

The Dynamics and Challenges related to the Sustainable Development of Marine Fishing and Aquaculture Activities. Spatial Maritime Planning and Solutions in the Coastal Region of Romania

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Abstract

In the context of maritime spatial planning, it is necessary to carry out an assessment of the contribution of fishing and aquaculture sector's total economic value. The purpose of this research has been to conduct a dynamic analysis and a structural analysis of turnover and fixed assets reported by the economic agents/entities operating in the Fishing and Aquaculture field in Constanța County, so as to get a clear picture of how companies in this area achieve their intended purpose and contribute to the area's economic benefit. Despite national support, the dynamics of turnover and fixed assets for each sub-activity is very heterogeneous, the main causes being: the overestimation of demand and inadequate dimensioning of production, the failure to obtain the planned production, the emergence of substitute products, the decreasing solvent demand of the potential buyers, the quality of the manufactured products, the intensification of competition.

Key words: turnover, fixed assets, marine fishing and aquaculture, coastal area, Maritime Spatial Planning (MSP)

J.E.L. classification: Q20, Q22, Q50, Q57

1. Introduction

According to the information presented in 2018 on the United Nations' Sustainable Development Knowledge Platform, the development of maritime areas' economies must be based both on the sustainable development objectives and principles and on the blue economy concept. European Parliament's 8 September 2015 Resolution states that this type of economy covers a wide range of interconnected economic activity sectors, which rely on their position in the vicinity of seas and oceans, including even traditional or emerging sectors, such as: fishing, aquaculture, maritime and inland waterways transport, port activities with their entire logistical side, coastal tourism, recreational and cruising nautical activities, shipbuilding and ship repair, maritime and coastal protection works, exploration and exploitation of mineral resources, exploitation of wind and marine energy and biotechnology.

Coastal areas bear the imprint of the interaction between land and water and, furthermore, they are areas with an intense human activity, being a fulcrum of regional, national and international trade (Ariel, Feitelson and Marinov, 2021). In this context, given the many activities carried out in this area, it is necessary to assess their vital role, firstly within the local economy and secondly within the ongoing concern about raising living standards.

In his research paper, Petrișor (2017) showed that the sustainable development of the coastal area must be seen as a multifaceted concept which must combine four coordinates: economic, social, environmental, and cultural, taking into account the fact that sustainability depends on the non-replaceability of economic, social or ecological capital (Petrișor, Susa and Petrișor, 2020).

Given that MSP adopts scientifically based management practices which allow the sustainable socio-economic and ecological development of the coastal and marine areas (Ehler, 2014), the development of the maritime spatial plan in the Black Sea is meant to contribute on the one hand to the sustainable development of sea energy sectors, maritime transport, fishing and aquaculture sector,

and on the other hand to the conservation, protection and improvement of the environment, including the increasing resilience to the impact of climate change (2014 / 89 / EU Directive, Article 5).

In the coastal communities, fishing and aquaculture activities are closely linked to the local economy, with a strong correlation between these activities and the social structure, the localities' culture and traditions, which is why the stakeholders' experience is a very valuable tool in building an inclusive and reliable maritime spatial planning (Salas-Leiton, Vieira and Guilhermino, 2021).

2. Theoretical background

Maritime spatial planning is a process and a tool which not only makes considerable efforts to protect the marine environment, but also promotes the sustainable development of maritime economic activities in this area (Ullah et al., 2021). In order to effectively support and promote a sustainable development, it is essential for the stakeholders - authorities, residents, economic entities - to be consulted when drawing up the maritime spatial plan, all of these concerns being introduced and explicitly stated in the European Union's Directive 89 of 2014.

In Romania, according to the *2014-2020 National Fishing Sector Strategy*, the sustainable development of fishing and aquaculture is a socio-economic need in the medium and long term, which entails, among others, promoting competitive fisheries and aquaculture, supporting producer organizations and bodies and economically viable and socially and environmentally sustainable fish farms.

In the context of the sustainable development of activities in the maritime and coastal area of the Black Sea, it is necessary to know the multiple benefits (Filip, Stan and Vintilă, 2016a) offered by the maritime economic activities given that the nature and extent of economic activities in the coastal area can also influence the costs and the benefits of management (Ariel, Feitelson and Marinov, 2021).

