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THE EFFECT OF THE COVID-19 ON THE PURSE SEINE FISHING BUSINESS AT CFP BAJOMULYO, PATI

DAMPAK PANDEMI COVID-19 TERHADAP USAHA PENANGKAPAN IKAN DENGAN ALAT TANGKAP PURSE SEINE DI CFP BAJOMULYO, PATI

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ABSTRACT

The COVID-19 virus has brought many changes in the economy and business, including in the CFP Bajomulyo, Juwana, and Pati Regency fishing businesses. This study aimed to determine the impact of the COVID-19 pandemic on capture fisheries business from a technical, marketing, social, and financial perspective on the fishing business using purse seine fishing gear at CFP Bajomulyo, Pati. The sampling method is the purposive sampling method with a total sample of 13 respondents. The results of the study show that technically and socially. There is no influence from the presence of COVID-19, while in financial and marketing aspects, there is an influence of COVID-19. The effect is an increase in fixed costs, variable costs, and total costs and income of small-scale fishing businesses, respectively, by 0.9%, 5.7%, 4.7%, and 1%. Meanwhile, for medium-scale businesses, there was an increase of 0.45%, 4.6%, 3.6%, and 2.8%. The profit for small-scale businesses increases by 1.81%, and for medium-scale businesses decreases by -0.35%. The NPV, IRR, R/C Ratio and PP values of each business have different results, but all of the values are positive, which means they include in the feasible business category. In terms of marketing, the impact of COVID-19 is an increase in the price of fish such as scad (*Decapterus sp*) 1.5%, lemuru (*Sardinella sp*) 1.01%, tuna (*Euthynnus affinis*) 1.3%, banyar (*Restrelliger sp*) 1.15%, mackerel (*Scomberomorini*) 1.03%.

Keywords*:* COVID-19, CFP Bajomulyo, purse seine, fisheries business.

ABSTRAK

Virus COVID-19 telah membawa banyak perubahan di bidang ekonomi dan bisnis, termasuk dalam usaha penangkapan ikan yang ada di PPP Bajomulyo, Juwana, Kabupaten Pati. Tujuan dari penelitian ini adalah untuk mengetahui dampak pandemi COVID-19 terhadap bisnis perikanan tangkap dari segi teknis, pemasaran, sosial, dan finansial terhadap usaha penangkapan menggunakan alat tangkap purse seine yang ada di PPP Bajomulyo, Pati. Metode pengambilan sampel adalah metode *purposive sampling* dengan jumlah keseluruhan sampel yaitu 13 responden. Hasil penelitian menunjukkan secara teknis dan sosial tidak ada pengaruh dari adanya COVID-19, sedangkan secara aspek finansial dan pemasaran terdapat pengaruh COVID-19. Pengaruh tersebut yaitu terjadi kenaikan pada biaya tetap, biaya variabel, dan biaya total serta pendapatan usaha penangkapan skala kecil berturut-turut sebesar 0,9%, 5,7%, 4,7%, dan 1%. Sementara pada usaha skala menengah terjadi kenaikan berturut-turut sebesar 0,45%, 4,6%, 3,6%, dan 2,8%. Keuntungan dari masing-masing usaha berbeda yakni usaha skala kecil naik sebesar 1,81%, dan untuk usaha skala menengah turun sekitar -0,35%. Nilai NPV, IRR, R/C Ratio dan PP masing-masing usaha hasilnya berbeda, namun semua nilainya positif yang berarti masuk dalam kategori usaha yang layak. Secara aspek pemasaran, dampak COVID-19 yaitu adanya kenaikan harga ikan seperti ikan layang *(Decapterus sp)* 1,5%, lemuru *(Sardinella sp)* 1,01%, tongkol *(Euthynnus affinis)* 1,3%, banyar *(Restrelliger sp)* 1,15%, tengiri *(Scomberomorini)* 1,03%.

Kata kunci: COVID-19, CFP Bajomulyo, *purse seine,* usaha perikanan.

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INTRODUCTION

The outbreak of COVID-19 requires the government to issue policies such as physical distancing and mobility restrictions (PSBB). This policy has limited community mobility which has an impact on all sectors, one of which is in the field of fisheries (Mardhia et al., 2020). Restrictions on mobility cause fishermen to be unable to go to fishing normally, as well as activities at fishing ports that cannot run as usual.

CFP Bajomulyo is one of the ports with the highest number and production value in Pati, Central Java (Jauhari et al., 2021). The total production recorded in 2020 is 95,070,613 kgs with a production value of IDR 559.936,899,800 (CFP Bajomulyo, 2021). This port is dominated by vessel with purse seine fishing gear. The purse seines that are widely used at CFP Bajomulyo are small pelagic purse seines with fishing gear used as lights, power blocks, capstans, and scoops. The fish target of this fishing gear are scad (*Decapterus sp*), lemuru (*Sardinella sp*), tuna (*Euthynnus affinis*), banyar (*Restrelliger sp*), mackerel (*Scomberomorini*) (Mallawa & Sudirman, 2012); (Siahaan et al., 2021). Regarding the purse seine vessels in CFP Bajomulyo, most of them are vessels with sizes above 30 GT, so the operation time takes 5-8 months (CFP Bajomulyo, 2021).

