Analysis of the profitability of small pelagic capture fisheries in Ambon City, Indonesia

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Abstract. Small pelagic fishing is open-access, providing opportunities for business actors to enter and exit freely. This condition requires knowing the ability to generate profits (profitability) in order to be able to attract the business actors. Ambon City with Nusaniwe sub-district is the area that gives the most significant contribution to the overall production of small pelagic capture fisheries. The research was conducted through structured interviews to obtain data related to fishing equipment investment variables, costs and income variables, fishing frequency and fishing experience, which are then compiled to know how much profit is generated by fishing trip. The estimation was based on a multiple linear regression model using the results of the interview data processing. The estimation results show that investment does not affect profitability. Fishing experience and fishing frequency have a positive and significant effect on profitability. On the other hand, the cost of fishing has a negative and significant effect on profitability. The estimation results indicate that small pelagic fishing activities are still open to new fishers but factors like the fishing experience of the crew and the costs control (especially for the fuel oil) have to be previously considered. The small pelagic capture fisheries business remains an attractive and profitable fishery activity.

Key Words: capital expenditure, revenue expenditure, fishing activity, income, profit.

Introduction. Small pelagic fish is a type of fish that has abundant potential in many places in the world (Peck et al 2020). The abundance and potential of the small pelagic fish is a unique attraction for fishers (Fréon et al 2005), which encourages the occurrence of overfishing, threatening the future income from fishing. The immediate impacts are: a limited number of small pelagic capture fisheries, an increasing cost of carrying out the fishing business and a decreasing ability to generate profits (Smith & Bennett 2019). Some countries particularly concerned by the small pelagic fish include the Canaries and Guineea in West Africa (Ba et al 2017), the West Africa Region (Brochier et al 2018; Lakhnigue et al 2019), India (Yadav et al 2020), the Czech Republic (Říha et al 2015), and in Indonesia (Petrik et al 2019). The characteristics of fisheries like this cannot be separated from the main characteristics of capture fisheries activities which are available.

Indonesia has 11 fisheries management areas (WPP). Unmanaged small pelagic fishing zones of Western Indonesia have achieved overfishing. In contrast, managed areas record moderate catches (Fahmi & Dharmadi 2015). The fishing area of Ambon City in the Banda Sea WPP is in a moderate fishing regime. Ambon, the capital of Maluku province, is surrounded by the Banda Sea, which is rich in fishery potential. The potential of fish resources is 484,532 tons year^{-1}, of which Ambon City is allowed 387,532 tons year^{-1} of fish to be caught (DKP Maluku Province 2020). This situation indicates that there are still opportunities to grow and develop small pelagic fishing business activities, which can increase the contribution of the fisheries sub-sector to the GRDP in Ambon City and Maluku Province. The contribution of the fisheries sub-sector in 2016 was 15.47 to 15.26% in 2017. In 2018, the contribution of this sector changed from 15.24 to 15.62% in 2019 and to 16.93% in 2020. The contribution of the fisheries sub-sector tends to increase from year to year (BPS Maluku 2020). Data from the Ambon City Maritime Affairs and Fisheries Service shows that capture fisheries production has grown from

23,506,100 tons in 2018 to 25,176,930 tons in 2020 (BPS City of Ambon 2020). The number of catches has increased from 2016 to 2020, which can certainly have an impact on the increasing income.

Mulazzani et al (2015) mention the correlation between catch and effort, at a certain population level, in the short term. The long term shows the relationship of effort to the average number of catches over a period. Small pelagic fish are a resource with a large distribution in coastal areas (Malley et al 2017). Changes in the coastal environment occur along with changes on the land. These coastal changes will also affect the density of small pelagic fish located in the sea, not far from the coast. On the other hand, small pelagic fish is under pressure from fishing activities carried out by fishers (Taabu-munyaho 2014). Small pelagic fish include scad, selar, anchovies, lemuru, tembang, mackerel, and flying fish (Sandison et al 2021). Capture fisheries are based on open fishing. This open catch will give fishers the freedom to leave if the business is not profitable and will attract more fishers if the conditions are favorable, and those already in the industry will expand their business (Duy et al 2012; Sandsund et al 2015). The development and expansion of fishing activities will encourage the overfishing supported by the excess investment (Nunan 2020).

