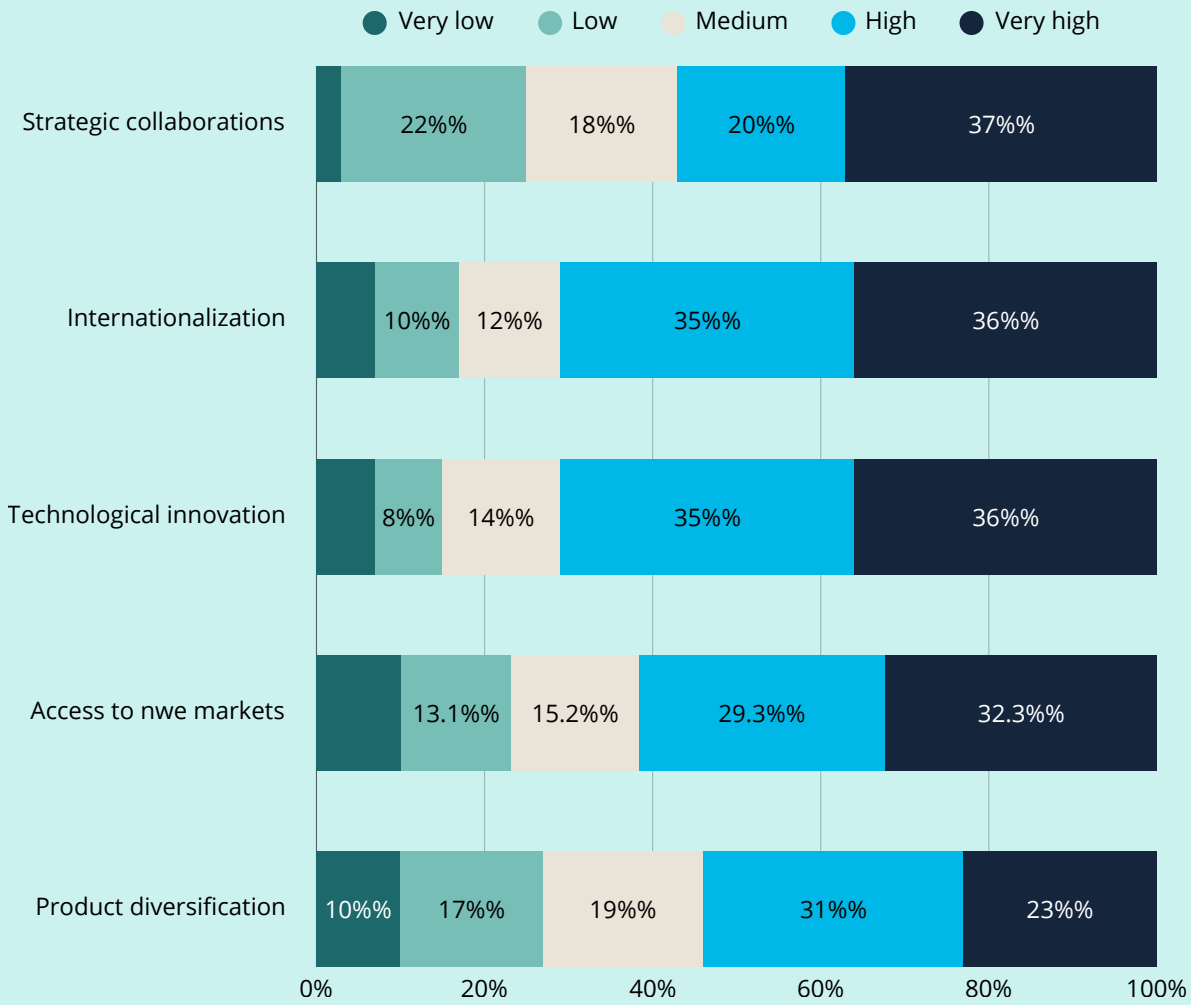


Figure 17. Percentage distribution of responses from entities in the aquaculture value chain according to the relevance assigned to different strategic opportunities (strategic collaborations, internationalization, technological innovation, access to new markets, and product diversification), classified into five rating levels: very low, low, medium, high, and very high.

1.Strategic collaborations

They are identified as the highest-rated opportunity, highlighting the potential of partnerships between companies, technology centers, universities, and clusters to drive innovation and competitiveness.

2.Internationalization

It emerges as one of the clearest opportunities, with a high level of consensus regarding its relevance. It reinforces the idea that foreign markets are key to scaling technological solutions, advanced services, and higher value-added products.

3.Technological innovation

In addition to being a challenge, it is also consolidated as one of the main opportunities, highlighting its dual role as both a limiting factor and a growth driver. Its high valuation reflects confidence in the sector's ability to leverage R&D&I as a competitive advantage.

4.Access to new markets

It is perceived as a relevant opportunity, especially linked to geographic diversification and the growing demand for sustainable and technologically advanced aquaculture solutions.

5.Product diversification

It represents a solid opportunity to reduce risks, expand market niches, and increase added value, both through new products and through services associated with production.

4.6. FUTURE OUTLOOK AND RECOMMENDATIONS

Next, the sector's future outlook is presented, focusing on how entities expect their activity to evolve over the next five years and on the most relevant lines of action they consider to foster growth. These results help identify general trends, anticipate expansion dynamics, and understand which strategic priorities could guide the sector's development in the medium term.

The survey reflects a strong level of optimism among entities regarding their evolution over the next five years (Fig. 18). A total of 42.1% of organizations anticipate significant growth and 44.7% expect moderate growth, indicating that nearly nine out of ten participants believe their activity will increase in the medium term. Only 13.2% foresee a stable situation, and none expect a decline, highlighting an overall outlook of expansion and confidence in the sector's future.

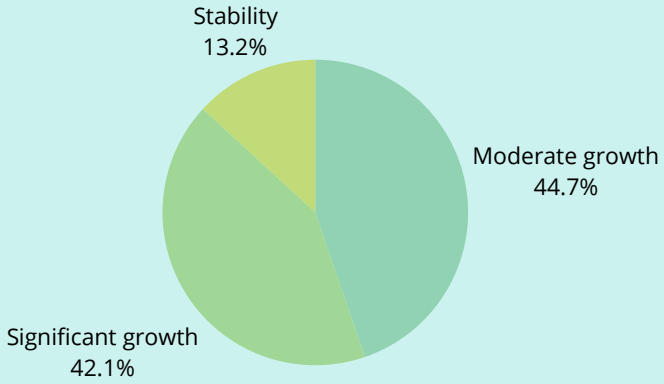


Figure 18. Results of the survey on the expected evolution of entities' activity over the next five years.

The priority measures identified to strengthen the aquaculture value chain (Fig. 19) show a clear focus on structural actions. Regulatory simplification stands out as the most relevant measure, reflecting that administrative complexity and regulatory fragmentation affect the entire chain, from production to technological and auxiliary services. This priority indicates that improving the regulatory framework is perceived as a prerequisite for facilitating investment, innovation, and sectoral growth.

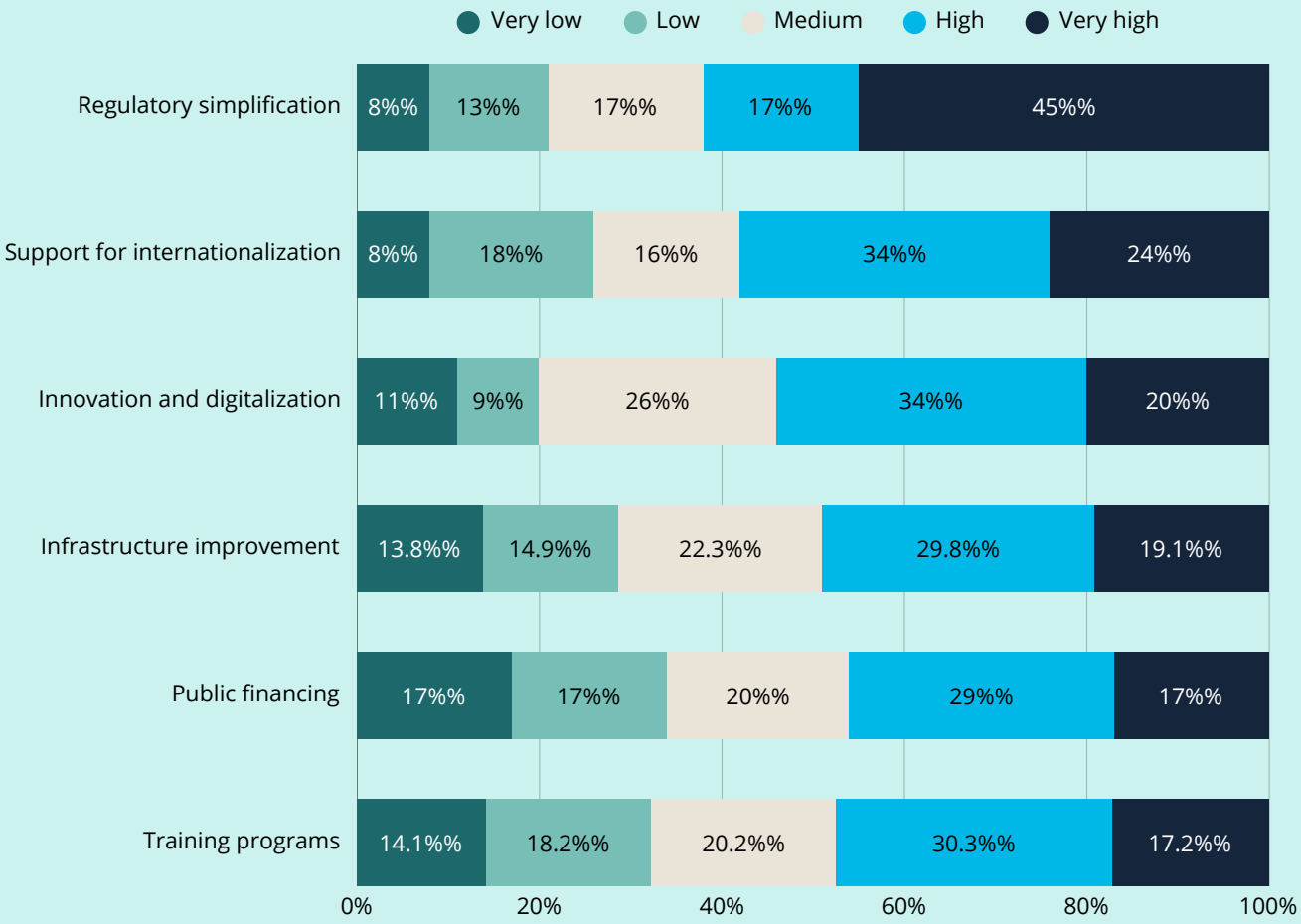


Figure 19. Percentage distribution of responses from entities in the aquaculture value chain according to the importance assigned to different strategic measures for the sector's development, expressed across five levels (very low, low, medium, high, and very high). The chart reflects the relative perception of each measure in terms of strategic priority for the sector as a whole.