It is well-known that coastal areas can be subjected to intense levels of activity, and many of them face issues related to the deterioration of natural, socio-economic, and cultural resources. The exploitation and use of coastal areas directly affect the sustainable development of the coastal localities, which have a complex economy and face a multitude of problems specific to their geographical location. Therefore, it is necessary to take into account the opportunity cost when choosing the most cost-effective use (Petrișor, Susa and Petrișor, 2020). For a sustainable development of the Romanian coastal area, fishing activities can provide the opportunity of developing the local economy, providing a permanent source of income for the locals and they can support associated activities (Loizou et al., 2014), while aquaculture offers not only an alternative source of income for the fishing sector, but also an alternative source of sustainable supply (Conejo-Watt et al., 2021). It is therefore essential that the latest information on fishing and aquaculture activities be used in integrated approaches to maritime spatial planning, from a holistic perspective.

The Black Sea coastal area poses quite different social, economic and environmental problems (Filip, Stan and Vintilă, 2016b), which is why it was necessary to involve the stakeholders in the resource management' decision-making process (Pomeroy and Rivera-Guieb, 2006) and to integrate them into the “equation” of the coastal area development through the efficient dialogue between government, companies, NGOs and local communities (Nguyen et al., 2020), being known that they have a considerable economic influence.

MSP's stakeholders are individuals or groups of people who have an interest in or are affected by MSP's outcomes (Luhtala et al., 2021) providing an opportunity to understand their specific problems, explore and integrate their concerns, generate mutually beneficial solutions (Pomeroy and Douvère, 2008). Since the recommendations addressed to the authorities in terms of planning focus on tackling economic, social, and environmental issues within an integrated approach, assigning to them equal priority in the process of the sustainable development of the area (Petrișor, Petre and Meita, 2016), multiple study approaches have emerged from the perspective of the business sectors. They often focus specifically on a certain business sector in the MSP area, such as: the fishing industry (Luhtala et al., 2021), the relationship between MSP and fishing, the involvement of fishermen in MSP and tools that can help integrate fishing into MSP (Psuty et al., 2021), aquaculture (Salas-Leiton, Vieira and Guilhermino, 2021).

3. Research methodology

The purpose of this research has been to perform a dynamic analysis and a structural analysis of the turnover and fixed assets reported by the economic agents operating in the field of Fishing and Aquaculture in Constanța County, in the context of maritime spatial planning.

The statistical observation was conducted in a comprehensive manner, using the data provided by the Ministry of Public Finance - the National Agency for Fiscal Administration for the 2010-2019 period. In order to obtain generalizing data, which would allow us to know what is typical in the form of manifestation of the analyzed companies, we have used the statistical grouping method, in which the financial indicators used were presented both by subgroups of activities according to NACE/CAEN classification and by year, while the classes' formation and the indicators' calculation were done with the help of the SPSS computer program. The generalization of the values was achieved with the help of absolute, relative, and average indicators.

4. Findings

The analyzed database, comprising all the companies in Constanța County whose main activity is the "Fishing and Aquaculture field" (03), includes fishing and aquaculture activities, covering the exploitation of fishery resources in the marine and freshwater environments, for catching or gathering fish, crustaceans, mollusks, and other marine organisms, as well as marine products - aquatic plants, pearls, sponges, etc. Also included in this category are the activities that are normally integrated into the production process, such as seeding oysters for pearl production.

The '*Fishing*' class of activities (031) includes fish catching activities, respectively capturing and collecting of aquatic organisms, predominantly fish, mollusks and crustaceans, including plants, from ocean waters, coastal waters or inland waters, for human consumption or for other purposes, by hand or with various tools. This type of activities can be carried out along the intertidal shoreline, such as collecting mollusks - mussels and oysters, with fishing nets based on the shore, from boats or, usually, using specialized vessels. This group includes the following sub-activities: (0311) '*Marine fishing*', which includes: commercial fishing, in ocean and coastal waters; collecting of crustaceans and marine mollusks; whale hunting; harvesting of marine aquatic animals (turtles, sea urchins, etc.); activities of vessels engaged both in fishing and in fish processing and preserving; the collection of other marine organisms and materials (natural pearls, sponges, corals, algae) and (0312) '*Freshwater fishing*', which includes: commercial freshwater fishing, collecting of freshwater crustaceans and mollusks, collecting of freshwater aquatic animals, collecting of freshwater materials.