Related with the outbreak of COVID-19 in the fisheries sector, there are several impacts. According to Wiradana et al., (2021), the issues include reducing national fishery products, reducing markets, decreasing consumer demand including restaurants and hotels, reducing export-import cargo volumes by 14-18% and domestic cargo by 5-10%, increasing clearance processes at ports, decreased crew performance due to online, and slow vessel docking process. Meanwhile, according to Sari et al., (2020), stated that there was a decline in fish prices by around 50% in Pati Regency, Central Java due to the government's physical distancing and social distancing policy which resulted in quiet FAP activities due to the absence of buyers from outside the area.

According to Waiho et al., (2020) COVID-19 has dropped the demand for fish and its product, as well as negatively impacting the supply chain. Small businesses and seafood producers have been hit particularly hard, many of which have yet to resume normal operations. Indeed, COVID-19 poses complex long-term challenges to the continued operation of the capture fisheries value chain and the livelihoods of the millions who depend on it. Pita et al., (2021) found that advanced fishers were, in general, more pessimistic about the impacts of COVID-19, reporting higher reductions in physical activity and fish consumption, as well as poorer quality of night rest, foul mood, and raised more concerns about their health status. On the other hand, Nurhayati et al., (2020) stated that there is still opportunity for fishermen to adapt the COVID-19 situation. Based on the results of the study, the condition of fishery business actors, especially fishermen, experience business risks in the midst of the COVID-19 pandemic.

Purse seine fishing business in CFP Bajomulyo, Pati is a relatively large business. This is because the majority of purse seine vessels in CFP Bajomulyo are small vessels, namely 30-60 GT, and medium-sized vessels, namely 60-200 GT. In the capture fisheries business, the larger the size of the vessel, the higher the cost. Physical measures (e.g. vessel size) are used as inputs in DEA in

order to estimate capacity utilization, indirectly reflecting the economic decisions of each unit (Walden, 2006). This bigger business certainly makes prosperity increase (Kusumayanti et al., 2018). According to Puspasari (2017), Pati can fully manage existing its fishery resources, it's hoped that it can become the foundation of the economy in Pati Regency. Regarding the existence of the CFP Bajomulyo, it encourages capture fisheries activities to be more organized and directed. As for capture fisheries, the most in CFP Bajomulyo, is purse seine fishing. CFP Bajomulyo is one of the backbones of economic strength in Juwana District with fishing boat visits increasing every year.

Considering serious impact on Indonesian fisheries, especially capture fisheries, this research was aimed to study the effect of COVID-19 on purse seine fisheries in Juwana. The aspects were technical, marketing, social, and financial aspects. Technical aspects include purse seine fishing vessels, fishermen, fishing operations activities, and how to handle fish catches on board. The marketing aspect includes how to distribute fish and also the price of fish from before the pandemic and during the pandemic. The social aspect includes the life of fishermen at CFP Bajomulyo, which is seen from the income earned before the pandemic and during the pandemic, as well as the financial aspect, including the costs incurred before and during the COVID-19 pandemic.

RESEARCH METHODS

Research Time and Location

This research was carried out in April 2021 at the Bajomulyo Coastal Fishing Port, which is astronomically located at coordinates 111°8'30" East Longitude and 6°42'30" South Latitude and administratively belongs to Juwana District, Pati Regency, Central Java Province (CFP Bajomulyo, 2021).

Research Data

This study uses primary data and secondary data. Primary data includes interviews with vessel owners regarding No., marketing, social, and technical aspects. The population was taken based on the total number of purse seine vessels at CFP Bajomulyo in 2020, as many as 384 vessels, then from that population a sample was taken by calculating the slovin formula so that a sample of 13 respondents was obtained. The secondary data are production data and production values, fisherman data, and vessel data obtained from the CFP Bajomulyo annual report and the Pati Regency Marine and Fisheries Service.

Research Data Analysis

The analytical method used is a qualitative descriptive method, where researchers compare and analyze whether there is an effect related to fishing business with purse seine fishing gear before the COVID-19 outbreak and during the COVID-19 outbreak occurred. The aspects analyzed in this study include technical, marketing, financial, and social aspects.

Technical Aspect Analysis

Technical analysis is used to assess factors related to the technical performance of fishing units motor boats in CFP Bajomulyo, Juwana District, Pati Regency and fishing operations. This analysis includes a description of: a) the vessel; b) fishing gear; c) fishermen; and d) method of operation of fishing gear.

Marketing Aspect Analysis

Analysis of marketing aspects is used to determine the market and market opportunities of the catch landed at CFP Bajomulyo. Assessment on the marketing aspect is also used to determine the market price, marketing chain, and distribution process.

Financial Aspect Analysis

Analysis of financial aspects is used to determine whether a business is feasible or not (Fauzi, 2010). The components required for the measurement of financial analysis are shown in Table 1.