Support for internationalization and the promotion of innovation and digitalization form a second group of highly valued measures. Both are closely linked to the export-oriented profile of many entities and to the need to maintain competitiveness in international markets through technological solutions, automation, and process digitalization. These measures reinforce the sector's shift toward higher value-added activities and greater international projection.

At a slightly lower level are infrastructure improvement, public financing, and training and skills development programs. Although these areas generally receive medium to high ratings, their perceived relevance varies more widely among the surveyed entities.

This variability reflects the diversity of realities and needs across different types of activities within the aquaculture value chain, as well as differences in organizational maturity, scale, and specialization.

Overall, the results highlight a priority demand for structural reforms aimed at strengthening the sector's competitiveness, which should be complemented by targeted instruments supporting innovation, internationalization, and the development of technical and professional capabilities. This combination is seen as essential to foster sustainable and balanced growth.

The assessment of aquaculture's current impact on the Spanish economy is a key element for understanding how the real contribution of this strategic sector is perceived. Beyond its productive dimension, aquaculture makes a significant contribution to food supply, direct and indirect employment generation, and the socioeconomic development of coastal and rural areas, many of which have limited alternative economic activities. In the Spanish context—given that Spain is among the leading aquaculture producers in the European Union—it is particularly relevant to analyze how sector entities interpret their economic weight and their capacity to generate added value, as well as their current and future role within the agri-food system and the blue economy.

According to the results collected, most of the surveyed entities place the impact of aquaculture on the Spanish economy (Fig. 20) at intermediate levels: the medium level is the most frequent, with 28 responses (36.8%), followed by the low level with 22 responses (28.9%), indicating a moderate perception but still distant from its maximum potential. Nearly a quarter (23.7%) consider the impact to be high. The extremes are minority positions: only 5 responses (6.6%) rate the impact as very low, and only 3 responses (3.9%) rate it as very high. Overall, the data show a widespread perception that the sector has a relevant impact but one that is still below what it could achieve under a more favourable environment and with greater economic and social recognition.

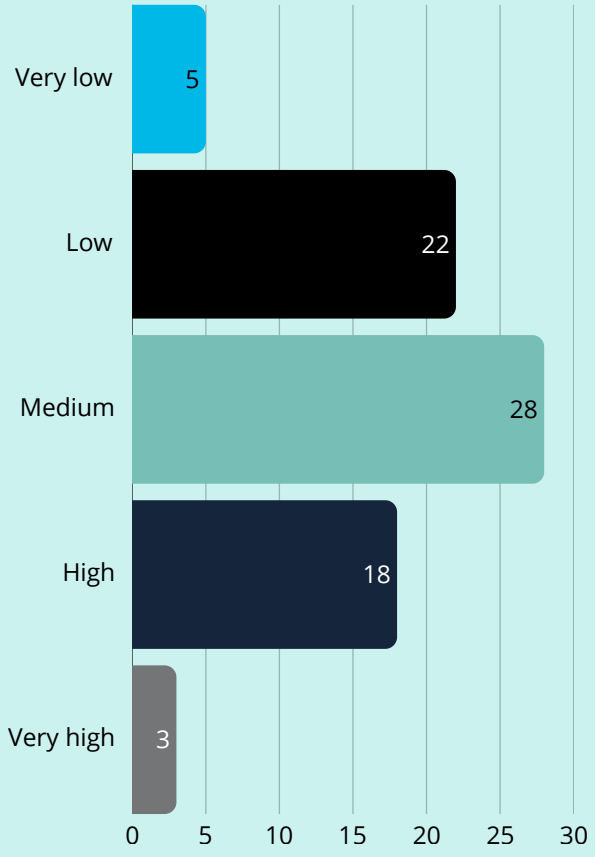


Figure 20. Assessment of the current impact of aquaculture on the Spanish economy.

5. THE VALUE CHAIN: BEYOND PRODUCTION

The analysis of the aquaculture value chain has become a key tool for understanding the economic structure of the sector. It allows the identification of value flows (economic, technological, informational, and regulatory), the examination of how costs and benefits are distributed across different links, and the detection of bottlenecks that limit system competitiveness (Bush et al., 2019). It also enables the assessment of value-added processes, both traditional (processing, preservation, efficient logistics) and emerging ones (environmental certification, digitalization, automation). These mechanisms can generate economic value (higher prices and market share), as well as social value (skilled employment, strengthening of the productive fabric, equitable access to natural resources) and environmental value (reduced impacts, circularity, lower carbon footprint) (Ababouch, 2023; Naylor et al., 2021).

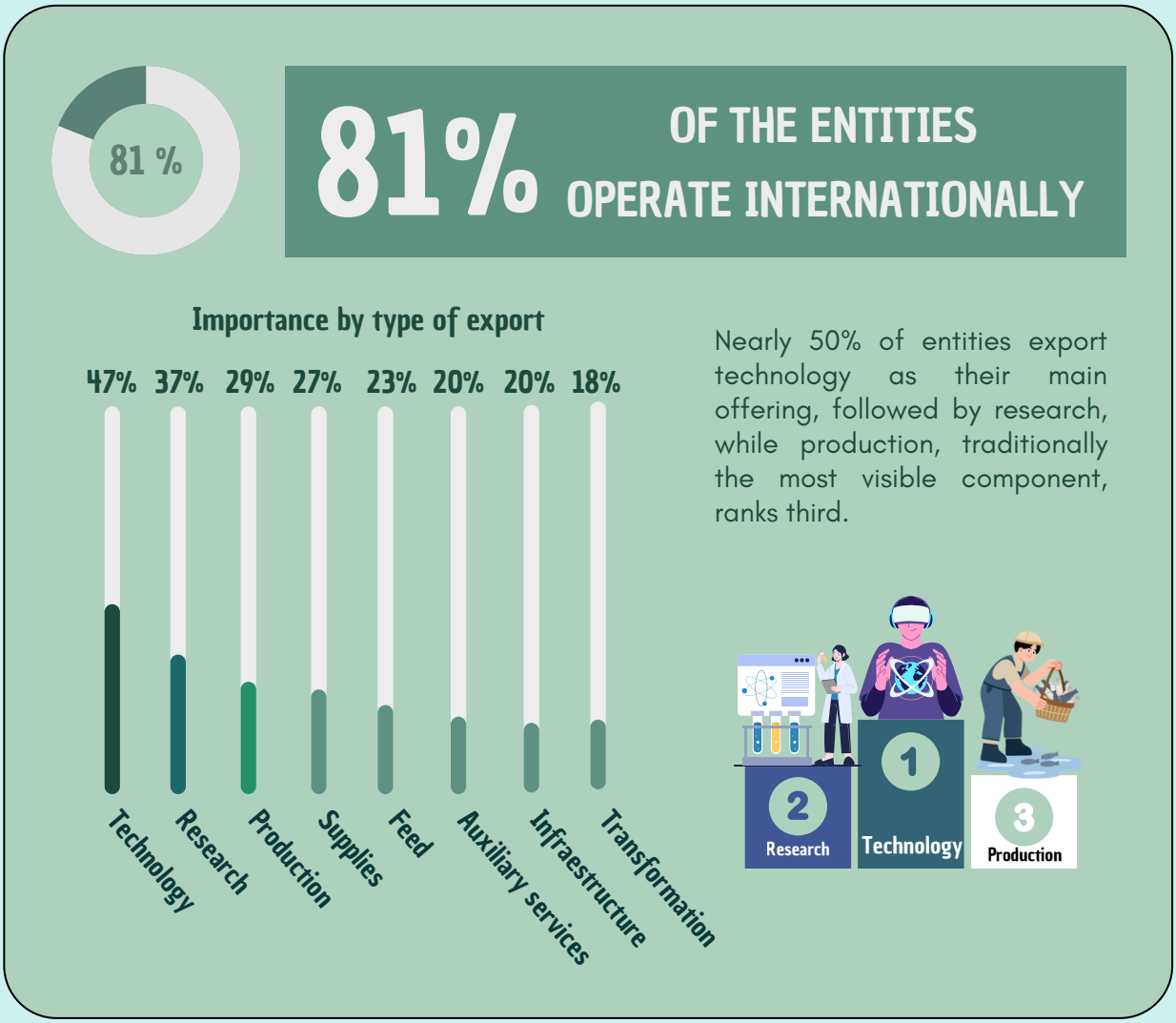
Applied to the Spanish case, this approach helps explain why sectors that have traditionally been underrepresented in statistics—such as aquaculture technology, equipment, laboratory services, digitalization, and certification—have an increasingly strategic role (APROMAR, 2025). These links not only support the competitiveness of national production but also represent high value-added activities with a growing export orientation, contributing to positioning Spanish aquaculture within global value chains as a provider of advanced solutions rather than solely a producer of primary goods (EUMOFA, 2023; FAO, 2024).

5.1. SECTORAL ANALYSIS RELATED TO THE EXPORT AREA

Assessing this dimension makes it possible to evaluate the sector's real scope as a provider of knowledge, technology, and advanced solutions, as well as its capacity to generate added value, consistent with the priorities identified in the EATiP Strategic Innovation and Research Agenda (European Aquaculture Technology and Innovation Platform), and to strengthen the presence of Spanish aquaculture within global value chains of specialized services.