The '*Aquaculture*' class of activities (032) includes activities on aquatic farms, i.e., the production process involving culturing, including harvesting, in fish farms of aquatic organisms - fish, mollusks, crustaceans, plants, crocodiles, other amphibians, etc. - by using techniques created to increase the production of these organisms, beyond the natural capacity of the environment (e.g., regular stocking, feeding and protection from predators) and it refers to raising them up to their juvenile and/or adult stage in the conditions of captivity of those organisms. Moreover, 'aquaculture' also contains the ownership (individual, collective or state) of the respective individual organisms during the growing up stage and it includes the stage of harvesting them. This group comprises the following sub-activities: (0321) '*Marine aquaculture*', which includes: fish culturing in marine waters, including culturing ornamental marine fish; bivalve spat (oysters, mussels) production; lobsterling production, post-larvae shrimp, juvenile salmon; growing edible kelp and other marine plants; raising crustaceans, bivalves, other mollusks and other aquatic animals in the seawater; aquaculture activities in low salinity waters; aquaculture activities in tanks or reservoirs filled with saltwater; marine fish hatcheries' activities (fish eggs incubators); marine worm farms' activities and (0322) '*Freshwater aquaculture*', which includes: culturing of fish in freshwater, including freshwater ornamental fish; culturing of freshwater crustaceans, bivalves and other mollusks and aquatic animals; activities of hatcheries with freshwater fish broods (fish eggs incubators); raising frogs; aquaculture activities in tanks or reservoirs filled with saltwater.

Currently, throughout Romania's territory approximately 100 companies whose main field of activity is "*Marine fishing*" (0311), 50 companies whose main field of activity is "*Marine aquaculture*" (0321) and about 900 companies whose main field of activity is "*Freshwater aquaculture*" (0322) are registered.

According to the economic literature, *turnover* consists of the revenues generated by a company as a result of the activity it carried out, turnover maximization being an objective set by the companies with the aim of increasing the market share and counteracting the competition. In order to achieve the turnover maximization objective, economic agents act in the direction of increasing *fixed assets* since they are the assets generating future economic benefits.

Table 1 highlights the structure of the average turnover by subgroups of activities according to the NACE code for the companies in the *Fishing and Aquaculture* field that are registered in Constanța County.

Table no. 1 The average turnover recorded by agencies whose main activity is "Fishing and Aquaculture" by sub-activities

| Turnover | Marine fishing | Freshwater fishing | Marine aquaculture | Freshwater aquaculture | Total |
|-----------------|-----------------------|---------------------------|---------------------------|-------------------------------|--------------|
| 2010 | 93,169.39 | 60,686.75 | 32,466.50 | 210,542.94 | 133,835.40 |
| 2011 | 92,214.00 | 128,278.60 | 27,528.00 | 280,898.89 | 170,138.27 |
| 2012 | 79,995.67 | 54,091.57 | 82,350.67 | 1,848,770.22 | 726,193.18 |
| 2013 | 58,182.97 | 98,568.09 | 26,853.83 | 409,557.86 | 189,283.73 |
| 2014 | 205,736.79 | 493,746.25 | 279,595.00 | 658,725.61 | 402,685.81 |
| 2015 | 223,388.73 | 453,702.80 | 156,225.50 | 297,756.14 | 263,749.27 |
| 2016 | 370,578.23 | 650,496.50 | 58,369.00 | 363,623.86 | 372,108.30 |
| 2017 | 396,499.50 | 993,194.17 | 1,580.00 | 452,160.31 | 452,276.00 |
| 2018 | 323,338.60 | 1,018,375.00 | 1,000.00 | 350,892.25 | 395,008.60 |
| 2019 | 335,930.06 | 512,981.00 | 3,000.00 | 193,673.96 | 313,727.81 |