Using fishing gear for obtaining optimum results require attention to biological, technical and economic aspects (Cámara & Santero-Sánchez 2019). Fish resources and the whole coastal and aquatic environments are the main biological aspects. The equipment and technology used to carry out fishing are technical aspects; the economic aspects are related to the investment and to the various efforts to develop fishing activities (Kadfak & Oskarsson 2019). In the Nusaniwe sub-district, Ambon City, the small pelagic capture fisheries are dominated by scad, tuna and selar fish (Matrutty et al 2019). Most of the costs incurred for the fishing activities deployment come from the kerosene, gasoline and lubricating oil, nets and lamps (petromax). Meanwhile, the fixed fishing cost refers to maintaining ships and outboard motors. The fishing activities begin when fishers with boats head to location of a fish aggregating device (FAD). FADs are tools that function to gather schools of fish at night, because they are attracted by the bright lights on the floating FADs so that they can be caught the next day. Each fishing unit has 1 to 5 FADs (Matrutty et al 2021). Based on the processing of interview data in the field research, it is known that the amount of the fishing fee reflects the amount of working capital, with an average amount of USD 110.18. In the cost of fishing's structure, the cost of fuel represents USD 34.45 or 31%, the ship and outboard motor maintenance cost represents USD 67.03 or 61% and the remaining cost refers to the petromax lamp, representing USD 8.70 or 8%. The amount of this cost is variable, increasing with the intensity of the capturing activities.

Fishers usually perform their professional activities from Monday to Friday, but also the Saturdays, except for the wave season. There can be 3 to 5 trips a week, in the wave season, when the waves are not too powerful. Fishing activities must be temporarily stopped when the wave season is very strong. The substitute activities during the waves relate to the maintenance of the fishing equipment. The study considers that the fish catch is sold directly to retailers, at the fish landing site, to avoid transportation costs. The price per kg of fish marketed varies according to the type of fish: F for tuna it is USD 0.63 kg^{-1}, flying fish USD 0.77 kg^{-1}, selar fish USD 1.54 and for skipjack tuna USD 0.82 (BPS City of Ambon 2020). The price also fluctuates depending on the volumes of fish marketed at that time. If the volume of fish is large, the price tends to fall. Otherwise, if the volume of fish is small, the price increases.

The fishery business recognizes two types of expenditures, which are described as follows: Capital expenditures are investment actions that are sacrificing large amounts of funds today to generate income in the future (Enayet et al 2021). It can be ascertained that investment is an activity to buy assets in the form of fixed assets or funds that will generate income or increase its value in the future. Investment uses funds to procure boats, outboard motors, nets, and other tools to support fishing activities in capture fisheries. Expenditures incurred to carry out fishing operations such as the purchase of gasoline, kerosene, lubricating oil, fisherman rations and costs for fishing assistants are revenue expenditures (Arvin et al 2021).

According to the description above, for capital expenditures, implementing a fishery business requires fishing facilities such as vessels with a tonnage of 15 to 29 GT, two outboard motors of 40 horsepower each and a net. The average cost of these fishing facilities is of USD 26,185.65 and most of these business operators utilize their own sources of capital. The average fishing operation cost is USD 43.15, dominated by the fuel oil costs, which are around USD 34.45 and the remaining USD 8.70 are required for the petromax lamp. It was identified that once a fisherman goes fishing, a small pelagic fish-catching business will get a catch revenue ranging between USD 108.70 to 181.16, which means that the net income from fishing is around USD 101.78. The income described above indicates an opportunity to develop a small pelagic fishing business in the Nusaniwe sub-district.

However, in reality, the fishery business is still static: there is no new fleet and fishers are not prosperous, in spite of the ability of the capture fisheries to generate profits. Capture fisheries require investment, which will determine their capacity to reach the catch area and is considered a cost (Adedokun 2018). The fishing experience has a positive effect on the level of profit (Frawley et al 2021). A person will be more skilled, agile, and fast in doing his job if he has worked for a long time. The number of fish catches in a certain period is determined by the volume of catch on one fishing trip and the frequency of fishing. The fishing frequency also affects income, thereby increasing the business profitability (Andrews et al 2021). The profitable operating activities of fishing companies will be achieved if the main elements in the fishing process are well known. Good management is needed by all cost elements that occur in the production process, to achieve the desired level of efficiency (Den & Oruc 2009).

