JOURNAL OF MARITIME RESEARCH

Vol XXI. No. II (2024) pp 250–259

ISSN: 1697-4840, www.jmr.unican.es

Productivity Analysis in the Development of Competitive Capture Fisheries Production Center Areas in West Sumatra

Deltri Apriyeni[1,*], Heryanto[2], Suhelmi Helia[3]

ARTICLE INFO

Article history:
Received 08 Jan 2024;
in revised from 25 Jan 2023;
accepted 26 Mar 2024.

Keywords:
productivity, competitiveness, fisheries areas, investment, exports.

ABSTRACT

This research aims to look at the productivity of capture fisheries production center areas and regional competitiveness. Central production areas are the center of regional economic growth. The progress of the maritime economic sector relies on fisheries areas. This research was designed descriptively and analytically. The data used is secondary data, obtained from related institutions. Data collection techniques are based on documentation studies. Data analysis was conducted qualitatively. The research results demonstrate that fisheries production outcomes fluctuate while the number of fishing households that rely on the fisheries sector increases. The area's infrastructure still requires improvement and repair. Fleet and fishing gear technology, real-time data recording, limited capital, fish processing companies, investment, and exports are still limited and require serious attention to increase regional competitiveness. Further regional development needs to consider the various aspects studied in this research.

1. Introduction.

1.1. Research background.

Indonesia is an archipelagic country, most of its territory is surrounded by sea. This strategic position is very beneficial for residents who live along the coastline because they can utilize marine resources as a source of life. Besides being beneficial for society, the resources contained in the ocean can be a source of income for the country in the form of taxes and foreign exchange. Various superior commodity products have become idols to stimulate economic activity through exports to foreign markets. This makes the sea a resource that must be conserved. The government, through the blue economy development program, is encouraging the progress of the maritime sector, because it has a positive impact on the progress of economic development, especially the maritime sector. This is in line with what was stated by Jubiz-Diaz et al., (2021) that certain regions can be more competitive than other regions because of their geographical location.

West Sumatra is one of the provinces in Indonesia whose territory is located on the west coast of the Indonesian Ocean. As an area that has a long coastline, most of the residents on the coast earn their living as fishermen. Fishermen's catches are marketed locally and globally. Products that are in demand abroad are exported to countries that need them. Tuna as an export commodity is very popular in China, the United States, Japan, Korea, etc. This is a source of income for countries and regions as managers of fisheries areas.

Coastal areas in West Sumatra are divided into several capture fisheries production center areas. This area is equipped with various facilities and infrastructure, infrastructure, and facilities to increase production and facilitate the distribution and processing of catches which will lead to efficiency, productivity, and competitiveness in the fisheries area. Regional productivity and investment reflect the territorial capital of each region, which is broadly the regional ability to convert resources into competitive products and services (Romão & Nijkamp, 2019). Productivity as stated by (Deininger et al., 2016) is determined

[1]Master of Management, Sekolah Tinggi Ilmu Ekonomi KBP.
[2]Associate Professor, Master of Management, Sekolah Tinggi Ilmu Ekonomi KBP.
[3]Master of Management, Sekolah Tinggi Ilmu Ekonomi KBP.
[*]Corresponding author: Deltri Apriyeni. E-mail: deltri.apri@gmail.com.

by land, labor, and capital. Besides that, knowledge management is a determining factor for productivity in both modern and traditional economies (Voronenko et al., 2022).

The skilled and reliable workforce determines regional productivity. According to (Deininger et al., 2016), worker skills and regional integration in capital markets foster higher productivity. Labor productivity increases along with the ratio of labor, capital, working hours, and experienced workers (Penny Li et al., 2017) ; (Phusavat et al., 2013). The use of technology can increase labor productivity in a more effective way (Camiña et al., 2020). Productivity is in line with technological progress, driven by labor (Xu et al., 2020). However, technological progress does not always run perfectly because when introducing dynamic increases in productivity, the commodity boom will shift the trade sector and delay the convergence of technology (Alberola & Benigno, 2017). Increasing system efficiency will increase labor productivity and increase domestic competitiveness. and internationally (Guliyeva et al., 2021). Higher labor productivity further increases business continuity (Tatikonda et al., 2013).

The next influencing factor is the capital used for regional development. Humans as actors or capital in the economy are determined by education, training, and health services. human resource investment will increase as financial capital increases (Wang et al., 2008). Improvement of conditions for investment and capital formation in the real sector, especially through own funds due to stable demand for products and growth in product profitability, investment, and availability of bank loans; ensuring workforce development through training (Kozhemiakina et al., 2018).

Apart from sufficient labor and capital, expertise in management or managing the area plays a crucial role in encouraging regional progress. Proper management is where marginal productivity lies. The addition of labor must be equal to the marginal cost or wage provided (Lambert, 2020). Application of new management methods in data-based decision-making and public policy-making (Camiña et al., 2020). The ability to manage and implement good area management will have a positive impact on the competitiveness of the area and the commodities produced. Increasing efficiency, improving quality, and increasing the level of quality, quantity, and profitability means that increasing efficiency, and improving quality will simultaneously improve quality performance (Fan et al., 2017).

Furthermore, competitiveness built into the system, obtains results that are relevant to practical policy and managerial implications, based on causal analysis of the impact of competitiveness determinants related to innovation dynamics and contextual regional characteristics (Romão & Nijkamp, 2019). Regional authorities in managing competitiveness must pay attention to issues of production business performance and activities and labor conditions (Saubanov et al., 2014). On the other hand, relations with international trade must be strengthened through imports of raw materials and exports of output, technology transfer, and learning through export and import processes, to gain experience and international trade competitiveness (Gomez Sanchez et al., 2022).

The concentration of regional economic activities brings savings in production and distribution costs. Leading to lower prices or other benefits for consumers. Positive results provide lower price competitiveness (Allmuça, 2010). The high competitiveness of products on the global market has an impact on the booming phase of commodity prices, contributing to increased growth and economic performance in countries rich in natural resources (Alberola & Benigno, 2017). However, competitive prices must be accompanied by product quality. High-quality products do not cause harm to consumers. However, if the quality is low it will cause losses for buyers and consumers (Fan et al., 2017). Higher prices will lead to fewer sales, and lower marginal income, so investment will decrease and vice versa (Motta & Tarantino, 2021).