Tabel 1. Components of Calculation of Financial Aspects

No.	Component	Definition	Formula	Information
1	Capital	Cost of acquisition of vessels, fishing gear, machinery, navigation tools, communication tools, and fishing aids	-	-
2	Business costs	• Fixed costs (maintenance costs and depreciation costs) • Variable costs (costs incurred each vessel will operate at sea) • Total costs (sum of fixed costs and variable costs)	-	-
3	Income	Represents the gross profit that has not been deducted from the capital, and the total cost	-	-
4	Profit	Margin that can be obtained from a business activity. Criteria:	P = TR- TC	• P = net income (IDR/year) • TR = total income (IDR/year) • TC = Total cost of fishing (IDR/year)
5	*Net Present Value*(NPV)	The difference between the present value of benefits and present value of costs	$NPV = \frac{Bt - Ct}{(1+i)t}$	• Bt : Gross benefit (profit) earned in year t • Ct : Cost (cost) in year t • I : The prevailing interest rate • t : Year of current project • n : Economic life of the project
6	*Internal Rate of Return*(IRR)	Finding the current interest rate on expected future cash flows, or cash receipts, by excluding the initial investment	$IRR = PI - C1\frac{P2 - P1}{C2 - C1}$	• P1 = 1st interest rate • P2 = 2nd interest rate • C1 = 1st NPV • C2 = 2nd NPV
7	*R/C*ratio	To find out to what extent the results obtained from business activities during a certain period (one season) are quite profitable	$R/C = \frac{TR}{TC}$	• TR = Total Revenue (IDR) • TC = Total Cost (IDR)
8	*Payback Period*	The period of 17 tis1717 s investment capital that will be paid through the profits obtained by a business	$PP = \frac{I}{Bt}$	• I = Investment Amount • Bt = Net benefit on average each year

RESULTS AND DISCUSSION

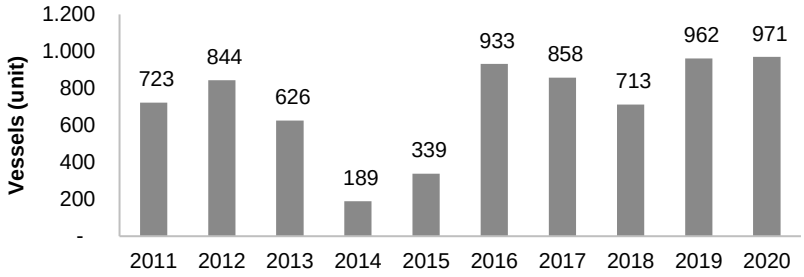
General Condition of Pati Regency Area

Astronomically, Pati district is bordered by 1100.15' – 1110.15' east longitude and 60.25' – 70.00' south latitude (Statistics Indonesia, 2021). The Pati Regency itself has 21 districts and 406 villages. One of the districts in Pati is Juwana. Juwana is one of the districts which is famous for its fishery sector. The center of fishery activities in Juwana is CFP Bajomulyo. CFP Bajomulyo is included in the category of an active port equipped with adequate facilities. The unique thing about Bajomulyo Port is that it has two FAP units, including Unit I and Unit II. As for FAP Unit I, it is a wet FAP in the sense that the catch is auctioned unpacked and unfrozen.

Technical Aspect Analysis

Number of Vessels

Vessels operating at Bajomulyo Port are mostly motorized vessels with an average size of above 30 GT.



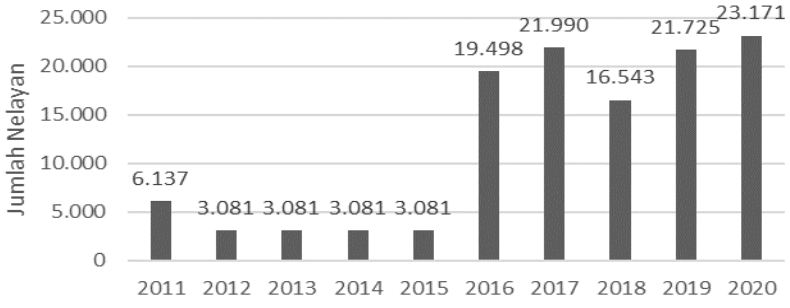
Source: CFP Bajomulyo (2021)

Figure 1. Number of Fishing Vessels in CFP Bajomulyo 2011-2020

It can be seen in Figure 1 that 2014 was the year in which the number of vessels based at CFP Bajomulyo experienced a very significant decline. The decrease is estimated at -231%. However, in 2015 and 2016 there was an increase in the number of vessels in CFP Bajomulyo by 44% and 64%, respectively. The highest number of vessels in CFP Bajomulyo is 971 vessels or in 2020.

Number of Fishermen

Most of the people of Juwana make a living as fishermen, especially in Bendar Village, Juwana. As for purse seine fishermen, most of them come from the Juwana area or from several vocational school children who do field work practices. For fishermen from other fishing gear, most of them come from various regions. As with squid nets, most of the fishermen come from Indramayu, West Java.