Source: Author's own processing

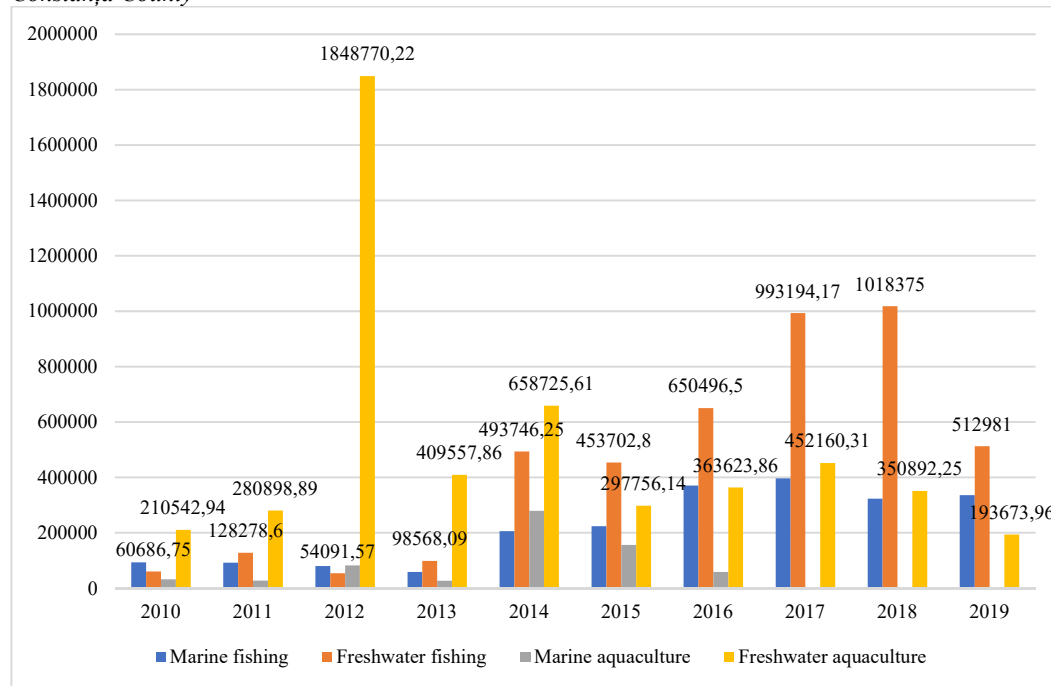
As was the case with other economic activities, economic crises have had a considerable impact on investment and financing decisions in the fishing and aquaculture sector. Thus, the analysis of the statistical units investigated over a period of 10 years shows that 2012 is the year of comebacks, in which the fishing and aquaculture sector registered the highest average turnover (726,193.18 lei). In 2013, the value of turnover (189,283.73 lei) decreased compared to the value in 2010 (133,835.40 lei) and 2011 (170,138.27 lei), and since 2014 there is an upward trend in the value of turnover, which shows that entities in this field of activity have been concerned about the revenue situation, making significant investments in the area.

Marine fishing is carried out along the Romanian coastline and is limited to the marine area located up to the 60-70 m isobath and on the maritime side of the Danube Delta Biosphere Reserve. One can note that, starting from 2014, the Black Sea marine fishing activity registered an increase, the year 2017 being the one in which the value of the turnover reached the maximum of 396,499.50 lei.

Corresponding to the dynamics of each activity subsector, the traded products have different contributions to the achievement of the turnover. The aquaculture activity's importance is confirmed by the fact that in the coastal region of Romania the largest areas intended for aquaculture are concentrated, approximately 65% of the national area, the maximum value of turnover recorded by the marine aquaculture sub-activity, in the 10 years analyzed, being 279,595.00 lei (in 2014).

Although the development of aquaculture in the coastal area has registered a positive dynamics it is oscillating, being determined and influenced by the local socio-political conditions. In some cases, aquaculture enterprises are regarded as foreign to the local community and granting of licenses for the establishment of aquaculture farms is seen as a form of expropriation of the common maritime space used for traditional fishing activities by the local groups (Hofherr, Natale and Trujillo, 2015).

Figure no. 1 The turnover dynamics of the companies in the Fishing and Aquaculture field at the level of Constanța County