Central production areas must produce competitive products. However, there are still questions regarding the contribution of the labor and capital sectors in determining success. Dong et al., (2013) explained that the share of capital income continues to increase. Increasing labor income is very important. Meanwhile, regional productivity has not played an effective role in increasing fishermen's income. Larraz et al., (2017) emphasize achieving higher labor productivity in line with better economic results. According to Ghulam & Mousa, (2019), the labor market is expected to make a positive contribution to increasing productivity. Changes in technical efficiency are more significant in the impact of productivity growth (Zhao et al., 2020).

Facilities and infrastructure to support regional economic activities must be improved. So that the region plays an efficient and effective role in carrying out business activities. According to Na et al., (2019), public investment in economic infrastructure plays a key role in economic growth. According to (Khalid et al., 2020) very advanced infrastructure and technology are needed to utilize natural resources optimally. It is important to implement policies to encourage fixed asset investment, which helps improve basic infrastructure (Razzaq et al., 2021). Investment in infrastructure increases the country's progress (Szopiński & Staniewski, 2017). Because the competitiveness of a region is determined by investment in infrastructure (Jubiz-Diaz et al., 2021)**.**

Technology is a regional supporting factor such as; fleet of vessels, fishing gear, post-catch technology, availability of access to accurate data, etc. However, fisheries areas in West Sumatra have limited access to the latest technology for modern fisheries. Li et al., (2019) explained that technological progress contributes to economic growth. Technology transfer and innovation encourage regional development gradually towards progress. Meanwhile, technological advances increase productivity (Xu et al., 2020). Technological innovation has an impact on increasing productivity (Nakamura et al., 2019). Modern technology is useful for providing accurate data to all competent parties. Data according to Bradley et al., (2019) is an integral part of fisheries management. A new approach to fisheries data systems, driving innovation to increase data coverage, accuracy, and resolution, while reducing costs and enabling adaptive, responsive, and real-time management decisions to improve fisheries yields. Data technology can increase trust between actors in the fisheries sector by increasing transparency

and availability of information (Probst, 2020).

Advanced and modern production center areas are developed by allocating large investments to the area. Especially for fishing gear and ship fleets, ports, and other supporting facilities. However, fishing gear and fishing boat fleets in West Sumatra are still unable to compete with other fish-producing areas in Indonesia. The value of investment in the fisheries sector, especially capture fisheries, is less than satisfactory. In fact, according to Motta & Tarantino, (2021), investment is useful for improving product quality. Significant investments in technology facilitate the ability to integrate management, monitoring, and information movement (Newsome et al., 2013). The government can provide investment subsidies (Su et al., 2020). Investment provides opportunities for infrastructure development and good management (Voronenko et al., 2022). The government should increase investment in technological innovation absorb advanced technologies and promote trade integration and regional cooperation (Zhao et al., 2020).

Fishery production center areas require fishery product processing companies. Fishermen's catches are marketed fresh and some are processed into products such as; dried fish, sausages, nuggets, fish fillets, meatballs, etc. The growth and development of companies on both the micro and macro scale or large and medium scale tend to be stagnant. Gomez Sanchez et al., (2022) stated that government economic policy must provide additional support to the manufacturing sector, especially small and medium enterprises (SMEs) to increase economic growth. With a good resource base, a high level of expertise, and strict management, the industry is growing. The role of the seafood industry as a food supplier is important in the future (Johansen et al., 2019). This industry is very dependent on the supply of resources flowing from the ocean (Kemp et al., 2023). Furthermore, Yan et al., (2015) urged increasing the innovation capacity of the high-tech marine industry. The local fishing industry can introduce new fish processing and marketing competencies to strengthen the fishing industry (Espinasse et al., 2023).

Production of high-quality fish, such as tuna, has an export market share. However, export performance has not been very encouraging. Needs to increase in volume and value. According to (Shamsuzzaman et al., 2020) fisheries are an integral part because of their enormous export and income potential. The fishing industry plays an important role in the national economy. It is a food commodity that is traded throughout the world through net exports (Lofstedt et al., 2021). The value of global fish trade exceeds international trade in all foods (N'Souvi et al., 2021). However, the quantity and value of fishery commodity exports have decreased due to quality standards and food safety (Shamsuzzaman et al., 2020).

This research is very interesting and important to carry out because there are still limited studies of the same nature. Contribute to the development and growth of capture fisheries areas in the future. Explains the actual conditions in the area and is useful for policy-making for developing the blue economy, which is the idea of the current government. So that the maritime sector in the national economy increases. The area becomes solid and the economy of the fishing community improves. Considering the various studies that have been carried out, it is clear that the lives of fishermen are vulnerable to poverty.

2. Research Methodology.

The design of this study is descriptive and analytical. The data used is secondary data, coming from related and competent institutions. Presentation of data in the form of tables, figures, and documents related to the topic of discussion. Data collection techniques are carried out through observation in fishery areas, and documentation studies. Data processing techniques by qualitative analysis.

3. Results of Research and Discussion of Fisheries.

3.1. Production and the Number of Fishermen Working.

Capture fisheries production center areas are fish production barns and sources of livelihood for fishermen. However, data on the number of fishing households tends to increase while fish production has decreased in several years. As explained by Solano et al., (2021) fishing activities are family activities, and household members also participate. Freitas et al., (2020) added that workers of both genders must be treated fairly. Furthermore, Belton et al., (2022) explained that the fisheries sector, including processed fish, provides employment opportunities for millions of people.

Data on the number of households working and earning a living as fishermen, both full-time and part-time, shows an increase, but this is not accompanied by the number of fish production which tends to decrease. Production increased less while there were more fishermen. This phenomenon shows that workers' expectations are still high to earn a living as fishermen. The income received as a fisherman tends to be unstable because it is influenced by weather conditions when fishing. The imbalance between the increase in production quantity and production value as well as the increase in the number of fishermen and fishing households can be seen in Tables 1 and 2 below.

Table 1: Total Production and Production Value of Marine Capture Fisheries in 2015-2020 in West Sumatra.