Profitability is the company's ability to earn profits in relation to sales, total assets and equity. The higher the profitability achievement means the better the company's financial performance (Furrer et al 2007). The success of implementing this governance can be seen in the ability to generate returns on sales and to efficiently include assets in the business activities (Rakshit & Bardhan 2021). As measured by profitability, the achievement of company performance is an essential element in the effort to estimate and assess future economic resource changes and can be managed and controlled. With the basis of controlling changes in economic resources, it is possible to estimate the company's capacity to generate cash and to determine the suitability of the company's management strategies.

The purpose of this study was to investigate whether elements such as investment, fishing experience, fishing frequency and fishing costs impact the profitability of small pelagic capture fisheries in the Nusaniwe sub-district, Ambon City. If these results proved that investment, fishing costs, business experience, and fishing frequency affected profitability, it would undoubtedly be very beneficial for fishers to optimize the management of the above variables every time they carry out fishing activities. It is believed that if these variables can be controlled, they will provide opportunities for a better profitability.

Material and Method. Descriptive research is the basis for writing the present article. The research focused on the common experience of the fishers when carrying out small pelagic capture activities. Various calculations were applied to complete the explanations that eventually answer the questions that have been formulated. The research results were analyzed with the SPSS 25 computer program to apply the multiple linear regression method in estimating.

This research was conducted in Ambon City, especially the Nusaniwe sub-district in Latuhalat Village, Seilale, and Urimesing Villages (Dusun Seri and Mahia), the most significant contributors to the production of small pelagic fish. Data collection was carried out through interviews with participants and other related published data. The relevant published data from the Provincial and City Fisheries and Maritime Services were complementary data to provide a general description of small pelagic fish capture fisheries in Maluku Province, especially in Ambon City. Other data were sourced from the Central Statistics Agency of Ambon City.

Organizers of small pelagic fishing activities in the Nusaniwe sub-district were taken as research participants. All matters related to the implementation of small pelagic fish capture activities were considered as essential data. Therefore, the unit of analysis in this study was all Nusaniwe sub-district small pelagic fishers using ring seines as fishing gear. Free interviews were conducted by guiding a list of questions to identify the operational costs of fishing and the results obtained at each fishing session. After the interview was carried out for the participants, the next step was compiling the results of the interview to find out things such as fishing experience, fishing frequency, elements of costs that must be incurred so that fishing activities can be held, the number of catches in each fishing and the marketing process carried out so that the price was known. From the calculation of costs and income, a profit/loss statement for the participants was prepared. This data was analyzed to enable estimation to answer the predetermined goals. The data was analyzed using computer software for statistics, namely SPSS 25, to apply the multiple layer regression method (Ghozali 2005):

$$\text{Regression equation } Y = b_0 + b_1X_1 + b_2X_2 + b_3X_3 + b_4X_4 + e$$

Where:
Y - profitability;
X_1 - investment;
X_2 - fishing experience;
X_3 - fishing frequency;
X_4 - fishing fee.

The independent variable profitability was calculated using the profitability ratio, which is using the net profit margin of each participant. This ratio can be formulated as follows (Sartono 2016):

$$\text{Net Profit Margin (NPM)} = (\text{Net profit After Tax})/\text{Sale} \times 100$$

NPM is a reflection of the net profit margin on sales that have been achieved. This NPM value informs the amount of net profit that can be achieved from each sales value achievement. Automatically, when the NPM increases, the company's performance improves because the profit achievement for each sales value also increases. NPM is an indicator of the success of carrying out business operations. The standard threshold that is often used in interpreting the achievement of NPM, as stated by Sulistyanto (2005), is>5%. Before this multiple regression analysis was used to estimate the factors that affect profitability, the analysis model underwent the classical assumption test.

Multicollinearity. A good estimation model can be realized if the variables are orthogonal. The detection of multicollinearity symptoms in the regression model can be seen from the tolerance value or variance inflation factor (VIF). The basis of reference for making conclusions is (Ghozali 2005):
1) If the tolerance value is >0.1 and the VIF value is <10, it can be concluded that there is no multicollinearity among the independent variables in the regression model.
2) If the tolerance value is <0.1 and the VIF value is >10, it can be concluded that there is multicollinearity among the independent variables in the regression model.