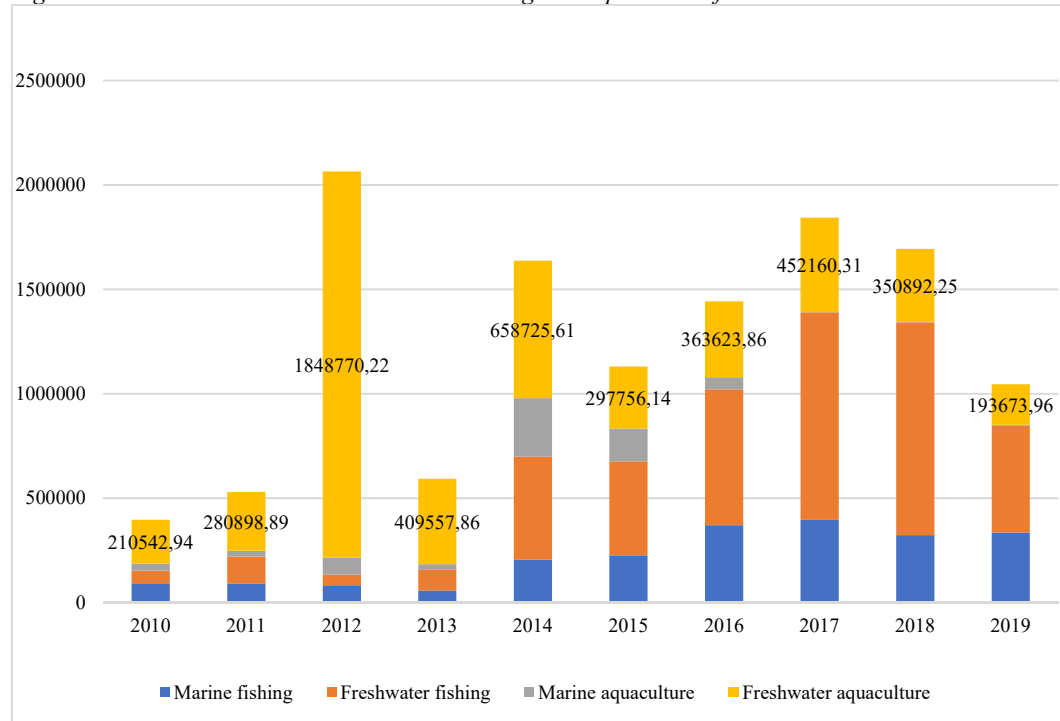
Source: Author's own processing

The potential of the *Fishing and Aquaculture* field is supported both by the historical tradition, prevalent in the coastal region of Romania, and by the existence of the most abundant resource that comes from both the Danube and the Black Sea. Figure 2, which presents the dynamics of the turnover's structure for the companies analyzed by class of activity, shows the predominance of freshwater fishing and aquaculture activities.

The *2014-2020 National Fishing Sector Strategy* acknowledges the role of traditional fish farming in fisheries facilities as an activity which creates opportunities for the development of the local economy, such as job creation in rural areas and capitalization of poorly productive land. Also noteworthy are the environmental benefits or services, such as biodiversity and microclimate. In this context, aquaculture farms, which have a relatively long history, have been very well integrated into the natural landscape, playing an important role in strengthening ecological balances, taking in excess water, ensuring and maintaining large areas of wetlands.

Despite all this support at the national level, the dynamics of the turnover on each sub-activity is very heterogeneous, as a result of the overestimation of demand and inadequate dimensioning of production, the failure to obtain the planned production, the emergence of substitute products, the decreasing solvent demand of the potential buyers, the quality of the manufactured products, the intensification of the competition.

Figure no. 2 The turnover's structure in the Fishing and Aquaculture field



Source: Author's own processing

Improving the performance of a company, of a sub-activity, reflected in the turnover's level, can also lead to the improvement of the company's image from the perspective of investors, creditors, employees, customers. This creates the possibility of attracting new sources of financing, both in the form of bank loans and in the form of bond issuance, under more advantageous interest rates and repayment terms. Improving the company's image also determines the stability of the staff, attracting qualified workforce from the labor market and developing customer loyalty.

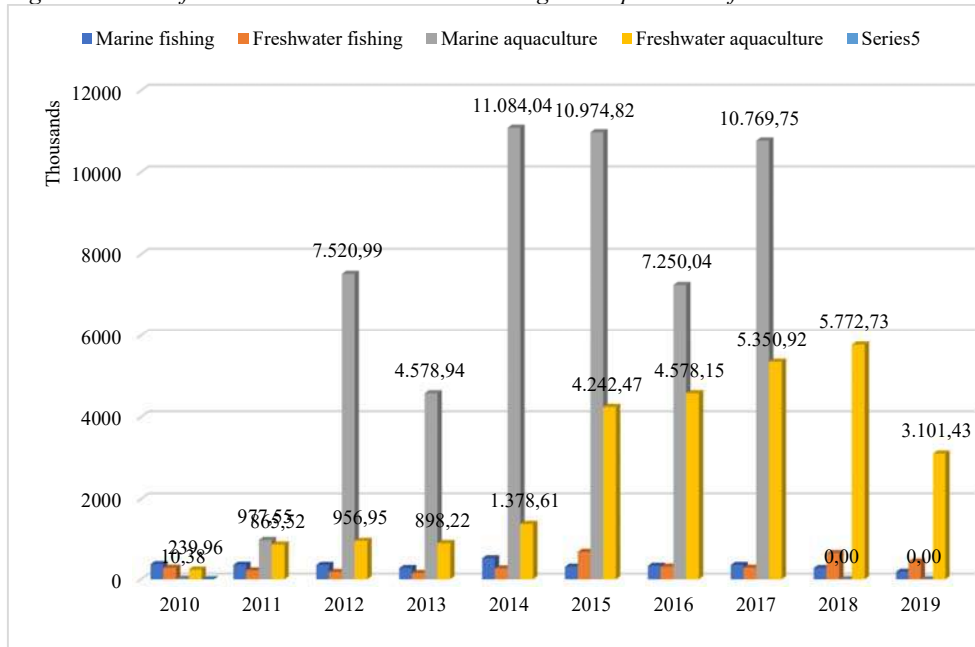
Table no. 2 The fixed assets of the companies in the Fishing and Aquaculture field