No	Year	Marine Capture Fisheries Production/year Unit: Ton Unit: Ton	Production Value of Marine Capture Fisheries/Unit Year: Rp. 1.000.000,- Unit: Rp. 1.000.000,-
1	2015	204.771	3.284.766
2	2016	200.610	3.314.994
3	2017	214.144	6.623.113
4	2018	211.821	6.659.432
5	2019	213.604	5.545.411
6	2020	205.182	5.621.611
7	2021	198. 261	4. 923 708
8	2022	207. 976	5. 962 745
Average increase in 2015-2020 (%)		0,11	17,18
Average increase in 2019-2020 (%)		-3,94	1,37

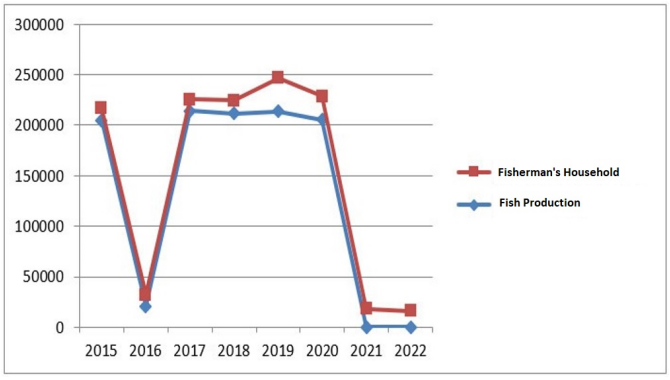
Source: Maritime Affairs and Fisheries in Figures for 2022.

Table 2: Number of Households and Fishermen in Sea Capture Fisheries in West Sumatra, 2015 - 2020/ Unit.

Amount	Year							
	2015	2016	2017	2018	2019	2020	2021	2022
Household	11,954	11,637	11,639	12,527	33,070	23,689	18,367	16,135
Fisherman	42,061	40,359	42,158	45,880	65,728	56,505	23,055	23,055
	Ascension average (%) 2015-2020				Ascension average (%) 2019-2020			
Household	28.12				28.37			
Fisherman	7.69				-14.03			

Source: Maritime Affairs and Fisheries in Figures for 2022.

Figure 1: Comparison of Fish Production Data and Fisher Households.



Source: Maritime Affairs and Fisheries in Figures for 2022.

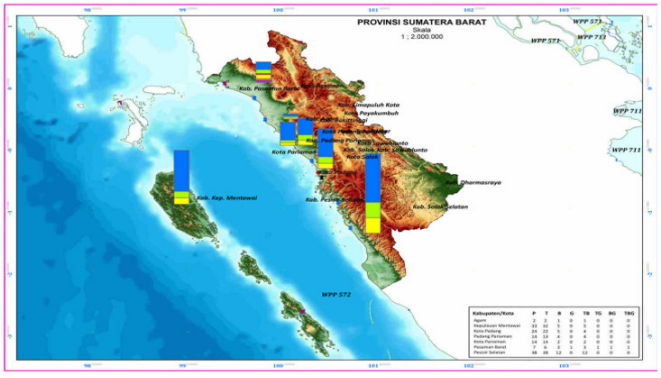
Fishermen's fishing activities depend on the weather. Meanwhile, fish production depends on the season. When fish production increases, the price of fish is very cheap. This situation is not profitable for fishermen because there is no stability in fish prices. Meanwhile, when the weather is bad, fishermen do not go to sea and this creates economic problems for fishermen's families. There must be alternative jobs to increase income. Considering that the scale of this fishery business is still small, as stated by Teh et al., (2020) that small-scale fisheries tend to be in developing countries. Apart from that, the profit-sharing system received by fishermen must be profitable for both ship owners and working fishermen. The bargaining position of boat-owning fishermen is better than working fishermen. So that the distribution of the catch is more enjoyed by the fishermen who own the boat. There is a gap between boat-owning fishermen and working fishermen. Working fishermen sometimes do not enjoy the results if they do not catch a catch. Because of this, the lives of working fishermen are not prosperous. Even though they work harder to increase productivity, the profit-sharing system means that the income of working fishermen remains small. This is contrary to the statement that higher labor productivity further increases business continuity (Tatikonda et al., 2013).

3.2. Fishing Area Port Infrastructure.

The port is a landing place for fish and also functions as a market and distribution of fishery products. The addition of facilities at the port tends to be stagnant, the fact some facilities are in a state of disrepair. Damaged facilities are not put back into use. Causing high activity costs at the port. Voronenko et al., (2022) stated that it is necessary to focus on knowledge and infrastructure management, as a strategy that can bridge the gap.

Regional productivity is largely determined by infrastructure support. To create a highly competitive area. In line with what Na et al., (2019) stated, economic infrastructure plays a key role in economic growth. Road improvements, port areas, clean water sources, clean and hygienic fish markets, and shallow harbors that interfere with ships' docking. This causes inefficiencies to occur in economic activities in the region.

Figure 2: Map of Fish Catching Areas in West Sumatra.



Source: Map of Marine and Fisheries Potential of Coastal Villages 2019.

From Figure 1, it is observed that along the west coast to the Mentawai Islands is a fishing area. The existence of fishing ports stretches along the coastline. The current fishing port with modern facilities is not yet available. There are 20 ports with conditions that are still not modern. Equipment to monitor excess catches and fraud in the ocean is still weak. Due to limited equipment and resources to quickly overcome it. Building information technology-based infrastructure according to (Szopiński & Staniewski, 2017) contributes to progress. Furthermore, Apriyeni & Wati, (2022) emphasized the need to improve and complete various facilities needed by the area. The following data on fishing ports in West Sumatra can be seen in Table 3 below;

From Table 3 it can be concluded that the number of existing fishing ports is still small compared to the coastline along the coast. The port still needs improvements, including the availability of clean water, irrigation, and drainage channels, a clean and hygienic fish market, an ice factory, *cold storage,* and various other supporting facilities. There are no obstacles to the supply of electricity, water, and communication networks (internet). Communication is important to monitor production, prices, and market needs. The development of fishing areas equipped with various modern facilities must be guided by advanced fishing ports that have international class. Therefore, (Jubiz-Diaz et al., 2021) explain that infrastructure investment is important to increase the competitiveness of a region. Investing takes time and costs money.

Table 3: Fishing Ports in West Sumatra.