Autocorrelation. A good linear regression model must avoid correction of the t-period residual error with the t-1 period's residual error. Therefore, a good regression model must be free from the occurrence of autocorrelation symptoms. The detection of autocorrelation symptoms can be done through the Durbin-Watson test (DW test) and Ljung box (Ghozali 2005). The terms of the DW test are as follows:
1) If the DW value lies between the upper bound (du) and (4 – du), it means that there is no autocorrelation.
2) If the DW value is less than the lower limit or lower bound (dl) or greater than (4 – dl), it means that there is an autocorrelation.

Heteroskedasticity. The test is to determine whether there is an inequality of variance in the regression model on the residuals from one observation to another observation. A good regression model only occurs when these show a homoskedasticity behavior (constant variance) heteroskedasticity. The heteroskedasticity test in this work was performed by using the graph method.
Basic analysis:
1) If there is a certain pattern, such as dots that form a certain pattern, which is regular (wavy, widening, narrowing), it indicates that heteroskedasticity has occurred.
2) If there is no certain pattern and the points spread above and below zero on the Y axis, then there is no heteroskedasticity.

Hypothesis testing was carried out with a partial test or a statistical t test and statistical F test, the details of which are as follows:
a. Statistical T-test. Testing the significance of the regression coefficients for each independent variable was performed by using a partial or T-test. The test steps are as follows (Jankowski et al 2018):
1) Formulating a hypothesis:
Ho is accepted: there is no significant effect of the independent variable on the dependent variable.
Ha is accepted: it means that there is a significant influence among the independent variables on the dependent variable.
2) Determining the level of significance (α) of 0.05:
Comparing t_{count} with t_{table}, with inference guidelines:
- If $t_{count}>t_{table}$, Ha is accepted and Ho is rejected, the independent variable influences the dependent variable.
- If $t_{count}<t_{table}$, H0 is accepted and Ha is rejected, the independent variable individually has no effect on the dependent variable.

b. F test statistic. Testing the significance of the effect of all independent variables on the dependent variable. The steps taken were as follows (Jankowski et al 2018):
1) Formulating hypotheses
Ho is accepted: there is no significant effect among the independent variables and the dependent variable simultaneously
Ha is accepted: it means that there is a significant effect among the independent variables on the dependent variable simultaneously.
2) Determining the level of significance that is equal to 0.05 (α=0.05).
3) Comparing F_{count} with F_{table}
4) If $F_{count}<F_{table}$, the independent variables have no effect on the dependent variable.
5) If $F_{count}>F_{table}$, the independent variables jointly affect the dependent variable.

Results

Fisheries conditions in Nusaniwe sub-district

Characteristics of participants. The characteristics of participants by age can be seen in the Table 1.

Table 1

The characteristics of participants according to age

Ages	*Total*	*Percentage (%)*
26–35	3	11.5
36–45	7	27.0
46–55	11	42.3
56–65	5	19.2
Total	26	100

Most of the participants were aged between 46-55 years, namely 11 people or 42.3%. Then, the age of the participants between 36-45 years was 7 people or 27%.

Furthermore, participants aged between 56–65 years were 5 people or 19.2%, and the participants aged 26-35 years were 3 people or 11.5%. The characteristics of participants according to their education level can be seen in Table 2.

Table 2

The characteristics of participants based on education level

Level of education	*Total*	*Percentage (%)*
Elementary School	5	19.2
Junior High School	5	19.2
Senior High School/Vocational High School	15	57.7
Higher Education	1	3.9
Total	26	100

Based on the data on the characteristics of participants according to the level of education in Table 2, it is shown that participants with a high school/vocational school education level is more frequent, namely 15 people or 57.7%. It is followed by participants with an elementary and junior high school education level, as many as 5 people or 19.2%, and by a minority of participants with tertiary education: 1 person or 3.9%.

Description of research variables. A brief description of the independent variable and the dependent variable can be seen as the results of the descriptive statistical calculations presented in Table 3.