| Fixed assets | Marine fishing | Freshwater fishing | Marine aquaculture | Freshwater aquaculture | Total |
|--------------|----------------|--------------------|--------------------|------------------------|--------------|
| 2010 | 375,061.87 | 283,628.50 | 103,770.00 | 239,963.50 | 301,574.41 |
| 2011 | 358,209.53 | 218,780.80 | 977,554.67 | 865,522.56 | 596,104.41 |
| 2012 | 355,662.21 | 178,385.83 | 7,520,985.33 | 956,951.44 | 1,126,250.38 |
| 2013 | 277,139.32 | 153,706.22 | 4,578,942.80 | 898,221.29 | 863,820.74 |
| 2014 | 521,094.69 | 269,228.75 | 11,084,039.00 | 1,378,607.25 | 1,411,584.84 |
| 2015 | 311,600.23 | 681,493.60 | 10,974,816.00 | 4,242,465.36 | 1,971,985.60 |
| 2016 | 334,759.43 | 309,452.75 | 7,250,039.33 | 4,578,149.00 | 1,914,106.87 |
| 2017 | 356,924.85 | 285,584.67 | 10,769,750.50 | 5,350,923.45 | 1,805,609.37 |
| 2018 | 276,246.51 | 646,997.86 | 0 | 5,772,727.20 | 1,342,173.67 |
| 2019 | 184,590.49 | 438,234.11 | 0 | 3,101,426.95 | 933,976.01 |

Source: Author's own processing

It is a well-known fact that the cost of fixed assets, which are found in the form of constructions, installations, machinery, equipment, vehicles, etc. and the appropriate means to purchase fixed assets have a great influence on the accumulation of capital, which can stimulate the rapid development of the fishing and aquaculture sector.

Figure no. 3 The fixed assets' structure in the Fishing and Aquaculture field



Source: Author's own processing

The managerial capacity to maintain, improve and increase the material base in the field of fixed assets directly contributes to the creation of an environment conducive to the economic activity of these companies.

Although in terms of the value of fixed assets in Table 2 one can notice an upward trend, the evolution of the indicator is atypical. The constant increase until 2015 (1,971,985.60 lei) was followed by a decrease in 2016 (1,914,106.87 lei) compared to 2015 and then until 2019 (933,976.01 lei), largely due to the prospects of continuing the fishing and aquaculture activities, which has left its mark on the oscillating dynamics.

5. Conclusions

The importance of studying coastal areas is justified by the key role played by companies in the socio-economic development (Petrișor et al., 2020), which is why we must know the economic potential of local development of the fishing and aquaculture field. Rodrigues, Abdallah and Gasalla (2019) have shown that economic data, such as turnover and fixed assets, play an important role in understanding the economic viability of fishing, whereas marine aquaculture, which is a promising industry, is characterized by the fact that it is generally capital consuming, with a high contribution to the creation of surplus value and high labor productivity (Hofherr, Natale and Trujillo, 2015). MSP has been defined as an integrated management approach, including a planning approach of the future coastal and marine areas, with an emphasis on the stakeholder's involvement for creating a sustainable environmental development. Although stakeholder participation and involvement are an integral part of MSP's success (Pomeroy and Dover, 2008), there are studies which have shown that specialized stakeholders have reported limitations in fishing and aquaculture activities (Salas-Leiton, Vieira and Guilhermino, 2021), while other studies (Jentoft and Knol, 2014) claim that these entities have difficulty in presenting and expressing their problems in the context of MSP.

Within the policy of penetrating new markets or expanding into existing markets, increasing the turnover, accompanied by the interest in diversifying sources of income and product supply, represent a way to reduce the risk and uncertainties that arise on the market segments on which the companies operate. Thus, the risk of being subjected to the excessive fluctuations which characterize the modern economy can be reduced and they have the opportunity to take measures to counteract the disruptive situations that may arise in their activity.

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