No	Port Code	Port Name	Port Type	Port Location
1	572.13.01	Bungus	PPS	Coastal
2	572.13.02	Muaro Anai	PP	River
3	572.13.03	Carocok Tarusan	PPI	Bay
4	572.13.04	Batu Kalang	CP	Coastal
5	572.13.05	Kambang	PPI	River
6	572.13.06	Surantiah	PP	River
7	572.13.07	Muaro Jambu	CP	River
8	572.13.08	Muaro Gadang	CP	River
9	572.13.09	Muaro Batang Kapas	CP	River
10	572.13.10	Api-Api	CP	Coastal
11	572.13.11	Tiku	PPI	Coastal
12	572.13.12	Muaro Putuih	CP	Coastal
13	572.13.13	Air Bangis	PPI	River
14	572.13.14	Sasak	PPI	River
15	572.13.15	Karan Aur	CP	Coastal
16	572.13.16	Ulakan Tapakis	CP	Coastal
17	572.13.17	Pantai Tiram	CP	River
18	572.13.18	Pasir Baru	PP	River
19	572.13.19	Sikakap	PPI	Coastal
20	572.13.20	Muara Siberut	CP	Coastal

Source: Website, pip.kkp.go.id.

3.3. Ship Technology and Modern Fishing Equipment.

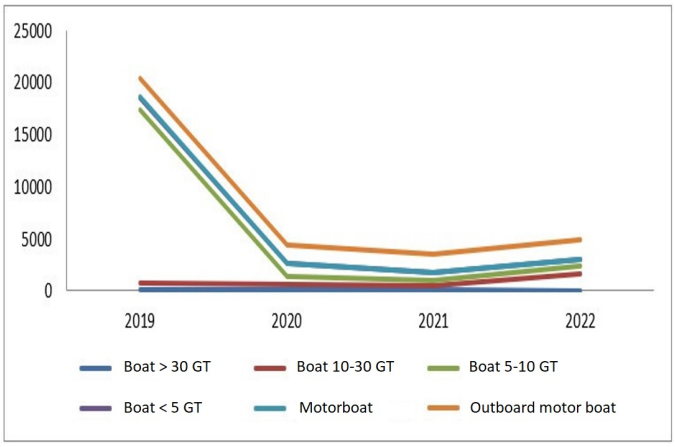
Optimal fishing must be equipped with a fleet that has modern technology and sophisticated fishing equipment. Because product quality must be maintained until it reaches the port so as not to reduce prices. Zhao et al., (2020) emphasized that the government should guide it to increase investment in technological innovation and absorb advanced technology. In addition, spare parts to replace damage must be available in full. The limited fishing gear used by fishermen is due to limited capital and investment in having modern and high-tech fishing gear. Production is difficult to increase due to limited fleet capabilities and fishing equipment. Apart from that, licensing fishing boats should be easier, faster, and cheaper. Then, the availability of special fuel for fishermen so that operations run smoothly. The following is data related to the number of fishing vessel fleets listed in table 4 below;

Table 4: Number of Marine Fishing Motorboat Fleets in West Sumatra.

No	Fleet Type	Year			
		2019	2020	2021	2022
1	Outboard Motor Boat	1,813	1,703	1,795	1,967
2	Motorboat	124	58	0	0
3	Motorboat < 5 GT	1,138	1,227	787	635
4	Motor Boats 5 – 10 GT	16,588	718	481	742
5	Motor Boats 10 - 30 GT	628	581	410	1,587
6	Motorboat > 30 GT	137	94	98	0

Source: 2023 KKP Statistics.

Figure 3: Number of Motor Fishing Boat Fleet.

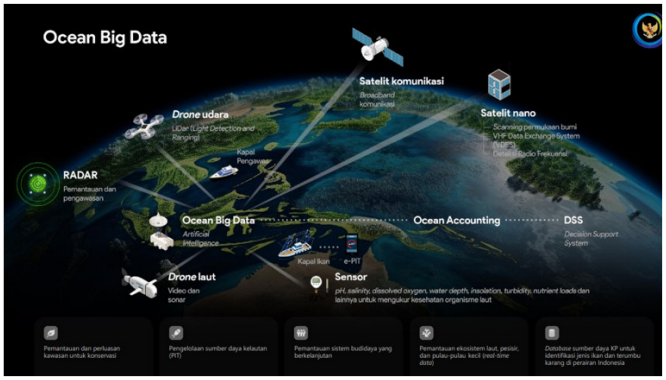


Source: 2023 KKP Statistics.

From Table 4 it can be observed that the majority of fishing fleets are below 30 GT. In 2022 there will be no fishing vessels over 30 GT. This gives the idea that there are still few fleets with large capacity. Of course, the ability to produce catches is also reduced.

Furthermore, to support advanced and modern fisheries areas, and integrated marine and fisheries resources, the government is preparing Ocean Big Data infrastructure. Data-based technology policies and accurate information to monitor fisheries and marine resources. Useful to minimize various frauds that occur. The technological system used is through satellites, radar, sensors, underwater drones, and air and involves nanosatellites. It can be observed in Figure 2 below;

Figure 4: Communication technology and data access for Capture Fisheries.



Source: KKP 2023.

Based on Figure 4, the integrated resource management plan makes it easier for parties involved in safeguarding and saving marine ecosystems sustainably. According to Hauck et al., (2021), the choice of detection method depends on the availability of technology, requiring initial investment. Aims to increase fisheries production with environmentally friendly fishing management. Although access to executions in the field is not necessarily easy considering the vastness of the sea and lim-

ited means of moving to the location where the illegal act occurred. Hyland & Bertsch, (2018) stated that significant investments are being made in generation and network technology. Fourie & Bijl, (2020) support the idea of high-speed broadband creating the potential for increased productivity and having a positive impact on economic growth. Bradley et al., (2019) emphasize that new data systems approaches will encourage innovation, increase data coverage, accuracy, and resolution, reduce costs, and enable adaptive, responsive, and near real-time management decisions to improve fisheries yields. Probst, (2020) added that the widespread spread of digital networks creates techniques that organize, store, and analyze large volumes of data automatically and self-managed in real-time.