Source: CFP Bajomulyo (2021)

Figure 2. Number of Fishermen in CFP Bajomulyo 2011-2020

Based on Figure 2, it can be seen that the highest number of fishermen was in 2020. This increase occurred during the pandemic where compared to 2019 the number of fishermen in CFP Bajomulyo increased by 6%. In that period the lowest number of fishermen was in 2012-2015 where the number of fishermen stagnated at 3,081 people.

Catch Production and Production Value

Basically the units in Bajomulyo Port have different fishing gear. As for FAP unit I, most of the vessels in the unit use cantrang fishing gear, gill nets, longlines, squid nets. Unit II is mostly filled with purse seine vessels and transport vessels. Overall, the amount of production in the three years prior to the COVID-19 outbreak tends to fluctuate, which means it fluctuates up and down. However, for the last two years during COVID-19 occurred, namely in 2019 and 2020, the amount of production and production value tended to increase rapidly by three times.

Table 2. Total Production and Production Value of Capture Fisheries in CFP Bajomulyo in 2011-2020

No.	Year	Production (kg)	Percentage (%)	Production value (million IDR)	Percentage (%)
1.	2011	38,548,915	0	203,185.86	0
2.	2012	42,053,760	8	198,887.47	-2
3.	2013	28,076,926	-50	169,145.97	-18
4.	2014	15,230,084	-84	86,539.83	-95
5.	2015	25,873,728	41	222,668.84	61
6.	2016	27,654,878	6	239,573.81	7
7.	2017	26,734,297	-3	324,104.11	26
8.	2018	23,517,490	-14	251,401.76	-29
9.	2019	29,014,780	19	267,708.05	6
10.	2020	95,070.613	69	559,936.90	52

Source: CFP Bajomulyo (2021)

It can be seen in Table 2 that in 2019 the total production was 29,014,780, and in 2020 it increased three times from 2019. The lowest production amount was in 2018 which was 23,517,490. The cause of the increase in the number of production and production value is the increase in the number of vessels which causes fishing activity to become very active and has an impact on the increase in numbers during the COVID-19 outbreak. Meanwhile, the production value is also in line with the amount of production. In 2019 the production value of CFP Bajomulyo was IDR 267,708,048,200 and in 2020 there was an increase so that the production value in 2020 was IDR 559,936,899,800 and became the highest production value. As for the lowest production value, in 2017 it was IDR 239.573,812,700.

Purse Seine Catcher Construction

The fishing gear in CFP Bajomulyo has an average length of 600 m-1,000 m, with the main net having a mesh size of about 2-4 cm (Table 3). The main parts of the net include the bag, net body, and wings. The body of the net and wings function to block the movement of fish when the fishing gear circles the catch, while the pockets function to form pockets when the corrugated rope is pulled.

Table 3. Specifications of Purse Seine Components

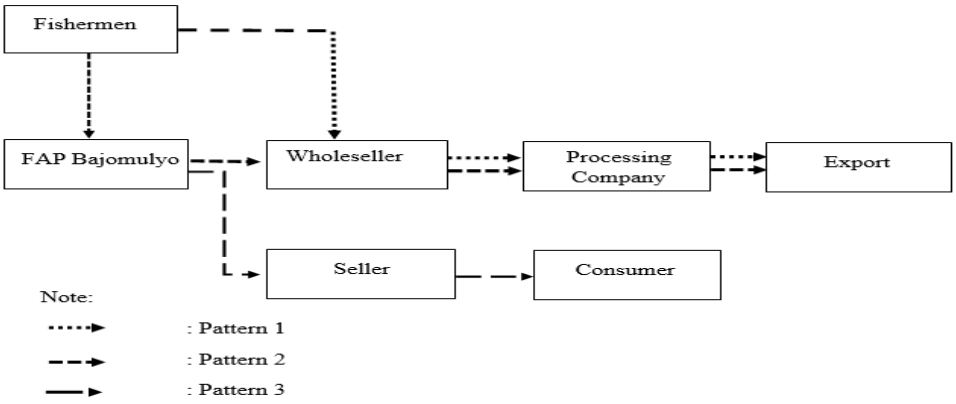
No.	Part	Component	Specification
1.	Pocket	Polyamide(PA)	Mesh size= 2-3,5 cm
2.	Net body	Polyamide(PA)	Mesh size= 3-4 cm
3.	Wing	Polyamide(PA)	Mesh size= 4 cm
4.	Srampat (selvadge)	Polyamide(PA)	Mesh size= 2 cm
5.	Lifebuoy	Polyvinyl chloride:Plastic	White color: plastic and hard material Yellow color: foam and soft material = 11 cm, length = 20 cm
6.	Ballast	Lead	= 2 cm, length = 5 cm
7.	Top rope	Polyethylene(PE)	Length = 1000 m
8.	Rise down	Polyethylene(PE)	Length = 1000 m
9.	Wrinkle strap	Polyethylene(PE)	Length = 1000 m
10.	Ring	White iron	= 5 cm

Source: Research Results (2021)

Marketing Aspect

Marketing Distribution

Marketing distribution can be defined as the distribution of products from producers to consumers. The longer the distribution chain, the higher the price for the end user. There are three patterns of distribution of catches from fishermen to consumers (Figure 3). The first pattern is that when the catch lands, fishermen immediately send fish to fish management companies for both export and import activities. The second pattern is from fishermen through the auction process at FAP then to wholesalers who continue to the processing industry in companies in Surabaya and Jakarta for export purposes, and the third pattern is fishermen follow the auction process at FAP which is followed by large and small fishermen who then marketed to consumers. Usually the results of the auction fish are marketed by baskets to sellers in the market. Due to the many hands that play a role in the fish distribution process, the price of fish will certainly increase when it reaches the end user.