The results of the study provide a characterisation the international dimension of services and capabilities associated with the aquaculture value chain in Spain. Around 81% of entities report operating at an international scale, with those linked to technology standing out in particular, evidencing that the export of technological solutions is one of the main drivers of external projection.

These services include food and environmental quality analysis and control, advanced water treatment, traceability and safety systems, energy optimization, engineering, project development and specialized software, as well as technical instrumentation (sorting machinery, photoperiod equipment, sensors, automated feeding systems, and laboratory materials). This shows that sector exports encompass processes, specialized services, and know-how with high strategic value. After technology, research is consolidated as the second most relevant export area (Ababouch et al., 2022), through knowledge transfer, genetic and nutritional optimization, and the development of new farming techniques, often in collaboration with technology companies. Production remains the most visible export flow, complemented by supplies, feed, and auxiliary services, which include equipment, specialized feeds and additives, logistics, maintenance, and operational support. Together, these elements constitute a diversified external offer distributed across the entire aquaculture value chain.



The analysis of the economic value of exports reveals a stratified structure. The largest group exports less than €100,000, mainly consisting of suppliers of inputs and auxiliary services, small technology consultancies, and some production companies with incipient international activity. The intermediate range (€100,000–€500,000) includes suppliers of goods and services, as well as organizations that integrate production and commercialization, reflecting more consolidated business models.

Finally, the highest-value group (over €500,000) includes the majority of entities in the study, highlighting two strategic profiles: production and trading companies with a strong export orientation, and technology and advanced service providers capable of exporting integrated solutions in engineering, automation, digitalization, and specialized equipment. This latter group confirms that the international competitiveness of the Spanish aquaculture sector relies primarily on the export of technology, technical services, and high value-added solutions, beyond the commercialization of farmed biomass.

ECONOMIC VALUE OF EXPORTS

< 100.000 €
Supplies and services
Small consultancies and auxiliary service providers. Operate in Europe.

100.000-500.000 €
Consolidated models
They integrate production and commercialization with moderate geographic diversification.

> 500.000 €
Technological leaders
They export integrated solutions (AI, engineering, digitalization) and have global market access.

The relevance of destination regions for internationalized companies in the aquaculture value chain shows a clearly hierarchical pattern. Europe emerges as the main market, concentrating the highest importance for most entities due to geographical proximity, regulatory harmonization, strong demand for technological and quality-related services, and ease of integration into already consolidated supply chains.

In second place is the Americas, particularly North America and leading aquaculture countries in Latin America, where there is strong demand for engineering, advanced equipment, and traceability solutions, making this a strategic market for companies with greater technological capacity.

Africa holds an intermediate position, mainly structured around auxiliary services, infrastructure projects, training, and technical consultancy, without constituting a core market for most companies.

Further behind is Asia, whose relevance is more limited and concentrated in highly specialized activities (biotechnology, precision instrumentation, analytical services) rather than broad sectoral presence.

Finally, Oceania occupies a clearly marginal position, reflecting a presence limited to specific projects or services.

Overall, this distribution shows that the internationalization of the Spanish aquaculture value chain is primarily oriented toward markets with high technological absorption capacity and compatible regulatory frameworks, while emerging regions are positioned more as opportunity spaces than as fully consolidated strategic destinations.

RELEVANCE OF REGIONS FOR INTERNATIONALIZED COMPANIES

Europe consolidates itself as the main destination market, followed by the Americas; Africa ranks next with intermediate relevance, while Asia shows a more limited and specialized presence, and Oceania occupies a clearly marginal position.

1. Europe

- Main destination market
- Proximity and regulatory harmonization
- High demand for technological services

2. America

- Second most important market
- Strong demand for engineering and equipment
- Interest in traceability solutions

3. Africa

- Intermediate importance
- Focus on auxiliary services
- Infrastructure and training projects

4. Asia

- More limited presence
- Highly specialized activities
- Biotechnology and instrumentation

5. Oceania

- Marginal relevance
- Specific projects
- Targeted services

LOn the one hand the combination of both analyses reveals a clear correlation: companies with exports exceeding 500.000€ also access access a larger number of regions, reinforcing their internationalization, particularly in Europe and the Americas, markets that high value-added services and technologies.

On the other hand, entities with exports below 100.000€ tend to operate in a more limited number of markets, concentrating primarily on Europe, where the entry costs are lower and regulatory barriers are more standarized. Mid-ranged companies show a mixed position, with some geopgrahic diversification but lower penetration to technologically demanding markets.

5.2. PERSPECTIVE ON THE EXPORT AREA

Based on this analysis, the European and Asian markets can be considered particularly relevant for the future of the Spanish aquaculture value chain. In the case of the former, the EU represents the largest single market for aquatic products, both from fisheries and aquaculture, and is the world's largest importer, with imports amounting to approximately USD 62.7 billion (FAO, 2024; APROMAR, 2025).

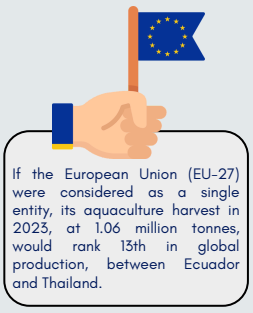
This represents a major opportunity for the Spanish aquaculture value chain, as its integration within the single European market—as discussed in the previous section—means that regulations and taxation frameworks facilitate the export of inputs and services. Likewise, the Asian market is particularly relevant due to its position as the largest aquaculture producer, with China leading global production (Ababouch et al., 2022; EUMOFA, 2025).

China is currently undergoing a transition from a net exporter to a net importer (Fig. 19). Since 2017, net imports of aquatic products into China have doubled, increasing from approximately USD 10.7 billion to USD 22.5 billion (FAO, 2024). This shift in the trade balance, which previously limited external market access due to the strong weight of its manufacturing and aquaculture production sectors, could open a window of opportunity for the export of high value-added goods and services from Spanish aquaculture value chain entities, such as biotechnology, analytical services, traceability systems, and quality control solutions, among others.

MARKETS OF INTEREST FOR COMPANIES IN THE VALUE CHAIN

European market

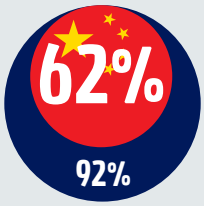
The European Union is the world's largest market and importer of aquatic products, both from fisheries and aquaculture, representing a strategic opportunity for the Spanish aquaculture value chain. This is further supported by its integration within the single market and by a regulatory and fiscal framework that facilitates the export of inputs.



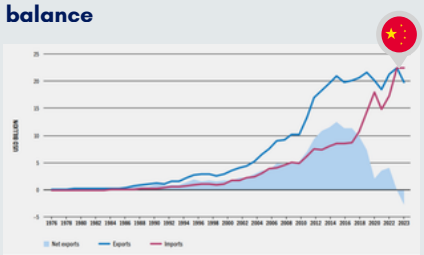
If the European Union (EU-27) were considered as a single entity, its aquaculture harvest in 2023, at 1.06 million tonnes, would rank 13th in global production, between Ecuador and Thailand.

Asiatic market

Asia accounts for nearly 92% of global aquaculture production. Within this continent, China is the leading producer, contributing approximately 62% of global output, followed by other major Asian producers such as Indonesia, Vietnam, and Bangladesh.



China's aquatic products trade balance



China is transitioning from a net exporter to a net importer of aquatic products; since 2017, its imports have doubled, opening opportunities for the export of high value-added aquaculture goods and services (FAO, 2024; APROMAR, 2025).

It is also necessary to emphasize the importance of markets in the so-called "Global South." In just a few decades, these countries have moved from representing a minor share of global GDP to accounting for approximately half, with projections indicating that their economic weight will continue to increase. This growth is accompanied by a rapid expansion of domestic consumption, driven both by demographic growth and the emergence of large middle classes, reshaping global patterns of food production and demand.

In this context, aquaculture clearly reflects this transition toward a multipolar system. As highlighted in Bush et al. (2019), although global value chains and international trade flows remain important, the sector can no longer be understood solely through a North–South logic. Aquaculture production, trade, and consumption are increasingly concentrated in the Global South, particularly in Asia, giving rise to South–South dynamics and a wide diversity of species, production models, and markets.

This multipolarity is not only economic but also regulatory and social: standards and values traditionally driven by Northern markets are losing relative influence in the face of new criteria emerging from developing markets and domestic consumption in Southern countries. Overall, these processes suggest that the future of aquaculture will be increasingly shaped by the demands, norms, and productive capacities of the Global South, with profound implications for governance and the structure of its value chains.

5.3. THE INTEGRATION OF SERVICES INTO THE AQUACULTURE CONCEPT

As already noted, alongside traditional producers and marketers of aquaculture biomass, the value chain also includes laboratories, technology companies, research centers, and suppliers of inputs and auxiliary services that perform essential functions for its operation (FAO, 2024). While production companies show a high dependence on income derived from aquaculture, a significant part of the network is made up of entities located in intermediate stages (such as equipment suppliers, technical services, engineering, specialized feed, biotechnology, consultancy, and certification), which generate value without being directly involved in the farming of organisms (Ababouch et al., 2022).

In many cases, aquaculture represents only a portion of their turnover, but it acts as a strategic client that supports specialized business lines, providing key capabilities in traceability, health control, automation, and facility design. The evolution of these activities reflects the rapid technological modernization of the value chain, driven both by internal innovation processes and by competitive pressure resulting from shrinking margins (Bush et al., 2019).

"The future of strong global aquaculture value chains will continue to depend on ongoing efforts to optimize key production factors (labour, energy, feed, and seed), as well as on innovation and technology, marketing and market information, and management." (Ababouch et al., 2022)

In economic terms, annual turnover linked to aquaculture is not concentrated solely in large farming operations. As highlighted by the FAO in The State of World Fisheries and Aquaculture (FAO 2022 and 2024), engineering and technology firms supplying machinery, structures, processing systems, or mechanical solutions generate significant turnover even when aquaculture does not represent the majority of their income. This demonstrates that knowledge-intensive, equipment-based, and industrial service segments capture a substantial share of the value added within the chain. Similarly, laboratories and technology centers show how analytical services, applied research, and technical support can account for medium-to-high levels of aquaculture-linked turnover, even when they also serve other sectors.