3.4. Fisheries Investment.

Economic investment will encourage economic growth and have a multiplier effect on other economic activities. Regional governance, friendliness in service, and improvement of the business climate must always be well maintained. In line with the opinion of Newsome et al., (2013) significant investments in technology facilitate the ability to integrate management, monitoring, and information movement. So that investors want to invest their capital in the area so that the area can play a profitable business role for investors. The realization of investment in the marine sector can be seen in Table 5, as follows:

Table 5: Realization of Investment Value in the Maritime and Fisheries Sector in West Sumatra, 2015-2021.

Source	Year	Investment (Million, Rupiah)	Growth (%)		Proportion (Million, Rupiah)
			2015-2020	2019-2020	
West Sumatra	2015	9,614.04	48.39	(-41.42)	0.27
	2016	24,288.96			0.48
	2017	7,581.67			0.16
	2018	16,839.14			0.34
	2019	29,873.37			0.52
	2020	17,500.31			0.23
	2021	19,985.29			0.67

Source: Maritime Affairs and Fisheries in Figures for 2022.

Based on the data in Table 5, it can be observed that investment growth in 2019-2020 decreased by (-41.42)%. During this year, the Covid-19 pandemic occurred, so the investment sector was also affected. Meanwhile, in the previous year, it grew by 48.42%, although it still fluctuated over the years. This phenomenon still needs to be improved so that investment continues to increase throughout the year. The investment climate must be created conducive to investors.

Meanwhile, in the fishing sector, there was a decline in 2019-2020 due to the Covid-19 pandemic. However, the investment value in 2015-2018 increased by 13.38% but still fluctuated from year to year. An increase in investment value can be achieved by continuously improving the investment climate (Ease of Doing Business or EODB) so that there is certainty in the return of capital and profits obtained. According to (Motta & Tarantino, 2021) investment is important to improve product quality. The decreasing investment value will make it difficult to increase capital to improve quality.

3.5. Fish Processing Factory.

The fish processing business is a locomotive for regional progress. When the fish harvest season is abundant, fish processing activities become important. Because it can reduce excess production of fresh fish by processing it and can help stabilize prices. Johansen et al., (2019) the seafood industry is very important for the economy. Fish processing businesses by companies or individuals are still limited in number. Still small or micro scale and traditional. According to Gomez Sanchez et al., (2022) manufacturing productivity influences short-term and long-term regional economic growth.

Some of the obstacles faced include; that marketing capabilities for processed products are still low both domestically and globally. Quality raw materials (food safety) are not always available as processed materials for factories. Due to weak handling of catches by fishermen. Processed fish products still have low competitiveness in the global market, companies tend to lack innovation, the ability to reduce costs in the production process is still lacking, fixed costs and social costs are relatively high, and processed products are rejected by destination countries. This rejection is because the quality and safety of the products produced are not guaranteed and the quality standards of the destination country are strict. Johansen et al., (2019) recommend policies to increase the competitiveness of the marine industry in blue economy areas.

The various obstacles that occur, when viewed from the prospect of the fish processing business, provide good opportunities. This can be seen from the relatively continuing increase in the value of fish consumption by the community. It can be observed in Table 6 below;

Table 6: Average National Per Capita Fish Consumption (Kg/Capita) in West Sumatra 2014-2021.

Region	Year							Growth (%)	
	2014	2015	2016	2017	2018	2019	2020	2021	2014-2020	2020-2021
West Sumatra	34.16	36.42	37.37	42.30	66.86	42.97	43.15	43.90	6.70	1.75
National	38.14	41.11	43.94	47.34	50.69	54.50	54.56	55.37	5.51	1.50

Source: Maritime Affairs and Fisheries in Figures for 2022.

The tendency of the community to like fishery products provides opportunities for the fish processing business to continue. The habit of eating fish every day as a source of protein is not easily replaced with other processed products. Meanwhile, when viewed in terms of price, it is relatively cheap compared to beef and chicken.

Table 7: Number of Fish Processing Units in West Sumatra.

Fish Processing Unit	Year				
	2018	2019	2020	2021	2022
Micro Small	1,652	833	833	833	1,493
Medium Large	2	2	2	2	0
SKP Certified	12	13	14	12	12

Source: 2023 KKP Statistics.

Based on the number of fish processing units in Table 7, it is still dominated by small or micro-scale businesses. Large-scale or macro companies tend to remain non-operating even in 2022. This is very concerning for the progress of production center areas. The large costs of setting up a company (sunk costs) mean that the company's growth does not show positive development from year to year. The presence of large-scale companies will provide agglomeration benefits for the region. This is in line with the statement (Apriyeni et al., 2019) that production center areas provide agglomeration benefits for other economic activities in the area.

If you look at the Fish Processing Certificate (SKP), the number is very small, around 12 - 14 companies have it. This phenomenon makes it difficult to carry out correct processing standards and monitor the quality of fish processing results. The SKP given to the fish processing unit (UPI) has implemented good and correct fish processing based on GMP (Good Manufacturing Practices). Fish processing activities meet the requirements of Standard Sanitation Operating Procedures or Standard Sanitation Operating Procedures (SSOP) carried out by the relevant institutions. Aims to ensure the safety of processed products consumed by consumers. Yan et al., (2015) urge increasing the innovation capacity of marine industry policies that emphasize scientific and technological innovation. Espinasse et al., (2023) introduce new competencies regarding fish processing and marketing, which can expand and ultimately strengthen the fishing industry.

3.6. Export of Capture Fisheries.

Production center areas have a competitive advantage if the products produced are in demand in other countries. Lofstedt et al., (2021) stated that seafood products are commodities traded throughout the world as providers of animal protein. The greater the export opportunities to other countries, the greater the economic value of the region. However, the scale of production produced by the region is still small to be able to provide product supplies to destination countries. This is in line with the statement by Shamsuzzaman et al., (2020) that the quantity and value of fishery commodity exports have decreased due to quality standards and food safety. Apart from that, product quality must be guaranteed starting from catching and handling on the ship until it reaches consumers in the destination country. Data related to export volume and export value can be observed in Table 8 below;

Table 8: Export Volume of Fishery Products and Export Value in West Sumatra 2016-2021.

Source West Sumatra	Year						Ascension average (%)	
	2016	2017	2018	2019	2020	2021	2016-2021	2020-2021
Export Volume Ton/MT	243	172	344	283	160	164	2.49	2.79
Unit Export Value: US$ 1,000/ Unit: US$ 1,000	2,188	1,325	2,511	2,076	1,497	1,628	2.73	8.76

Source: Maritime Affairs and Fisheries in Figures for 2022.