Source: Research Results (2021)

Figure 3. Flowchart of Marketing Distribution Channels at CFP Bajomulyo

Fish Prices at CFP Bajomulyo

During this covid pandemic, the fish that were often found were layang fish (*Decapterus sp*), lemuru (*Sardinella sp*), and other catches such as tuna (*Euthynnus affinis*), banyar (*Restrelliger sp.*), mackerel (*Scomberomorini*), and dorang (*Formio niger*), although the number was not as much as 20aying fish and lemuru. The table regarding the price of fish before and during the COVID-19 pandemic is presented as follows:

Table 4. Fish Prices at CFP Bajomulyo Before and During COVID-19

No.	Fish Type	Minimum (IDR/Kg)		Maximum (IDR/Kg)		Average (IDR/Kg)	
		Before	During COVID-19	Before	During COVID-19	Before	During COVID-19
1.	Layang fish (*Decapterus sp*)	10,000	16,000	15,000	20,000	12,500	18,000
2.	Short 21 tis21 fish (*Decapterus sp*)	4,000	7,000	10,000	10,000	7,000	8,500
3.	Lemuru (*Sardinella sp*)	5,000	6,500	6,500	6,500	5,750	7,500
4.	Cob (*Euthynnus affinis*)	5,000	12,000	12,000	13,000	8,500	12,500
5.	Banyar (*Restrelliger sp.*)	20,000	23,000	20,000	23,000	20,000	23,000
6.	Mackerel (*Scomberomorini*)	40,000	42,000	41,000	42,000	40,500	42,000
7.	Dorang (*Formio niger*)	39,000	39,000	40,000	42,000	39,500	39,500

Source: Research Results (2021)

Social Aspect

Almost 82% of purse seine fishermen have the latest education, namely junior high school. Fishermen's income is considered large because purse seine fishermen fish on average 6-8 months, so that the fish they catch are certainly large. Regarding the income during peak season, it can range up to 20 million per crew. Meanwhile, during this pandemic, the average purse seine vessel with one vessel containing 40 fishermen, one fisherman's income is around 2-5 million, not much different during the peak season. The welfare of the fishing community, of course, can be measured from various aspects, both physical and non-physical.

Financial Aspect

In knowing that a business can be said to be feasible and has the right to continue, a financial analysis is needed Ismail (2020). The financial analysis calculations include NPV, IRR, R/C Ratio, and Payback Period (PP). To find out this value, it is necessary to calculate the business profit obtained from the components of capital (investment), fixed costs, variable costs, total costs and also income.

Capital

There is certainly not a small amount of capital in carrying out a fishing business, especially purse seine fishing gear. The capital is also adjusted to the specifications of the vessel, fishing gear and other objects that will be used for fishing. Therefore, the owner of the vessel with one another must be different. The capital used by vessel owners is presented in Table 5-6.

Table 5. Small-Scale Fishing Business Capital

No.	Investment	Minimum (million IDR)	Maximum (million IDR)	Average (million IDR)
1.	Boat	3,000	3,600	3,300
2.	Catching tool	500	500	500
3.	Machine	450	522	486
4.	Navigation Tools	51	56	53.5
5.	ABPI	75	75	75
6.	Light	200	200	200
7.	Pyurite	0.549	0.549	0.549
	Amount	4,276	4,953	4,615.05

Source: Research Results (2021)

Based on the Table 5, it can be seen that the average amount of capital or investment costs incurred in small-scale fishing businesses is IDR 4,615.049,000. Capital or investment costs as it is known

are goods that become business assets. These goods include vessels, fishing gear, engines, navigation tools, ABPI, lamps, pyurite. The goods with the lowest investment value are pyurite worth IDR 549,000, and the goods with the highest investment value are boat with the price of IDR 3,600 million. The costs incurred in the purse seine catching business are quite large, moreover the lowest GT vessel that is the respondent to be interviewed is 55 GT, the price of the purchased vessel has reached IDR 3,000 million.

Table 6. Average Capital of Medium-Scale Purse Seine Catching Business

No.	Investment	Minimum (million IDR)	Maximum (million IDR)	Average (million IDR)
1.	Boat	4,000	7,000	5,500
2.	Catching tool	600	1,000	800
3.	Machine	290	600	445
4.	Navigation Tools, Communication	50	65	57.5
5.	ABPI	75	75	75
6.	Light	150	400	275
7.	Pyurite	0.549	0.785	0.644
	Amount	5,165	9,315	7,240.644

Source: Research Results (2021)

Based on Table 6 the capital for fishing business with medium-scale purse seine fishing gear has a different capital. The highest investment capital is in boat and the lowest is pyurite with prices of IDR 7,000 million and IDR 549,000, respectively.