Table 3

The description of analysis variables

	Investment (USD)	*Fishing experience (year)*	*Fishing frequency (times)*	*Fishing fee (USD)*	*Profitability*
Valid	26	26	26	26	26
Missing	0	0	0	0	0
Mean	349,678,100	10.39	5.62	3,693,800	0.64
Median	336,475,000	8.50	6.00	3,774,300	0.64
Mode	329,200,000	6.00	6.00	3,876,000	0.64
Std. deviation	392,646,100	6.34	0.64	545,700	0.01
Minimum	298,900,000	2.00	4.00	2,586,000	0.62
Maximum	506,700,000	25.00	6.00	4,926,000	0.65

The figures presented provide the following information:

1. Investment:

The average investment value for small pelagic fishing activities in the Nusaniwe sub-district is USD 25,339 including the facilities related to the fishing process. The lowest investment that occurs in capture fisheries using ring trawls is USD 21,659.41 and the largest investment value in small pelagic capture fisheries is USD 36,717.39. The investment for the net until it is ready for use is USD 13,559.09. The second biggest investment is for fishing boats until they are ready for use, which is USD 7,883.92. The investment for the procurement of outboard engines is USD 3,815.22. The investment for other needs is USD 80.77.

2. Fishing experience:

The fishing experience of a small pelagic catch fisherman can be seen from the length of time he has been running the business. The average experience of carrying out pelagic fishing activities is 10.39 years. 2 years is the lowest experience of fishers in carrying out

fishing activities. The most experienced fishers have been carried out fishing activities for 25 years.

3. Frequency of fishing:

The frequency of fishing will determine the number of catches in a week. The results of the field research showed that the lowest frequency of fishing in a week was 4 times and the highest was 6 times. Many fishers go fishing from Monday to Friday, and some also go fishing on Saturdays. The fishers carry out maintenance and repair activities for all fishing activities when they are not at sea.

4. Fishing fees:

The cost of fishing in small pelagic capture fisheries in the Nusaniwe sub-district includes the cost of kerosene fuel, gasoline, lubricating oil and procuring mantle and petromax lamp glass. Costs of consumables are USD 39.88 plus USD 7.88, which is the cost of the mantle and the glass of the petromax lamp, which is replaced every time fishers go fishing because it is damaged. The cost of fishing operations for a week is around USD 356.96. The kerosene, gasoline and lubricants purchasing is the main cost component of the fishing operations. The cost variation of each participant is influenced by the distance from the home base to the fishing ground area: the lowest cost is USD 1,817.29 and the highest cost is USD 356.96 with an average of USD 280.87.

5. Profitability:

Profitability is measured by the profit margin, which compares the net income with sales. The net profit margin for small pelagic capture fisheries is relatively high, at an average of 64%, with the highest net profit margin at 65% and the lowest at 62%. This profit margin achievement is considered relatively high and the variation between fishermen is relatively small.

Classic assumption test

Multicollinearity test results. The estimation accuracy using regression requires the assumption that there is no correlation between the independent variables, but only with the dependent variable. If this assumption is not fulfilled, multicollinearity will occur. Calculating the regression coefficient as a measure of change in the dependent variable if there is a change in the independent variable must not be disturbed by the influence or correlation among the independent variables. The correlation among independent variables, more commonly called the multicollinearity test, was carried out using the tolerance test and the variance inflation factor test. The conditions were that the tolerance value <1 and the VIF value <10 means that there are no multicollinearity symptoms.

Autocorrelation test results. The symptoms of autocorrelation were tested by using the first-order autocorrelation test of Durbin-Waston. The conditions used are upper bound (dU) > Durbin Watson value (DW) >4 – Upper bound (dU). If it does not meet the provisions above, then it is an indication of autocorrelation symptoms. Therefore, it can be concluded that there were no symptoms of autocorrelation in the regression model that was used in this paper, so that the proposed regression model was used.

Heteroskedasticity test results. Heteroskedasticity testing has been carried out and the results show that the residual values are randomly distributed and not patterned or grouped. This means there is no heteroscedasticity symptom.

Multiple regression analysis. The analytical model that has passed the test is then applied to estimate the influence of the variable X_i … X_n of the variable y according to the predetermined regression equation. The regression equation was determined to test the effect of investment (X_1), fishing experience (X_2), fishing frequency (X_3) and fishing costs (X_4) on the profitability of small pelagic capture fisheries (Y), and the results are presented in Table 4.