Based on Table 8, the highest export volume and value was in 2018, exceeding the previous and subsequent years. To stabilize or tend to move higher, improvements are still needed in various aspects. In fishing methods, fishermen need to be trained, and boats and FADs that are environmentally friendly. The necessary facilities, means and infrastructure must be available to guarantee the quality of products to be exported, such as; ports, transportation, fuel, clean water, ice factory, and cold storage. Special aircraft to transport fishery products to the destination country so that the quality of the market share for fishery products is maintained both domestically and for export abroad. This is in line with Zhang et al., (2019) statement to increase productivity, train skilled workers, and even employ high-quality personnel.

Based on export destination countries, fishery products are dominated by China and the United States, both in terms of export volume and value, as can be seen in Table 9 and Table 10 below;

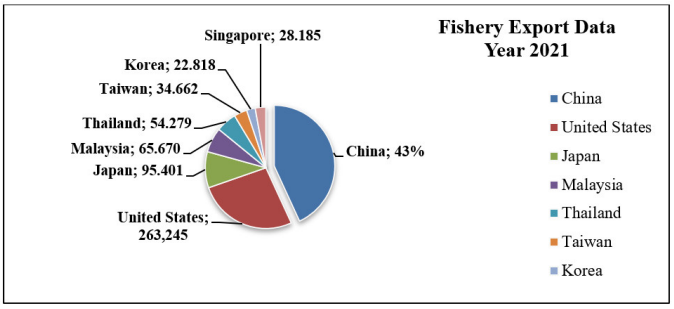
Table 9: Export Volume of Fishery Products by Destination Country 2016?2021.

Country of destination	Year						Ascension average (%)	
	2016	2017	2018	2019	2020	2021	2016-2021	2020-2021
China	275,872	282,501	365,411	405,955	422,565	428,056	9.65	1.30
United States	180,314	186,029	197,487	210,990	238,390	263,245	7.92	10.43
Japan	104,998	120,888	108,586	120,236	99,767	95.401	-1.14	-4.38
Malaysia	62,141	54,719	59,995	65,356	71,412	65,670	1.57	-8.04
Thailand	56,019	73,250	57,917	54,403	98,332	54,279	7.94	-44.80
Taiwan	40,024	39,865	37,980	38,497	40,908	34,662	-2.55	-15.27
Korea	24,144	19,677	27,016	27,330	27,407	22,818	0.70	-16.74
Singapore	35,426	32,016	31,756	29,661	29,521	28,185	-4.41	-4.53

Source: Maritime Affairs and Fisheries in Figures for 2022.

The increase in China's export volume from 2016 - 2021 was 9.65 % and decreased sharply in 2020-2021 by 1.30%. This is due to the Covid 19 pandemic situation which started with the discovery of the first case in China. This reduces exports to China and vice versa increases to the United States.

Figure 5: Image of Fisheries Export Data by Destination Country.



Source: Maritime Affairs and Fisheries in Figures for 2022.

Based on the export value in 2016-2021, the average increase was around 19.07 % and in 2020-2021 it decreased sharply by 8.90%. Meanwhile, for the United States from 2016-2021, it was 9.83 % and increased by 20.81% in 2020-2021.

It can be analyzed that the Covid-19 pandemic factor does not affect fisheries exports to the United States. There is a huge opportunity for the region to continue to optimize its production results and comparative advantages. The international market is open for products produced by the region.

Table 10: Export Value of Fishery Products by Country Unit: US $ 1,000/ Unit: US$ 1,000 Goals 2016-2021.

Country of destination	Year						Ascension average (%)	
	2016	2017	2018	2019	2020	2021	2016-2021	2020-2021
China	391,892	447,503	675,981	828,364	817,367	890.144	19.07	8.90
United States	1,608,731	1,816,362	1,876,897	1,828,979	2,096,627	2,532,998	9.83	20.81
Japan	623,601	672,438	676,582	665,191	608,939	621,013	0.06	1.98
Malaysia	116,526	114,373	114,883	137.202	133,687	128,703	2.35	-3.73
Thailand	122,734	162,640	147,062	133,967	199,004	138,190	6.40	-30.56
Taiwan	92,532	107.271	118.224	132.311	154,959	132,715	8.16	-14.36
Korea	58,639	57.212	73,969	73,545	77,575	76,794	6.15	-1.01
Singapore	89,987	88,189	93,436	92,494	88,952	95,954	1.40	7.87

Source: Maritime Affairs and Fisheries in Figures for 2022.

Conclusions.

Based on research findings and discussions carried out, the productivity and competitiveness of capture fisheries production center areas are still not showing rapid development. The fact is that even though there is an increase in several variables, it tends to run stagnant. However, the findings in this research will have an impact on policies that support the creation of areas that have high productivity and competitiveness for parties who are competent in decision-making. This research is a benchmark for future regional development and progress. So the maritime sector through blue economy policies can improve the national economy which leads to the welfare of society as a whole.

References.

Alberola, E., & Benigno, G. (2017). Revisiting the Commodity Curse: A Financial Perspective. SSRN Electronic Journal. https://doi.org/10.2139/ssrn.2916467.

Allmuça, A. (2010). The Implementation of competition policy in the field of concentration: The Albanian case. European Research Studies Journal, 13 (1), 153–168. https://doi.org/-10.35808/ersj/264.

Apriyeni, D., & Wati, W. (2022). The Role of Cold Storage in the Development of the Minapolitan Capture Fisheries Area in Pasir Jambak, Padang City. CTF Bulletin, 8 (1), 59–72.

Apriyeni, D., Sjafrizal, S., Jafrinur, J., & Noer, M. (2019). (2019). The Effect of Agglomeration on Profits and Price Efficiency in Laying Chicken Farming Enterprises in Payakumbuh Production Central Area of Limapuluh Kota Regency, West Sumatra, Indonesia. Journal of Agricultural Extension Abstracted, 23 (2).

Belton, B., Johnson, D.S., Thrift, E., Olsen, J., Hossain, M.A.R., & Thilsted, S.H. (2022). Dried fish at the intersection of food science, economy, and culture: A global survey. Fish and Fisheries, 23 (4), 941–962. https://doi.org/10.1111/faf.12664.