Fixed cost

Fixed costs tend to remain unchanged in value, and are not affected by the amount of production. According to Carter (2009); (Ningsih et al., 2013); (Rambe et al., 2019), which states that fixed costs are costs that in total do not change when business activities increase and decrease. The fixed costs before and during the pandemic for small-scale and medium-scael businesses are listed in Table 7-8.

Table 7. Fixed Costs of Small-Scale Purse Seine Catching Business Before and During COVID-19

No.	Cost Type	Before COVID-19 (milion IDR/year)			During COVID-19 (milion IDR/year)		
		Min	Max	Average	Min	Max	Average
1	Maintenance costs						
	Boat	80	110	95	80	110	95
	Machine	50	60	55	55	63	59
	Catching tool	100	100	100	100	100	100
	Navigation Tools and Comunication	7	7	7	7	7	7
	Light	10	15	12	15	15	15
	ABPI	2	4	4	5	6	5.5
	Pyurite	0.350	0.350	0.350	0.350	0.350	0.350
2.	Cost of depreciation						
	Boat	300	360	330	300	360	330
	Machine	90	104	97.2	90	104	97
	Catching tool	100	100	100	100	100	100
	Navigation Tools	11.2	10.2	10.7	11.2	10.2	10.7
	Light	40	40	40	40	40	40
	ABPI	15	15	15	15	15	15
	Pyurite	0.11	0.11	0.11	0.11	0.11	0.11
	Total Fixed Cost			866.859			874.86

Source: Research Results (2021)

Table 8. Fixed Costs of Medium-Scale Purse Seine Catching Business Before and During COVID-19

No.	Cost Type	Before COVID-19 (million IDR/year)			During COVID-19 (million IDR/year)		
		Min	Max	Average	Min	Max	Average
1.	Maintenance costs						
	Boat	60	120	90	60	120	90
	Machine	75	150	112.5	75	150	112.5
	Catching tool	100	150	125	100	150	125
	Navigation Tools and Comunication	9	20	14.5	10	20	15
	Light	15	20	17.5	15	30	22.5
	ABPI	2	10	6	2	10	6
	Pyurite	0.350	0.585	0.467	0.350	0.585	0.467
2.	Cost of depreciation						
	Boat	400	700	550	400	700	550
	Machine	98.2	58	78.1	98.2	58	78.1
	Catching tool	175.45	120	147.73	175.45	120	147.73
	Navigation Tools	11.72	10	10.86	11.72	10	10.86
	Light	58.91	30	44.45	58.91	30	44.45
	ABPI	15	15	15	15	15	15
	Pyurite	0.128	0.109	0.119	0.128	0.109	0.119
	Total Fixed Cost			1,212.22			1,217.72

Source: Research Results (2021)

There was an increase in the fixed costs of fishing businesses on a small and medium scale before COVID-19 and during COVID-19. The increase in small-scale fishing business between before COVID-19 and during COVID-19 was 0.9%, and the increase in medium-scale fishing business between before COVID-19 and during COVID-19 was 0.45%. This increase was caused by the COVID-19 pandemic which resulted in an increase in some materials such as fuel oil. This is reinforced by Fahrika and Roy (2020), that the positive growth in the coal and oil and gas refining industry was 2.58 percent due to the support for increased production of fuel oil and LPG.

Variable Cost

The physical and economic measures of the fixed inputs were highly correlated. Additionally, the variable inputs (fuel, variable cost, and man days at sea) showed high correlation coefficients (Dewi et al., 2020; Pascoe et al., 2015). The variable costs of small-scale purse seine catching before and during the COVID-19 pandemic are presented in Table 9.

Table 9. Variable Costs for Small-Scale Purse Seine Catching Businesses Before and During COVID-19

No.		Before COVID-19 (million IDR/year)			During COVID-19 (million IDR/year)		
	Cost Type	Minimum	Maximum	Average	Minimum	Maximum	Average
1.	Supplies	655.25	1,311.2	983,225	805.25	1,611.2	1,208,225
2.	Labor Wages	1,977,525	4,311.7	3,144,613	2,149,025	4,223.7	3,186,362
3.	Administration	270.3	316.98	293.64	270.3	316.98	293.64
	Total Variable Cost			4,421,475			4,688,225

Source: Research Results (2021)

Based on the Table 9, it can be seen that the variable costs consist of supply costs, labor costs and administrative costs. The total variable costs for small-scale fishing businesses before COVID reached IDR 4,421,475,000, while the table shows the total variable costs for fishing businesses during the COVID-19 pandemic, which was IDR 4,688,255,000. There was an increase in variable costs of 5.7%. The significant increase is from the cost of labor wages. This is influenced by the income received during the COVID-19 pandemic, causing the cost of labor wages to increase by

1.3%. Supplies costs also increased by 18.6%, while administrative costs were still the same as in the year during the COVID-19 pandemic had not yet spread.