The relationship between income dependency and aquaculture-linked turnover confirms that there is no direct correlation: some companies with high aquaculture-related turnover show low dependency ratios (mostly in the 0–25% or 25–50% ranges) because they operate across multiple industries, while other small, highly specialized entities exhibit very high dependency levels (where more than 75% of their income comes from aquaculture), such as niche service providers or certain technology firms. This hybrid structure shows that the Spanish aquaculture value chain is not composed solely of producers, but rather of a network of companies providing critical capabilities through services, technology, engineering, biotechnology, and quality control, enriching the overall chain.

In terms of employment, the data further support the idea of a hybrid value chain. Technology and service companies typically operate with small to medium-sized teams (between 1 and 50 employees), but with highly qualified profiles: engineers, biotechnologists, analysts, automation technicians, nutrition specialists, or certification experts. Input supply companies within this segment also tend to require relatively small workforces. In contrast, production and processing companies generally have larger staff structures, reflecting the higher labour intensity of these stages. Research institutes and technology centers also employ substantial numbers of workers, aimed at fostering and facilitating scientific and technological advancement.

This duality (small but highly skilled teams in services, and larger teams in production) highlights that Spanish aquaculture combines technological intensity and labour intensity, generating employment both in advanced services and in production operations.

Overall, the analysis confirms that a significant share of the sector's economic value does not lie in the final product itself, but in the services and solutions that enable production, improve performance, and ensure compliance with international standards. From biosensors to plant engineering, including environmental analysis, certification, logistics, equipment, and specialized software, the integration of these services not only broadens the functional definition of aquaculture but also enhances its resilience, competitiveness, and capacity for internationalization, aligning with the typical evolution of a mature value chain (Bush et al., 2019).

5.4. MAIN INDICATORS OF ECONOMIC GROWTH AND EMPLOYMENT

The recent evolution of the aquaculture-related business fabric shows a sustained growth dynamic since the late 1980s (FAO, 2024). The combined analysis of surveyed entities—based on number of employees, turnover evolution over the last five years, type of activity, and degree of internationalization—reveals a sector that, far from being limited to primary production, is driven by companies in engineering, equipment, biotechnology, technical consultancy, and advanced services (Ababouch et al., 2022). These activities act as value multipliers within the chain and generate opportunities for skilled employment.

As noted by the FAO in its 2024 report, global demand for aquatic products (both marine and inland aquaculture) is expected to increase substantially, given that over the last 60 years per capita consumption has risen from around 9.1 kg in 1960 to 20.7 kg in 2022. Aquaculture has covered a large share of this demand (Figure 21), showing a clearly exponential growth pattern and pointing towards a similar expansion of all entities linked to the global aquaculture value chain, which is expected to continue in the future.

In general terms, companies with the highest economic growth over the last five years tend to be located in the most technologically advanced segments: monitoring systems, automation, water treatment, sensors, management software, analytical services, and specialized engineering. This aligns with the increasing maturity of value chains (Ababouch et al., 2022). These entities typically show growing turnover trends and, simultaneously, workforces of more than 15–20 employees, reflecting a clear relationship between technical complexity, export capacity, and sustained economic growth. They also show a strong outward-oriented profile, confirming that knowledge-intensive activities are currently the main economic driver of the Spanish aquaculture value chain.

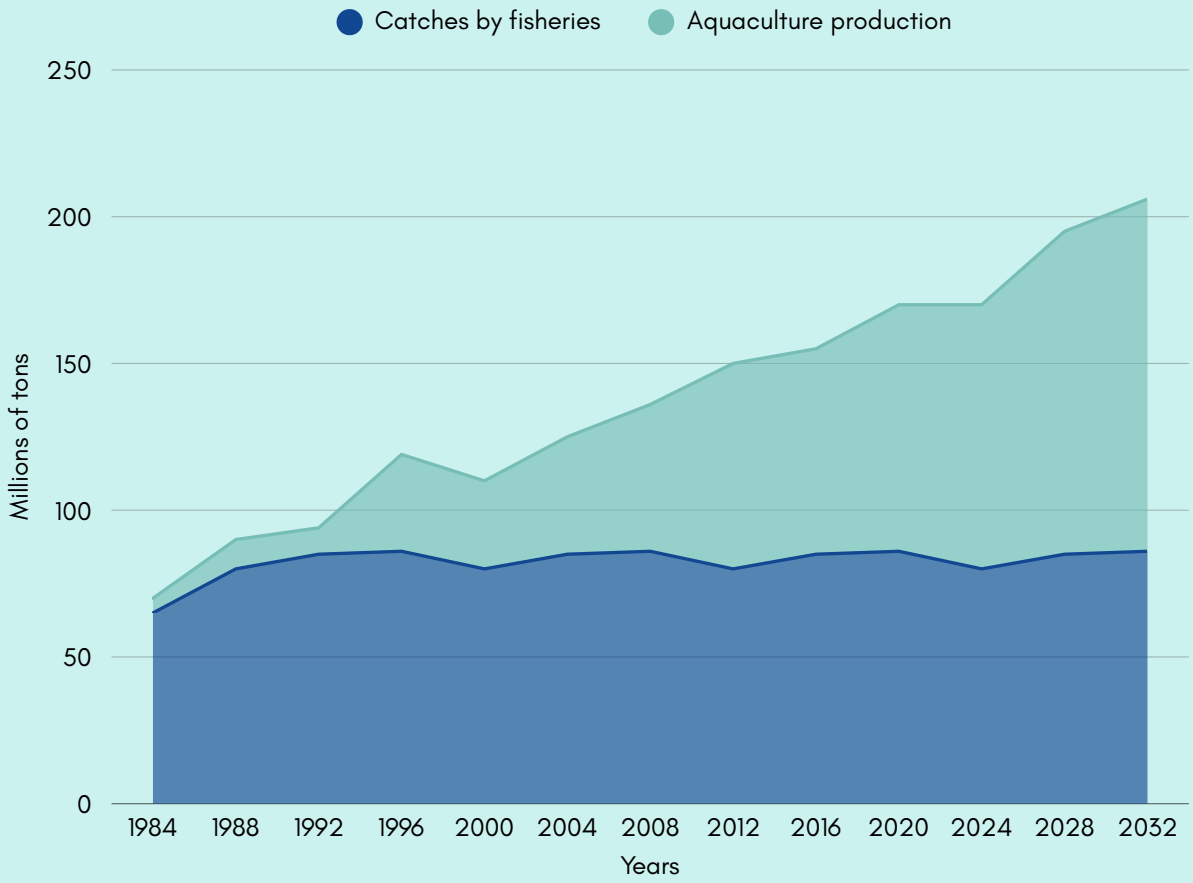


Figure 21. Estimated global aquaculture production (green) and fisheries catches (blue) from 1980 to 2026, with projections up to 2032 (FAO, 2024).

In contrast, organizations focused on more specific and limited services—such as administrative consulting, small-scale supplies, occasional training, or auxiliary activities—tend to have smaller business structures (often fewer than five employees) and a more stable but moderate turnover over the past five years. These entities are generally less dependent on internationalization and focus on local production niches, which limits their growth, although they provide essential functions for system operability (permits, inspections, training, logistical support, etc.).

The percentage of income dependent on aquaculture adds a second layer of interpretation. Highly specialized companies are typically found in the most integrated segments of the aquaculture value chain: laboratories, biotechnology firms, environmental monitoring services (water quality, traceability, and sanitary controls), nutrition, engineering, and production. These are also the entities most likely to show recent increases in turnover and to have larger workforce structures, indicating that specialization within the sector is currently a key driver of sustained growth.

By contrast, multisector companies (particularly those in consultancy, infrastructure, or technologies applicable to other industries) exhibit aquaculture dependencies below 30% and a more heterogeneous economic trajectory, highlighting that their role in the chain is relevant but not exclusive.

In terms of employment, the data confirm a clear correlation: entities reporting stable or accelerated growth in turnover also tend to have larger teams and more diverse professional profiles (bioprocess technicians, environmental analysts, engineers, laboratory staff, automation and digitalization specialists, etc.).

Conversely, organizations that have maintained stable business volumes typically operate with smaller teams and less knowledge-intensive structures. This indicates that the Spanish aquaculture value chain generates skilled employment where innovation, export activity, and the provision of advanced services are concentrated.

5.5. REGIONAL AND COMPARATIVE ANALYSIS

It is important to highlight that this regional analysis refers to entities within the aquaculture value chain and therefore does not necessarily coincide with production data at the regional level. Indeed, there has been a quantitative shift since the beginning of the century: while Galicia and Andalucía were historically the main fish-producing regions, more recently the Región de Murcia and the Comunidad de Valencia have emerged as important production hubs (APROMAR, 2025). In this study, the territorial distribution (Figure 21) of entities linked to the aquaculture value chain in Spain shows a clearly concentrated geographical pattern in certain autonomous communities, particularly Galicia, Cataluña, and Andalucía, which together account for a substantial share of the sector's organizations.

Galicia stands out as the main hub of activity, consistent with its historical leadership in aquaculture production, supporting industries, and R&D ecosystem. This region hosts technology companies, laboratories, analytical services, production entities, and suppliers, forming a diversified and highly integrated ecosystem closely connected to the production and commercial flows of northwestern Spain. It represents a particularly complete environment where both high value-added services and primary production coexist, placing Galicia at the core of national supply chains and in a prominent position within international markets (APROMAR, 2025).

Cataluña and Andalucía are also key pillars of Spanish aquaculture. Cataluña is characterized by its strength in technology, biotechnology, automation, advanced consultancy, and certification, with knowledge-intensive firms and strong export capacity. Andalucía, meanwhile, presents a more diversified ecosystem, combining marine production, environmental services, applied engineering, and technological solutions adapted to both Mediterranean and Atlantic conditions, integrating productive activities with strategically relevant auxiliary services.