Bradley, D., Merrifield, M., Miller, K.M., Lomonico, S., Wilson, J.R., & Gleason, M.G. (2019). Opportunities to improve fisheries management through innovative technology and advanced data systems. Fish and Fisheries, 20 (3), 564–583. https://doi.org/10.1111/faf.12361.

Camiña, E., Díaz-Chao, Á., & Torrent-Sellens, J. (2020). Automation technologies: Long-term effects for Spanish industrial firms. Technological Forecasting and Social Change, 151 (November 2019), 119828. https://doi.org/10.1016/j.techfore.2019.119828.

Deininger, K., Jin, S., & Ma, M. (2016). Structural Transformation of the Agricultural Sector in Low- and Middle-Income Economies. 1–23.

Dong, Z., Guo, Y., Wang, L., & Dai, J. (2013). The direction of technical change: a study based on the inter-provincial panel data of China. Asian Journal of Technological Innovation, 21 (2), 317–333. https://doi.org/10.1080/19761597.2013.866307.

Espinasse, M., Mikkelsen, E., Sørbye, S.H., Skern-Mauritzen, M., Falk-Andersson, J., & Fauchald, P. (2023). Seafood production in Northern Norway: Analyzing variation and co-development in aquaculture and coastal fisheries. Marine Policy, 155 (November 2022). https://doi.org/10.1016/j.marpol.2023.105777.

Fan, J., Ni, D., & Tang, X. (2017). Product quality choice in two-echelon supply chains under post-sale liability: insights from wholesale price contracts. International Journal of Production Research, 55 (9), 2556–2574. https://doi.org/10.1080/-00207543.2016.1240382.

Fourie, H., & Bijl, PWJ De. (2020). Race to the top: Does competition in the DSL market matter for fiber penetration? Telecommunications Policy, November 2017, 1–16. https://doi.org/10.1016/j.telpol.2017.11.003.

Freitas, CT, Espírito-Santo, HMV, Campos-Silva, JV, Peres, CA, & Lopes, PFM (2020). Resource co-management as a step towards gender equity in fisheries. Ecological Economics, 176 (May), 106709. https://doi.org/10.1016/j.ecolecon.2020.106709.

Ghulam, Y., & Mousa, W.I. (2019). Technological Forecasting & Social Change. Technological Forecasting & Social Change, 149 (December 2018), 119741. https://doi.org/10.1016/-j.techfore.2019.119741.

Gomez Sanchez, AM, Sarmiento-Castillo, JI, & Fajardo-Hoyos, CL (2022). Regional business cycles and manufacturing productivity: empirical evidence in Colombia. EconomiA , 23 (1), 62–87. https://doi.org/10.1108/ECON-05-2022-0020.

Guliyeva, S., Sadigov, Y., Guliyeva, N., Isayeva, L., & Aliyeva, S. (2021). Person-centered approach effectiveness in human resource management in the agriculture of Azerbaijan. Journal of Eastern European and Central Asian Research 8 (2), 267–279. https://doi.org/10.15549/jeecar.v8i2.713.

Hauck, Z., Rabta, B., & Reiner, G. (2021). Joint quality and pricing decisions in lot sizing models with defective items. International Journal of Production Economics, 241 (June 2020), 108255. https://doi.org/10.1016/j.ijpe.2021.108.

Hyland, M., & Bertsch, V. (2018). The Role of Community Involvement Mechanisms in Reducing Resistance to Energy Infrastructure Development. Ecological Economics, 146 (November 2017), 447–474. https://doi.org/10.1016/j.ecolecon.-2017.11.016.

Johansen, U., Bull-Berg, H., Vik, L.H., Stokka, A.M., Richardsen, R., & Winther, U. (2019). The Norwegian seafood industry – Importance for the national economy. Marine Policy, 110 (December 2018), 103561. https://doi.org/10.1016/j.marpol-.2019.103561.

Jubiz-Diaz, M., Saltarin-Molino, M., Arellana, J., Paternina-Arboleda, C., & Yie-Pinedo, R. (2021). Effect of Infrastructure Investment and Freight Accessibility on Gross Domestic Product: A Data-Driven Geographical Approach. Journal of Advanced Transportation, 2021. https://doi.org/10.1155/2021/55-30114.

Kemp, P.S., Subbiah, G., Barnes, R., Boerder, K., O'Leary, B.C., Stewart, B.D., & Williams, C. (2023). The future of marine fisheries management and conservation in the United Kingdom: Lessons learned from over 100 years of biased policy. Marine Policy, 147 (November 2022), 105075. https://doi.org/-10.1016/j.marpol.2022.105075.

Khalid, M., Yousaf, Z., Nassani, A. A., Vinh, X., & Zaman, K. (2020). Evaluating the 'natural resource curse' hypothesis under sustainable information technologies: A case study of Saudi Arabia. Resources Policy, 68 (April), 101699. https://doi.org/10.1016/j.resourpol.2020.101699.

Kozhemiakina, S., Cherkasov, A., Reznik, N., Yazlyuk, B., Zhuravka, O., & Mazurov, S. (2018). New workplace forecasting in the industrial sector of the Ukrainian economy. Problems and Perspectives in Management, 16 (4), 384–394. https://doi-.org/10.21511/ppm.16(4).2018.32.

Lambert, T. E. (2020). Monopoly Capital and Management: Too Many Bosses and Too Much Pay? Journal of Economic Issues, 54 (3), 644–666. https://doi.org/10.1080/00213624.2020.-1778971.

Larraz, J.L.G., Gené, J.M., & Pulido, L.S. (2017). Productivity and value-added distribution in family-owned businesses. Intangible Capital, 13 (1), 4–24. https://doi.org/10.3926/ic.916.

Li, J., Fong, K., & Chi, J. (2019). Water resources and water pollution emissions in China's industrial sector: A green-biased technological progress analysis. Journal of Cleaner Production, 229, 1412–1426. https://doi.org/10.1016/j.jclepro.2019.03.216.

Lofstedt, A., de Roos, B., & Fernandes, P. G. (2021). Less than half of the European dietary recommendations for fish consumption are satisfied by national seafood supplies. European Journal of Nutrition, 60 (8), 4219–4228. https://doi.org/10.1007-/s00394-021-02580-6.