Table 10. Variable Costs for Medium-Scale Purse Seine Catching Businesses Before and During COVID-19

No.		Before COVID-19 (million IDR/year)			During COVID-19 (million IDR/year)		
	Cost Type	Minimum	Maximum	Average	Minimum	Maximum	Average
1.	Supplies	579.5	2,685.75	1,166.64	704.5	3,075.75	1,372.91
2.	Labor Wages	1,697.55	5,349.3	23,752.5	1,720.05	5,145.3	2,747
3.	Administration	137.2	380.9	217.26	137.2	380.9	217.86
	Total Variable Cost			4,421.5			4,337.2

Source: Research Results (2021)

Based on Table 10 the variable costs of medium-scale fishing businesses both before COVID-19 and during COVID-19 are IDR 4,421,475,000 and IDR 4,337,166,318. There was an increase of 4.6% in the variable costs of medium-scale fishing businesses. The average variable cost of small-scale and medium-scale fishing businesses before COVID-19 and during COVID-19 has increased. This is due to the increase in some food products and therefore the cost of supplies rises. If food supplies increase, it is certain that the cost of supplies needed will also increase, not as usual. According to (Fahrika and Roy 2020), that inflation occurred in March 2020 of 2.69% which caused the price of gold jewelry and some food prices to increase quite drastically.

Total Cost

Total costs are the sum of fixed costs and variable costs. Fixed costs consist of maintenance costs and depreciation costs, while variable costs consist of supply costs, labor costs (Table 11). Based on Table 11 the total cost is the cost of the sum of the fixed costs and non-fixed or variable costs. The total costs for small-scale fishing businesses before and during COVID-19 were IDR 5,828,375,000 and IDR 6,114,125,000. The increase in the total cost of small-scale fishing businesses is around 4.7%.

Table 11. Total Cost of Small-Scale Purse Seine Catching Business Before and During COVID-19

No	Cost Type	Before COVID-19 (million IDR per trips/year)			During COVID-19 (million IDR per trips/year)		
		Minimum	Maximum	Average	Minimum	Maximum	Average
1.	Fixed Cost	1,120.2	1,693.6	1,406.9	1,142.2	1,709.6	1,425.9
2.	Variable Cost	2,949.75	5,893.2	4,421.5	3,271.25	6,105.2	4,688.3
	Amount			5,828.4			6,114.12

Source: Research Results (2021)

Based on Table 12 the total cost of a medium-scale fishing business before and during COVID-19 was IDR 5,668,877,100 and IDR 5,880,286,191. The increase in these costs is around 3.6%. Capacity utilization can be obtained by using the short run average total cost curve, as the ratio between actual output and the output at which the short run average total cost reaches its minimum value (Klein, 1960).

Table 12. Total Cost of Medium-Scale Purse Seine Catching Business Before and During COVID-19

No	Cost Type	Before COVID-19 (million IDR per trips/year)			During COVID-19 (million IDR per trips/year)		
		Minimum	Maximum	Average	Minimum	Maximum	Average
1.	Fixed Cost	1,207.11	1,990.12	1,532.48	1,219.11	2,561.74	1,543.12
2.	Variable Cost	2,414.24	8,415.95	4,136.39	2,008.18	8,601.95	4,337.17
	Amount			5,668.88			5,880.19

Source: Research Results (2021)

Income

Income is the result of all fish caught in one trip which is sold by auction at FAP or directly to the fish processing industry. In terms of income from purse seine fishing business, which can be seen in the table below, it represents one year's income from each respondent when interviewed (Table 13 and 14).

Table 13. Small-Scale Purse Seine Catching Business Income

No.	Trip	Before Covid	During Covid	Percentage (%)
1	2	5,175	5,690	9.1
2	4	11,000,000,000	11,140,000,000	1.3
Minimum	2	5,175	5,690	1.3
Maximum	4	11,000,000,000	11,140,000,000	9.1
Average		8,087,500,000	8,415	0.1

Source: Research Results (2021)

Table 14. Medium-Scale Purse Seine Catching Revenue

No.	Trip	Before Covid	During Covid	Percentage (%)
1	2	6,985	6.760.000.000	-3.3
2	2	7,600	7,770	2.2
3	3	11,197,500,000	11,460	2.3
4	1	4,300	4,475	3.9
5	1	4,562,500,000	4,825	5.4
6	2	9,330	9,850	5.3%
7	3	14,475	14,475	0.0
8	1	5,115	5,210	1.8
9	1	5,145	5,572,500,000	7.7
10	1	5,375	5,700	5.7
11	1	5,575	5,827.5 million	4.3
Minimum	1	4,300	4,475	-3.3
Maximum	3	14,475	14,475	7.7
Average		7,241,818,182	7,447,727,273	3.2

Source: Research Results (2021)

The average income for small scale before and during COVID-19 was IDR 8,087,5 million and IDR 8,415. There was an increase of about 1% for small-scale fishery business income. For large-scale fish income, both before and during COVID-19, the average was IDR 7,241,818,182 and IDR 7,447,727,273, an increase of around 2.8%. The increasing income of the vessel's business affects the welfare of the management and crew of the vessel. This is in line with what was expressed by Ayu et al., (2016); (Kusuma & Mayasti, 2014); (Hastrini et al., 2013). However, in a large-scale fishing business, the income earned is gross income and the company's business is not necessarily a profit, because a large turnover is not necessarily a large profit. This is because, there are still other costs that must be a deduction factor from the income, so that the income obtained is net income. The size of the income obtained is certainly influenced by several factors including the number of catches, the trips taken per year, the price of fish, and the season.