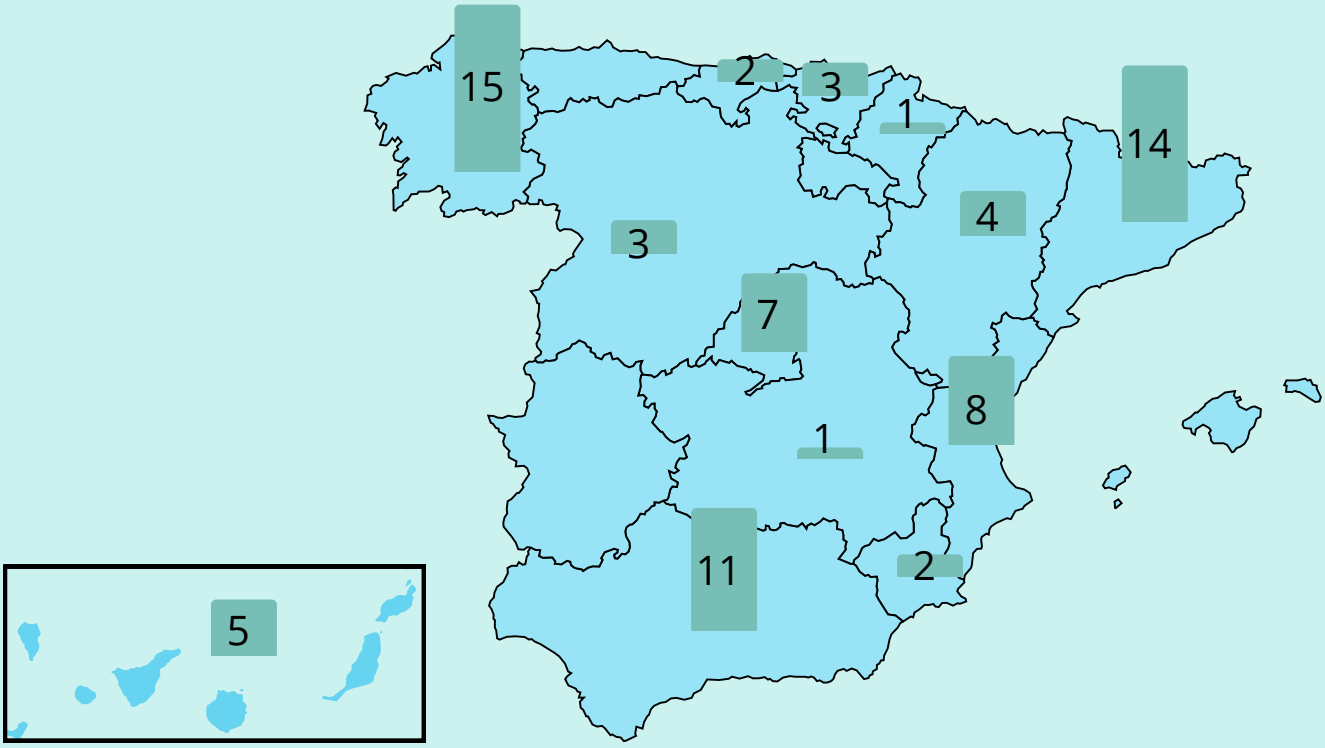


Figure 22. Number of entities included in this study within the aquaculture value chain, by autonomous community.

Other regions, such as the Comunidad de Valencia, the Canary Islands, Aragón, Castilla y León, and the País Vasco, present more heterogeneous ecosystems with specialized niches: aquaculture infrastructure, logistics services, and technical assistance in Valencia and the Canary Islands; and a higher concentration of technological specialization, training centers, and environmental consultancy in Aragón and Castilla y León. Overall, the value chain is unevenly distributed, with production concentrated in coastal areas, technological services in major urban centers, and cross-cutting activities (training, consultancy, equipment supply) more widely dispersed.

The territorial distribution is closely linked to export performance: regions with higher technological specialization and advanced services (Galicia, Cataluña and Andalucía) account for most of the export value, mainly based on technical solutions, equipment, monitoring systems, specialized nutrition, analytical services, and engineering. Galicia leads in exports of mollusc-related technology and analytical services; Cataluña in digitalization, automation, sensor systems, and high value-added consultancy; and Andalucía combines biomass exports with a growing share of environmental services, water analysis, and engineering solutions for Mediterranean systems. Regions with lower business density show reduced international projection and a stronger dependence on the domestic market.

6. SECTOR MATURITY AND INNOVATION

The innovation maturity of the Spanish aquaculture value chain is reflected in a business ecosystem that is clearly moving beyond the early stages of technology adoption and progressing toward knowledge-intensive models. The high proportion of entities allocating a significant share of their turnover to R&D&I (with two predominant clusters, one of moderate investment and another of high investment) reveals a sector in which innovation is no longer a complementary activity but a structural pillar of competitiveness, consistent with the evolution of value chains (Bush et al., 2019).

"Continuous innovation processes and technological change are ubiquitous across most aquaculture value chains, reflecting in part their relatively 'immature' status compared with longer-established components of the food system." (Bush et al., 2019)

This investment effort translates into a clear prioritization of strategic areas: technology and digitalization emerge as true drivers of modernization, followed by sustainability, production processes, and nutrition. All of these are directly linked to improving the technical and environmental efficiency of the production system, in line with FAO objectives (Ababouch et al., 2022; FAO, 2024). The emphasis on these areas indicates that companies are responding to increasing market pressures, such as traceability, automation, impact reduction, and resource optimization, and positioning themselves within the logic of the most advanced aquaculture value chains at the international level (Ababouch et al., 2022).

6.1. DIGITALIZATION AND PUBLIC-PRIVATE COLLABORATION

The high degree of sectoral digitalization reinforces this interpretation: the vast majority of entities already operate at medium-to-high levels. This scenario is consistent with the aforementioned innovation-oriented profile, as digitalization acts as an enabling platform for virtually all identified priority areas. Without real-time data, process optimization is not possible; without integrated systems, traceability cannot be achieved; and without digital tools, sustainability based on verifiable indicators is not feasible.

At the same time, the pattern of collaboration with the scientific and technological system (in which active and stable relationships clearly predominate) shows that innovation within the Spanish aquaculture value chain is based on a bidirectional transfer dynamic. This connection with universities, technology centers, and clusters strengthens ecosystem maturity, as it allows companies to access specialized knowledge, test new technologies in controlled environments, and participate in applied research projects that would be difficult to undertake individually.
It is also important to emphasize that, although Spain has a broad network of research centers, there is still room for improvement. It will be necessary to further deepen these industry–research relationships in order to adapt to future market needs.

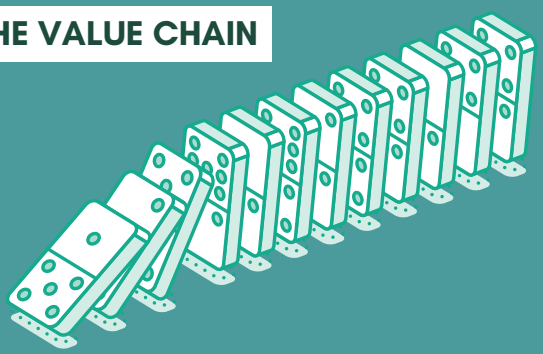
6.2. GENDER EQUALITY, EMPLOYMENT, AND TRAINING IN THE VALUE CHAIN

"Value chains are conceived as vehicles for achieving normative objectives, such as poverty reduction or gender equality, either through technical support to improve processes and skills in key nodes, or through initiatives aimed at improving market access, trading conditions, or the integration of producers, workers, and other actors linked to the value chain." (Bush et al., 2019).

The aquaculture value chain in Spain, beyond its economic and technological dimensions, faces important social challenges that condition its long-term sustainability. In terms of employment, the sector has demonstrated its capacity to generate job opportunities at different qualification levels, in line with FAO objectives. For each direct job in aquaculture, between 2 and 4 indirect jobs are generated within the value chain (feed, logistics, processing, etc.) (APROMAR, 2025).

EMPLOYMENT IN THE VALUE CHAIN

For each direct job in aquaculture, between 2 and 4 indirect jobs are generated within the value chain (feed, logistics, processing, etc.), creating a domino effect.



Employment distribution reflects functions both in highly labour-intensive production areas and in technological services, analysis, engineering, and consultancy, where greater specialization is required. However, imbalances persist in the quality and stability of employment offered: the significant presence of small and medium-sized enterprises with reduced organizational structures limits the development of clear professional career paths and may generate contractual instability in certain segments of the chain.

Regarding training, there is awareness among entities of the need for increasingly qualified professionals, which is reflected in the valuation of training and skills development programs as one of the key factors that would facilitate sectoral growth. However, alignment between existing training provision (in universities, technology centers, and vocational training institutions) and the actual competencies demanded by the sector remains improvable. Areas such as data management, automation, process engineering, applied biotechnology, and sustainability require a more systematic and cross-cutting training approach, both in higher education and in workforce continuous training. This translates into a gap that limits the full adoption of advanced technologies and the consolidation of stable, specialized career paths.