Motta, M., & Tarantino, E. (2021). The effect of horizontal mergers, is when firms compete in prices and investments. International Journal of Industrial Organization, 78, 102774. https://doi.org/10.1016/j.ijindorg.2021.102774.

N'Souvi, K., Sun, C., Zhang, H., Broohm, D. A., & Okey, M. K. N. (2021). Fisheries and aquaculture in Togo: Overview, performance, fisheries policy, challenges and comparative study with Ghana, Mali, Niger and Senegal fisheries and aquaculture. Marine Policy, 132 (September 2020). https://doi.org/10.1016/-j.marpol.2021.104681.

Na, KY, Kim, DH, Park, BG, Yoon, SW, & Yoon, C. (2019). ICT and transport infrastructure development: an empirical analysis of complementarity. Applied Economics, 00 (00), 1–17. https://doi.org/10.1080/00036846.2019.1640860.

Nakamura, K., Kaihatsu, S., & Yagi, T. (2019). Productivity improvement and economic growth: lessons from Japan. Economic Analysis and Policy, 62, 57–79. https://doi.org/10.1016/-j.eap.2018.11.002.

Newsome, K., Thompson, P., & Commander, J. (2013). "You monitor performance at every hour": Labor and the management of performance in the supermarket supply chain. New Technology, Work and Employment, 28 (1), 1–15. https://doi.-org/10.1111/ntwe.12000.

Penny Li, X., Joppe, M., & Meis, S. M. (2017). Human resource management impacts on labor productivity in tourism. Tourism Economics, 23 (5), 1028–1041. https://doi.org/10.117-7/1354816616662761.

Phusavat, K., Comepa, N., Sitko-Lutek, A., & Ooi, K. B. (2013). Productivity management: Integrating the intellectual capital. Industrial Management and Data Systems, 113 (6), 840–855. https://doi.org/10.1108/IMDS-09-2012-0330.

Probst, W. N. (2020). How emerging data technologies can increase trust and transparency in fisheries. ICES Journal of Marine Science, 77 (4), 1286–1294. https://doi.org/10.1093/icesjms/fsz036.

Razzaq, A., An, H., & Delpachitra, S. (2021). Technological Forecasting & Social Change Does technology gap increase FDI spillovers on productivity growth? Evidence from Chinese outward FDI in Belt and Road host countries. Technological Forecasting & Social Change, 172 (August), 121050. https://doi.org/10.1016/j.techfore.2021.121050.

Romão, J., & Nijkamp, P. (2019). Impacts of innovation, productivity and specialization on tourism competitiveness–a spatial econometric analysis on European regions. Current Issues in Tourism, 22(10), 1150–1169. https://doi.org/10.1080/1-3683500.2017.1366434.

Saubanov, K.R., Safiullin, L.N., & Pratchenko, O.V. (2014). Competitiveness assessment of the construction industry of the Republic of Tatarstan. Mediterranean Journal of Social Sciences, 5 (28), 65–70. https://doi.org/10.5901/mjss.2014.v5n28-p65.

Shamsuzzaman, MM, Hoque Mozumder, MM, Mitu, SJ, Ahamad, AF, & Bhyuian, MS (2020). The economic contribution of fish and fish trade in Bangladesh. Aquaculture and Fisheries, 5 (4), 174–181. https://doi.org/10.1016/j.aaf.2020.01.001.

Solano, N., Lopez-Ercilla, I., Fernandez-Rivera Melo, F.J., & Torre, J. (2021). Unveiling Women's Roles and Inclusion in Mexican Small-Scale Fisheries (SSF). Frontiers in Marine Science, 7 (January), 1–14. https://doi.org/10.3389/fmars.2020.6-17965.

Su, Y., Si, H., Chen, J., & Wu, G. (2020). Promoting the sustainable development of the recycling market of construction and demolition waste: A stakeholder game perspective. Journal of Cleaner Production, 277, 122281. https://doi.org/10-.1016/j.jclepro.2020.122281.

Szopiński, T., & Staniewski, M. W. (2017). Manifestations of e-government usage in post-communist European countries. https://doi.org/10.1108/IntR-01-2015-0011.

Tatikonda, M.V., Terjesen, S.A., Patel, P.C., & Parida, V. (2013). The role of operational capabilities in enhancing new venture survival: A longitudinal study. Production and Operations Management, 22 (6), 1401–1415. https://doi.org/10.1111-/poms.12038.

Teh, LCL, Teh, LSL, Abe, K., Ishimura, G., & Roman, R. (2020). Small-scale fisheries in developing countries: Looking beyond developing country narratives through Japan's perspective. Marine Policy, 122 (October), 104274. https://doi.org/10.-1016/j.marpol.2020.104274.

Voronenko, I., N., K., & O., N. (2022). Priority Areas Of Ukraine's Innovative Potential In The Conditions Of Digital Transformation . 1 (42), 0–1.

Wang, I.M., Shieh, C.J., & Wang, F.J. (2008). Effect of human capital investment on organizational performance. Social Behavior and Personality, 36 (8), 1011–1022. https://doi.org/10-.2224/sbp.2008.36.8.1011.

Xu, B., Sendra-García, J., Gao, Y., & Chen, X. (2020). Driving total factor productivity: Capital and labor with tax allocation. Technological Forecasting and Social Change, 150 (October 2019). https://doi.org/10.1016/j.techfore.2019.119782.

Yan, X., Yan, L., Yao, X.L., & Liao, M. (2015). The marine industrial competitiveness of blue economic regions in China. Marine Policy, 62, 153–160. https://doi.org/10.1016/j.marpol.2-015.09.015.

Zhang, Y., Dai, X., & Shao, Y. (2019). Does Matching with Foreign-Invested Enterprises Improve the Productivity of Chinese Enterprises? Emerging Markets Finance and Trade, 55 (15), 3404–3416. https://doi.org/10.1080/1540496X.2019.160-3541.

Zhao, Z., Shi, X., Zhao, L., & Zhang, J. (2020). Technological Forecasting & Social Change Extending production-theoretical decomposition analysis to environmentally sensitive growth: Case study of Belt and Road Initiative countries. Technological Forecasting & Social Change, 161 (August), 120289. https://doi.org/10.1016/j.techfore.2020.120289