Profit

Table 15. Profits from Small-Scale Purse Seine Catching Business

No	Description	Average/year		Percentage
		Before Covid	During Covid	(%)
1.	Income	8.087,500,000	8,415	3.89
2.	Total Cost	5,828,375,000	6,114,125,000	4.67
3.	Variable Cost	4,421,475,000	4,688,225,000	5.69
	Gross profit (Total Revenue-Total Variable Cost)	3,666,025,000	3,726,775,000	1.63
	Net profit (Total Revenue-Total Cost)	2,259,125,000	2,300,875,000	1.81

Source: Research Results (2021)

Table 16. Profits of Medium-Scale Purse Seine Catching Business

No	Information	Average/year		Percentage
		Before Covid	During Covid	(%)
1.	Income	7,241,818,182	7,447,727,273	2.76
2.	Total Cost	5,668,877,100	5,880,286,191	3.60
3.	Variable Cost	4,136,393,591	4,337,166,318	4.63
	Gross profit (Total Revenue-Total Variable Cost)	3,105,424,591	3,110,560,955	0.17
	Net profit (Total Revenue-Total Cost)	1,572,941,082	1,567,441,082	-0.35

Source: Research Results (2021)

The net profit of medium-scale fishing businesses before and during COVID-19 decreased by 0.35%. This is due to a high increase in variable costs followed by total costs. Although it is still categorized as a profitable business, this decline in profits must be watched out for due to the ongoing COVID-19 pandemic. In contrast to the profits of small-scale fishing businesses, which increased between before and during the COVID-19 pandemic. This decrease is of course influenced by many factors such as the number of catches, fishing season, number of trips, fish prices, and also increases in the components in variable costs and total costs. The profits obtained are not entirely from large income. A large income also does not completely make a large profit.

Business Feasibility Analysis

This analysis includes NPV, IRR, R/C Ratio, and Payback Period in the purse seine fishing effort at CFP Bajomulyo, Pati which is presented in Table 17-18.

Table 17. Feasibility of Catching Business with Small-Scale Purse Seine Catchers

No.	Value Type	Note	
		Before	During Covid
1.	NPV (Net Present Value)	7,313.653,166	12,477,972,286
2.	IRR (Internal Rate Return)	96%	250%
3.	R/C Ratio	1.27	1.34
4.	PP (Payback Period)	0.55	0.53

Source: Research Results (2021)

Table 18. Feasibility of Catching Businesses with Medium-Scale Purse Seine Catchers

No.	Value Type	Mark	
		Before	Moment
1.	NPV (Net Present Value)	8,538,311	3,029,430,776
2.	IRR (Internal Rate Return)	18%	31%
3.	R/C Ratio	1.10	1.21
4.	PP (Payback Period)	1.00	0.95

Source: Research Results (2021)

Government policy

According to Nurhayati et al., (2020), the existence of COVID-19 and policies made by the government caused a decrease in demand for capture fisheries products by 5%, a decrease in demand for the domestic market by 15% while a decrease in demand from abroad decreased by 30%. This condition causes the warehouse to be full so that the company reduces the supply of raw materials. Restrictions on transportation and workers in factories also reduce fish absorption capacity of fishermen and reduce capture fisheries production output. Decreased absorption of domestic and export markets, this is due to the limited distribution channels of raw materials, due to large-scale social restrictions policies (Indayani & Hartono, 2020); (Irnawati et al., 2021); (Yapanto et al., 2020).

CONCLUSION AND SUGGESTION

Conclusion

Based on the results of the study, there is an influence of the COVID-19 pandemic on the development of small and medium-scale fishing businesses using purse seine fishing gear in finansial and marketing aspects. In the finansial aspect, the increase in fixed costs, variable costs, total costs and income of small-scale fishing businesses were 0.9%, 5.7%, 4.7%, and 1%, respectively. Meanwhile, for medium-scale businesses, there was an increase of 0.45%, 4.6%, 3.6%, and 2.8%, respectively. Another impact is seen in the marketing aspect where there is an increase in the price of fish including scad (*Decapteruss sp*), lemuru (*Sardinella sp*), tuna (*Euthnnus affinis*), banyar (*Restrelliger sp.*), mackerel (*Sccmberorini*) in a row 1.5 %, 1.08%, 1.01%, 1.15%%, and 1.03%.

Suggestion

Meanwhile, the technical and social aspects of fishing business using purse seine fishing gear are not affected by the COVID-19 outbreak. The government's policy regarding the existence of COVID-19, namely PSBB (Large-Scale Social Restrictions) has made vessel management limited in their space, so that there are several strategies carried out by vessel owners including buying their own caught fish which is then stored in cold storage to be sold when the fish price is low is stable or normal.

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