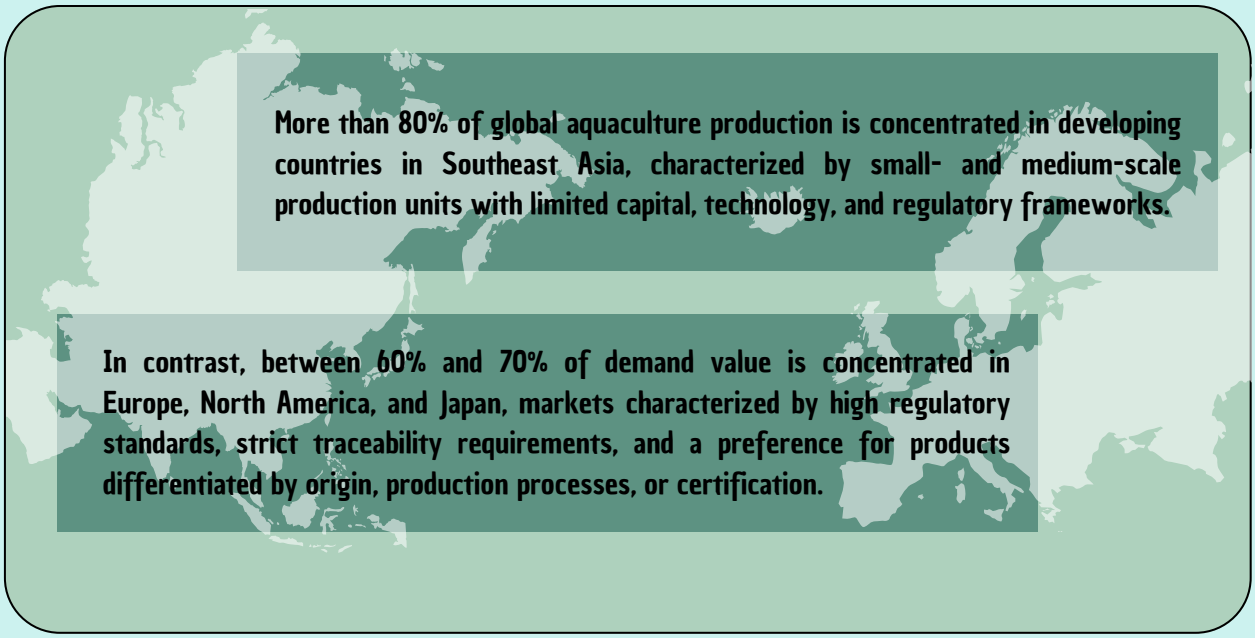
Gender equality remains a social aspect with room for improvement within Spanish aquaculture. Although there is not as pronounced a glass ceiling as in other traditional industrial sectors, balanced representation of women in technical positions, leadership roles, or R&D&I areas is not yet guaranteed (Kruijssen et al., 2018). According to The State of World Fisheries and Aquaculture (FAO, 2024), 24% of workers in the sector globally are women, compared to 62% in non-primary downstream sectors of the value chain. Female participation is more visible in support, administration, or training roles, but decreases progressively in technological functions, business leadership, or international project management. This gender gap, although less pronounced than in other fields, limits the full utilization of available talent and reduces diversity of perspectives in strategic decision-making within the sector (Kruijssen et al., 2018).

6.3. THE PRIORITIZATION OF ENVIRONMENTAL SUSTAINABILITY

As Ababouch and colleagues (2022) explain in their article, a structural feature of global aquaculture value chains is the deep geographical disconnect between production centers and consumption markets.

More than 80% of global production comes from developing countries, predominantly located in Southeast Asia, where small- and medium-scale production units prevail, often with limited access to capital, technology, and less robust regulatory frameworks. In contrast, between 60% and 70% of demand value is concentrated in Europe, North America, and Japan—markets characterized by high regulatory standards, strict traceability requirements, and a preference for products differentiated by origin, production processes, or certification.

This imbalance creates structural tensions along the value chain, as producing countries do not always adapt their control systems, biosecurity measures, environmental management practices, and governance frameworks to ensure access to markets with increasingly complex requirements.



In many producing countries, particularly in Asia and Latin America, intensive aquaculture operates under conditions that can generate significant environmental risks: mass escapes of organisms, structural failures due to storms or human error, and the resulting genetic interactions between domesticated and wild populations, as documented in the case of certain species such as coho salmon in Chile (Ababouch et al., 2022; FAO, 2024). These interactions threaten local biodiversity and create long-term ecological uncertainties.

In addition, production practices based on highly dense monocultures favor the proliferation of parasites and diseases that can spread to wild populations, affecting ecosystem resilience, as is also the case with the excessive use of antibiotics (Naylor et al., 2021). Furthermore, there are numerous impacts associated with habitat destruction, as illustrated by large-scale shrimp farming operations in South America that have led to the clearing of extensive areas of mangroves.

While these risks can also occur in facilities located in developed countries, their incidence is significantly reduced thanks to stricter regulatory frameworks, more robust environmental monitoring and control systems, and the widespread adoption of sustainability certifications, biosecurity standards, and best practice protocols that act as preventive and mitigation mechanisms (Ababouch et al., 2022).

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From an economic perspective, these environmental challenges not only threaten the ecological sustainability of production but also generate increasingly high compliance costs in order to access strictly regulated markets (such as the European Union). They increase the likelihood of tariff imposition, reduce commercial margins, and shift bargaining power toward downstream segments, which require guarantees of sustainability, traceability, and sanitary control (Bush et al., 2019)

As a consequence, the global value chain is evolving toward market models based on sustainability, safety, and regulatory compliance criteria, which directly influence the distribution of value along the chain (Ababouch et al., 2022). Chain segments capable of offering differentiation—such as health laboratories, certification bodies, technology centers, specialized equipment suppliers, or digitalization companies—tend to capture a larger share of the value generated, while primary producers generally operate with tighter margins and higher exposure to risk.

The FAO established the Blue Transformation vision in 2021, an initiative that, among other objectives, is fully aligned with the sustainability goals of the 2030 Agenda, through roadmaps such as the Guidelines for Sustainable Aquaculture (GSA). This highlights the central importance of sustainability for the future of the aquaculture industry at a global level. Likewise, the FAO works with all member states to promote sustainability in innovation, technology, and production systems (The State of World Aquaculture, 2024).

7. SWOT ANALYSIS

Building on the systematization of the information obtained, the SWOT analysis (Figure 22) represents the integration of the different sources used to establish a characterization of the aquaculture sector based on a set of key concepts. These characterizations are constructed from a combined reading of the available evidence, bringing together the analysis of secondary reference sources—used as a framework for comparison and validation—with the realities directly expressed by sector stakeholders.

SWOT ANALYSIS

OF THE AQUACULTURE VALUE CHAIN

S — STRENGHTS

- Diversified business structure
- Exportable technological capabilities
- Strong network of research and training centers
- High degree of internationalization
- Growing technological advancement of the sector

W — WEAKNESSES

- Insufficient innovation capacity
- Lack of skilled labour
- Regulatory complexity
- Difficulties in accessing financing
- Low social visibility of the sector

O — OPPORTUNITIES

- Regulatory simplification
- Greater internationalization
- Boosting innovation and digitalization
- Strengthening training and skills development programs
- Increasing public-private investment in infrastructure
- Growing demand for sustainable products

T — THREATS

- International competition
- Technological obsolescence
- Persistent regulatory barriers
- Shortage of technical talent
- Energy costs
- Lack of social acceptance

7.1. STRENGTHS AND OPPORTUNITIES

The **simplification of regulatory frameworks**, identified as the most priority measure by a broad majority of surveyed entities, constitutes the main strategic opportunity for the sector. The current administrative complexity, arising from overlapping regulatory frameworks, differences between autonomous communities, and lengthy and uncertain procedures, generates operational costs, limits investment, and slows down the deployment of new technologies according to APEM, FEAP, and EATiP. Moving toward a more homogeneous, predictable, and efficient regulatory framework would unlock significant growth potential, facilitate the adoption of more technologically advanced systems, and improve competitiveness compared to countries with more agile administrative processes.

Support for internationalization emerges as a second key opportunity. Entities within the Spanish value chain possess high value-added exportable capabilities (engineering, equipment, analytical services, biotechnology, nutrition, digitalization, technical consultancy) that have already demonstrated or are demonstrating their capacity to operate in foreign markets. Strengthening this factor would enable greater geographic diversification, reduce dependence on the domestic market (both Spanish and EU), and capture new opportunities in expanding regions, particularly Latin America, North America, and certain African and Asian countries. Internationalization would not only generate new revenue streams but also reinforce Spain's global positioning as a provider of advanced aquaculture services (MAPA, 2014).

In parallel, the **promotion of innovation and digitalization**—also considered a priority by entities—represents a strategic opportunity to enhance efficiency across the entire value chain (Ababouch et al., 2022). Technological improvement also reduces operational costs and facilitates regulatory compliance, while enabling more sustainable production models (RAS, offshore systems, automation, advanced environmental control) (FAO, 2024). Spain has technology centers, universities, and engineering companies with strong potential to strengthen this area, provided that knowledge transfer is promoted and the gap between research and industrial application is reduced.

Opportunities related to **training and skills development** are also noteworthy. As highlighted in the analysis of challenges, the increasing technical complexity of the sector demands highly qualified profiles capable of operating advanced technologies and sophisticated production systems. Strengthening specialized training programs would improve talent availability, facilitate innovation uptake, and help address one of the sector's most persistent bottlenecks: the shortage of technical labour. This issue has been considered a structural problem since the establishment of the sector around the early 2000s (APROMAR, 2025).

Finally, **public funding** and **infrastructure improvement** offer relevant opportunities to enhance the competitiveness of the value chain. Financing is a key element for scaling technological solutions and enabling SMEs to access international markets, while infrastructure—both public and private (especially ports, laboratories, experimental stations, and logistics networks)—determines the actual capacity for expansion and for integrating the chain into global markets (MAPA, 2014; APROMAR, 2025).

7.2. THREATS AND WEAKNESSES

The **technological innovation** stands out as the main challenge for the Spanish aquaculture value chain because the sector is increasingly moving toward highly technologized systems (automation, sensor deployment, applied artificial intelligence, genetics, traceability, and biosecurity), while a significant part of the business fabric consists of small and medium-sized enterprises (SMEs) with limited R&D capacity and intermediate levels of digitalization. Although there are technology centers (mostly public) and high-level corporate groups, the gap between the pace of global development and the internal capacity for adoption creates competitive vulnerability. This explains why innovation received the highest ratings: it is not merely an operational challenge, but a determining factor for competing in international markets and sustaining efficient production models (Bush et al., 2019; Ababouch et al., 2022).

International competition is also perceived as a critical challenge. The Spanish value chain competes with countries operating under lower structural costs, as is the case in most high-volume producing countries in Southeast Asia—particularly China—where labor costs are significantly lower than in Europe (MAPA, 2014). Likewise, countries such as Norway or Chile present much larger production scales or highly integrated industrial and technological ecosystems. Although Spain excels in engineering, monitoring, analytical services, and specialized nutrition, these niches must face increasing global pressure and rapid technological obsolescence. Internationalized companies need to continuously differentiate themselves to maintain their external market position, which explains the high relevance of this challenge.

The **availability of skilled labor** occupies an intermediate position, but its importance is increasing, especially since it was not explicitly emphasized in the 2014 Multiannual Strategic Plan for Aquaculture in Spain. The sector requires highly technical profiles (electromechanics, programming, data analysis, environmental monitoring, and sanitary diagnostics), while the training supply remains limited and fragmented. In addition, many companies in the value chain (especially in the services and technology segments) operate with small teams, making it difficult to attract talent compared to other better-remunerated sectors. The rapid technological intensification of aquaculture increases this need, which explains why the shortage of specialized profiles is widely perceived across the sector.

Administrative regulation, although uneven depending on the type of activity, constitutes a cross-cutting constraint according to most sector-related studies and reports (APROMAR, 2025). The distribution of competences across autonomous communities, lengthy environmental permitting processes, lack of standardization for innovative facilities, and overlapping regulations generate uncertainty and delay investments. This remains a persistent obstacle since the development of the Multiannual Strategic Plan for Aquaculture in Spain in 2014.

As noted by Naylor et al. (2021), the uneven application of government regulation has led to regional disparities in production, growth, and system design. Governments have facilitated aquaculture expansion in many Asian countries, as well as in Norway and Chile, whereas in other regions such as the European Union and the United States, public administrations have constrained growth. Although some segments (consultancy, analysis, research) are less affected by these barriers, the value chain as a whole recognizes the need for a clearer, more agile, and better coordinated regulatory environment.

"The burden of European aquaculture, they argue, lies in excessive bureaucracy, cumbersome administrative processes, fragmented initiatives, insufficient recognition in spatial planning, and policy frameworks that generate consultations but produce few tangible results." European Mollusc Producers Association, APEM; Federation of European Aquaculture Producers, FEAP; and EATiP, European Aquaculture Technology and Innovation Platform, addressed to Costas Kadis, EU Commissioner for Fisheries and Oceans.

Access to financing and **energy costs** appear as moderate challenges because they affect each segment of the value chain differently. These issues are also identified among the structural obstacles of the sector in the Aquaculture in Spain Report (APROMAR, 2025) and in the Multiannual Strategic Plan for Aquaculture in Spain (2014). Financing is key for project development and administrative monitoring, which highlights the importance of JACUMAR (Junta Nacional Asesora de Cultivos Marinos) and JACUCON (Junta Nacional Asesora de Cultivos Continentales).

Capital-intensive producers and closed-system operations are more vulnerable to energy price fluctuations, whereas services, R&D, and consultancy are far less dependent on this factor. At the same time, Spain represents an opportunity in this regard due to its high investment in renewable energy sources, which significantly reduces the overall energy bill. Similarly, small and medium-sized technology companies or firms in expansion face greater financing constraints than consolidated organizations or those operating in high-demand segments. Overall, their impact is relevant, but not as uniform as that of more structural challenges.

Finally, **social and consumer acceptance** is positioned as a secondary challenge due to the profile of the surveyed entities: most do not operate directly in production or in consumer-facing stages, but rather in technological, analytical, or service support segments. However, this lower weight in responses should not be interpreted as irrelevance; public perception continues to influence the deployment of new facilities and the sector's expansion, although its direct impact varies across value-chain segments (Ababouch et al., 2022).

This aspect has been characterized in the APROMAR 2025 report as critical, as it is considered—alongside economic factors—one of the drivers behind the decline in per capita consumption of aquaculture products in Spain (from 23.6 kg per person per year in 2022 to 17.99 kg per person per year in 2024), linked to greater awareness and perceptions of insufficient sustainability in the sector. To reverse this trend, strengthening public nutritional education is recommended.

8. FUTURE OUTLOOK, RECOMMENDATIONS, AND CONCLUSION

The future outlook for the Spanish aquaculture sector points toward a scenario of consolidation and expansion, in line with global trends in the industry (APROMAR, 2025; FAO, 2024). This is supported by the confidence expressed by most entities within the value chain, where the optimistic perspective reflects not only expectations of economic growth but also the perception that the sector is at a stage that will facilitate the capture of emerging opportunities, such as product diversification, internationalization of advanced services, and expansion into new technology, driven markets linked to water management, sustainability, and automation.

The projected increase in activity over the next five years suggests that companies anticipate a more dynamic environment, with rising demand for technological solutions and a growing role for specialized services. These developments are already positioning Spain as a relevant actor in specific segments of the global aquaculture value chain.

Simultaneously, the assessment of the economic impact of aquaculture conducted by the entities themselves reveals a key element from a sectoral perception standpoint: there is a general recognition of the sector's economic importance, but also an awareness that its contribution has not yet achieved the level of visibility or weight it could attain. This assessment is linked not only to the actual performance of the sector, but also to social factors such as the limited public understanding of the complexity of the aquaculture value chain and the sector as a whole, the persistence of stigmas associated with intensive production, and the lower social perception of the value added generated by technological, sanitary, or engineering services linked to the sector. In this sense, companies' views reflect not only an economic self-assessment, but also the need to strengthen the public narrative on the strategic role of aquaculture in food security, blue innovation, and the socio-economic development of coastal and rural areas.

Finally, the observed scenario allows us to conclude that, despite the strong positioning and high potential of the Spanish aquaculture value chain, there are two cross-cutting critical factors that affect all segments and therefore must be addressed in an integrated manner, avoiding their consolidation as structural constraints on future development. In particular, the following two are identified:

The need to facilitate access to new markets and to specific support instruments that accompany and reinforce growth, diversification, and internationalization processes across all activities within the value chain.

The importance of advancing in the dissemination, design, and consolidation of systems for data collection, systematization, and analysis at sector level, in order to improve monitoring of progress, development, and strategic decision-making, while creating better conditions for investment and access to financing. All of this requires a vision that emphasizes the importance and economic potential of aquaculture beyond a purely productive dimension.

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ANNEX 1. REPOSITORY OF ENTITIES BELONGING TO THE AQUACULTURE VALUE CHAIN IN SPAIN

This repository shows the entities associated with the aquaculture value chain that were invited to participate in the survey; it does not represent a comprehensive list of all entities belonging to the value chain in Spain.

- Public administrations

  - Consejería de Agricultura, Agua, Ganadería y Pesca de la Comunidad Valenciana
  - Consejería de Agricultura, Ganadería, Mundo Rural y Medio Ambiente de La Rioja
  - Consejería de Agricultura, Ganadería, Pesca y Soberanía Alimentaria de Canarias
  - Consejería de Agricultura, Ganadería y Desarrollo Rural de Castilla y León
  - Consejería de Agricultura, Pesca, Agua y Desarrollo Rural de Andalucía (CAPDR)
  - Consejería de Agricultura, Pesca y Medio Natural de las Islas Baleares
  - Consejería de Agua, Agricultura, Ganadería y Pesca de la Región de Murcia
  - Consejería de Desarrollo Rural, Ganadería, Pesca y Alimentación de Cantabria
  - Consejería de Desarrollo Sostenible de Castilla la Mancha
  - Consejería de Fomento, Medio Ambiente y Servicios Urbanos de Ceuta
  - Consejería de Gestión Forestal y Mundo Rural de Extremadura
  - Consejería de Medio Ambiente, Agricultura e Interior de la Comunidad de Madrid
  - Consejería de Medio Rural y Política Agraria de Asturias
  - Departamento de Agricultura, Ganadería, Pesca y Alimentación de Cataluña
  - Departamento de Agricultura, Ganadería y Alimentación de Aragón
  - Departamento de Alimentación, Desarrollo Rural, Agricultura y Pesca del País Vasco
  - Departamento de Desarrollo Rural y Medio Ambiente de Navarra
  - Dirección Xeral de Pesca, Acuicultura e Innovación Tecnolóxica de la Xunta de Galicia
  - Fundación Biodiversidad (programas marinos)
  - Ministerio de Agricultura, Pesca y Alimentación (Subdirección de Acuicultura) (MAPA)
  - Ministerio para la Transición Ecológica (área marina) (MITECO)

- Associations

  - Agrupación Mexilloeira Rianxeira
  - Asociación de Acuicultores de Canarias

- Asociación de Mejilloneros Vilaxoán (APM)
- Asociación de Mejilloneros Ría de Vigo
- Asociación de Mejilloneros San Cibrán de Aldán
- Asociación de Productores Mejilloneros San Amaro
- Asociación de Productores Mexilloeiros da Ría de Muros e Noia
- Asociación Empresarial de Acuicultura de España (APROMAR)
- Asociación Española de Mayoristas, Importadores, Exportadores y Transformadores de Productos de la Pesca y lde la Acuicultura (CONXEMAR)
- Asociación Española de Productores de Acuicultura Continental (ESACUA)
- Asociación Nacional de Acuicultura de Atún Rojo (ANATÚN)
- Asociación Nacional de Fabricantes de Conservas de Pescados y Mariscos (ANFACO-CYTMA)
- Asociación Valenciana de Empresas de Piscicultura Marina
- Cooperativa de Productores Mejilloneros de Cabo de Cruz (ASMECRUZ)
- Federación de Acuicultores de la Región de Murcia (FARM)
- Federación de Productores de Moluscos del Delta del Ebro (FEPROMODEL)
- Federación Nacional de Asociaciones Provinciales de Epresarios Detallistas de Pescados y Productos Congelados (FEDEPESCA)
- Federation of European Aquaculture Producers (FEAP)
- Fundación Centro Tecnológico del Mar (CETMAR)
- Fundación Instituto Tecnológico para el Desarrollo de las Industrias Marítimas (INNOVAMAR)
- Grupo de Acción Costera de Tenerfe (GAC Tenerife)
- Grupo de Acción Local de Pesca y Acuicultura de la Región de Murcia (GALPEMUR)
- Organización de Productores de Mejillón de Galicia (opmega)
- Plataforma Tecnológica Española de la Pesca y la Acuicultura (PTEPA)
- Sociedad Española de Acuicultura (SEA)

- Universities

- Universidad Autónoma de Barcelona (Máster Oficial en Acuicultura)
- Universidad de A Coruña (Instituto Universitario de Estudios Marinos, Departamento de Biología Celular y Molecular)
- Universitat de Barcelona (Division IV – Bioquímica y Biología Molecular, Division IV – Productos Naturales, Biología Vegetal y Edafología, Fisiología-División III)
- Universidad de Cádiz (Laboratorio de Genética, De partamentos de Bioquímica y Biología Molecular, Microbiología, Medicina Preventiva)
- Universidad Complutense de Madrid (Departamento de Fisiología Animal de la Facultad de Biología)
- Universidad de Extremadura (Departamento de Medicina y Salud Animal de la Facultad de Veterinaria)
- Universidad de Granada (Departamento de Biología Celular de la Facultad de Ciencias)

- Universidad de La Laguna (Departamento de Biología Animal (Fisiología Animal
- Universidad de Las Palmas de Gran Canaria (Grupo ECOAQUA, Patología animal, producción animal, bromatología y tecnología de alimentos)
- Universidad de León (Grupo Acuicultura Continental e Ictiopatología, ACUIPAT, Departamentos de Biología Celular y Anatomía)
- Universidad de Murcia (Inmunobiología para la Acuicultura (I4A))
- Universidad Miguel Hernández (Instituto Universitario de Biología Molecular y Celular)
- Universidad de Oviedo (Departamento de Biología de Organismos y Sistemas (Ecología) (Zoología), Biología Funcional – Grupo Genética Acuícola)
- Universidad Politécnica de Cataluña (Departamento de Ingeniería Agroalimentaria y Biotecnología)
- Universitat Politécnica de Valencia (Laboratorio de Acuicultura)
- Universidad de Santiago de Compostela (Inmunobiología para la Acuicultura" (I4A), Instituto de Acuicultura, Departamento de Farmacología)
- Universidad de Valencia (Departamento de Zoología)
- Universidad de Valladolid (Departamento de Bioquímica, Biología Molecular y Fisiología)
- Universidad de Vigo (Grupo Phytofish, Departamento de Fisiología Animal y Departamentos de Bioquímica, Genética e Inmunología)
- Universidad de Zaragoza (Departamento de Patología Animal)

- Technology and research centres

- AZTI: Centro de investigación marina y alimentaria
- Centro Oceanográfico de Baleares (IEO-CSIC)
- Centro Oceanográfico de Cádiz (IEO-CSIC)
- Centro Oceanográfico de Canarias (IEO-CSIC)
- Centro Oceanográfico de Santander (IEO-CSIC)
- Centro Piscifactoría de Bolinches
- Centro Tecnológico de la Acuicultura de Andalucía (CTAQUA)
- Centro de Investigación Agroforestal de Albaladejito (CIAF)
- Centro de Investigaciones Biológicas (CIB)
- Centro de Investigación en Sanidad Animal (CISA)
- Centro de Investigaciones Marinas de Corón (CIMA)
- Centro de Recursos Marinos (IMIDA)
- Centro de Repoblación de Salmónidos (Piscifactoría de Avalle)
- Centro de Repoblación de Salmónidos (Piscifactoría de Infiesto)
- Centro de Repoblación de Salmónidos (Piscifactoría de Molino de Quitería)
- Centro Tecnológico Gallego de Acuicultura (CETGA)
- Centro Tecnológico Naval y del Mar (CTN)
- Fundación Centro Tecnológico Acuicultura de Andalucía
- Institut de Recerca i Tecnologia Agroalimentàries (IRTA)
- Instituto de Acuicultura de Torre de la Sal (IATS-CSIC)
- Instituto de Ciencias del Mar (ICM-CSIC)
- Instituto de Ciencias Marinas de Andalucía (ICMAN-CSIC)
- Instituto de Ciencia y Tecnología de Alimentos y Nutrición (ICTAN-CSIC)

- Instituto de Investigaciones Marinas (IIM-CSIC)
- Instituto de Investigación y Formación Agraria y Pesquera (IFAPA-Centro Agua del Pino)
- Instituto de Investigación y Formación Agraria y Pesquera (IFAPA-Centro El Turuño)
- Instituto Español de Oceanografía (centro Vigo)
- Instituto Murciano de Investigación y Desarrollo Agrario y Medioambiental (IMIDA)
- Instituto Universitario de Investigación en Acuicultura Sostenible y Ecosistemas Marinos (ECOAQUA)
- Laboratorio de Investigaciones Marinas y Acuicultura (LIMIA)
- Piscifactoría de Brieva de Cameros
- Xarxa Marítima de Catalunya (BlueNetCat)

- Companies

  Producers

- Acuicultura y Nutrición de Galicia SL (Acuinuga)
- Acuidelta
- Acuipalma
- Algayield
- Alevines de Guardamar SL
- Alicante Aquaculture
- Angulas Aguinaga
- Andres Bruño e Hijos
- Aquanaria
- Aqualgae SL
- Arandina Agropecuaria
- Astur Aquaculture
- Aurelio Silva Abalo
- Avramar (Grupo)
- Bedón Acuacultura
- Cademar
- Caladeros del Mediterráneo
- Carmar Cultivos Marinos
- Caviar Pirinea SL
- Cooke Aquaculture Spain (Culmarex)
- Cultivos Marinos de Andalucía
- Cultivos Piscícolas Marinos, S.A.
- Cultivos Piscíolas Marinos SA
- ECOBIOFARMS FUERTEVENTURA SL
- Eurotrucha
- Explotaciones Trucheras Ganaderas y Agrícolas
- Fitoplánccton Marino
- Futuna Blue España
- Geremar
- Grupo Tres Mares

- Hermanos Fernández Ibáñez Consignatarios de Pesca
- Insuiña (Nueva Pescanova)
- Maresmar
- Mejillones Bel
- Mejillones Nodales
- Mundova SLU
- NEO SC Piscifactorías
- Ovapiscis SA
- Perla de Sarrión SL
- Pisceo
- Piscicultura PisciKoi
- Piscifactorías Albaladejo SL
- Piscifactorías Andaluzas SA
- Piscifactoria Berxa
- Piscifactoría del Alba
- Piscifactorías del Mediterráneo SL
- Piscifactoría de Saro 8897
- Piscifactorías Hermanos Fariña SL
- Piscifactoría Industrial El Zarzalejo
- Piscifactoría Las Fuentes SL
- Piscifactoría Nuestra Señora de Ibernalo
- Piscifactoría Río Mundo
- Piscilor SA
- PISCISELMO
- Piszolla SL
- Profand Piscifactorías de Galicia SL
- Riofrío 1963 SL
- RiverFresh Iregua SLU
- Sea Eight Aquaculture Group
- Seafood Legacy Spain
- Stolt Sea Farm SA
- Truchas de Leiza
- Truchas del Saja
- Truchas Tavascan
- Tuna Graso SAU
- Valenciana de Acuicultura SAU
- Verdeacuaria

Feed, nutrition, and additives

- Acuazul
- Actipro
- Aller Aqua
- Aquafeed
- BioMar España
- Biorizon biotech
- Dibaq aquaculture

- Entomo Agroindustrial
- HealthTech Bio Actives (HTBA)
- InsectBiotech
- Inve Aquiculture
- Kaesler Nutrition
- LifeBioencapsulation SL
- Lípidos Toledo SA
- Lucta
- Nanta
- Natac
- Ptaqua
- Skretting España
- Tebrio
- Tecnosa

Equipment and technology

- Agriprotek
- Akva Group España Tecnologia De Acuicultura, Sociedad Limitada.
- AQUACONSULTANT ACUICULTURA Y SERVICIOS S
- AQUITEC SL
- ArgosAI Smart Aquaculture
- Atlantic BFT Farm
- BLANCHADELL
- Derwent Group
- ELDI SPAIN
- Elimat
- Envases de Galicia SAU (EGALSA)
- Futuna Blue España
- Galiza Analítica
- Grupo Eurored
- Goldfish
- Grundfos
- iAgua
- Iber Aquaculture
- Inencope
- Intermas
- INGESOM
- Integral Aquaculture Services SLU (INAQUA)
- INTERMAS NETS SA
- JJCHICOLINO
- LAMOR
- Maccaferri
- MAIMBAR GROUP SL
- Markleen Maangment SL
- Mega Fortris
- NTT DATA EUROPE & LATAM GREEN ENGINEERING SL.

- Pesquerías Isla Mayor
- PROMETAL SECURITY SEALS
- Redes Mar Adentro
- ROTOGAL SL
- TEQUISA
- UNMANNED TEKNOLOGIES APPLICATIONS SL.
- Surcontrol
- Servicios de Acuicultura y la tecnología del agua (INNOVAQUA)
- SMARTWATER PLANET
- Suministros Pesqueros y Agrícolas (SPyA)
- STARAQ
- Zoomare
- ZUNIBAL SL

Laboratories and pharmaceuticals

- Acuinuga
- ACUIPHARMA AQUACULTURE HEALTH SL
- AGQ Labs
- Aqualabo
- AQUATRECK
- BIOCENTROL LABORATORIOS
- BioIberica
- Biotech Biosecurity SL
- CENAVISA
- Eurofins Oceansnell
- Hydrosphere
- ICTIOVET S.L.
- Laboratorio Akunatura
- Laboratorios HIPRA SA
- MAYMO
- Noresga
- TECNOVIT
- Vithas RED
- ZOETIS MANUFACTURING & RESEARCH SPAIN SOCIEDAD LIMITADA.

Business management and technical services

- AgroSeguro
- BLAT Seguros (pib Group Iberia)
- Engrupo
- FIATC Seguros
- fiGroup
- Howden
- Itsas Garapen Eltarkea
- Minguez Sáez, Correduría de Seguros
- Murimar Seguros
- Occident
- SABSEG

Information, consultancy and certification

- Amancio Otero S.L.
- Asemar
- Asesoría B. Mariño
- Artemio Lab
- AGP fish quality
- ASC Spain
- GA Agopyme
- Gestenaval
- Gestimar
- i-Fish Consulting
- Instituto para el Crecimiento Sotenible de la Empresa (ICSEM)
- ipac Acuicultura
- misPeces
- Panorama Acuícola Magazine
- Sinerxia
- Wangumaqua