Table 4

Multiple regression analysis results

Model		*Unstandardized coefficients*		*Standardized coefficients*	*t*	*Sig.*
		B	*Std. error*	*Beta*		
1	Constant	1.167	.184		6.353	.000
	Logx1	.030	.017	.220	1.759	.093
	X_2	.023	.012	.334	2.408	.025
	X_3	.009	.002	.943	4.557	.000
	Logx4	-.126	.019	-1.291	-6.603	.000
a. Dependent variable: Y						

The results of the regression calculations that have been presented produce the following regression equations:

$$Y = 1{,}167 + 0{,}030\ \text{Log}X_1 + 0{,}023\ X_2 + 0{,}009\ X_3 - 0{,}126\ X_4 + e$$

The explanation of this equation is as follows:
a. If the investment, fishing experience, fishing frequency and fishing costs are fixed, the profit margin is 1.16%.
b. Investment has a positive effect on the profitability of small pelagic capture fisheries. Suppose there is an additional investment of one unit. In that case, it will increase the profitability by the regression coefficient of 0.030 or 3%.
c. Fishing Experience has a positive and significant effect on the profitability of small pelagic capture fisheries in the Nusaniwe sub-district. Each change in fishing experience will result in a 2.3% increase in profitability.
d. Frequency has a positive effect on the profitability of small pelagic capture fisheries. If there is a change in fishing frequency, it will change the profitability with a coefficient of 0.9%.
e. The cost of fishing based on the indicated sign has a negative and significant effect on the coefficient. If there is an increase of 1 unit of fishing cost, it will decrease the profitability by 12.6%.

Hypothesis testing. The application of the T-test and F-test checked the formulated assumptions. The T-test application was to test the first to fourth hypotheses. In contrast, the F test was intended to test the fifth hypothesis. Based on the results of the calculations, as shown in the table of the regression analysis, partial effects were tested (Statistical T test) for the variables investment (X_1), fishing experience (X_2), fishing frequency (X_3), and fishing costs (X_4) on profitability (Y), then the test hypotheses were determined.
Ho: investment variable (X_1) has no and significant effect on profitability (Y);
Ha: investment variable (X_1) has a positive and significant effect on profitability (Y).
The T_{table} value with degree of freedom sample (n) – sum of variable (k) = (26–5) = 21, with a significance value of =0.05, the T_{table} value is 2.080 and the T_{count} value =1.759 with a significance level of 0.093 so it is known that the T_{count} value is less than T_{table} or (1.759<2.080); and the value of investment significance (X_1)=0.093>0.05; then the first hypothesis that investment has a positive and significant effect on the profitability of small pelagic capture fisheries in Nusaniwe sub-district, is rejected. This means that investment has no effect on profitability.
To prove the effectiveness of the fishing experience variable (X_2) on the profitability (Y), the hypothesis test is first determined as follows:
Ho: fishing experience variable (X_2) has no and significant effect on profitability (Y);
Ha: fishing experience variable (X_2) has a positive and significant effect on profitability (Y).

The test results show the magnitude of the t_{count} value of the fishing experience variable (X_2) = 2.408, with a significance level of 0.025. The value of the t-table at the degree of freedom n – k (26–5) = 21 and the value of α=0.05 is 2.080, so it is known that the t_{count} value is greater than the t_{table} or (2.408>2.080). Furthermore, by looking at the significance value of the fishing experience variable (X_2) of 0.025, it is smaller than (0.05). Therefore, the second hypothesis is accepted. It states that fishing experience has a positive and significant effect on the profitability of small pelagic capture fisheries in Nusaniwe sub-district.

To test the influence of the variable frequency of fishing (X_3) on profitability (Y), the test hypotheses were first determined as follows:
Ho: fishing frequency variable (X_3) has no significant effect on profitability (Y);
Ha: fishing frequency variable (X_3) has a significant positive effect on profitability (Y).
The test results provide information on the t_{count} value of the variable frequency of fishing (X_3)=4.557>t_{table} value of 2.080, with a significance level of 0.000<0.05. These results confirm that H0 is rejected and Ha is accepted. It means that there is a positive and significant effect between the variable frequencies of fishing (X_3) on the profitability (Y). These results confirm that the third hypothesis is accepted. It states that fishing frequency has a positive and significant effect on the profitability of small pelagic capture fisheries in the Nusaniwe sub-district.

To test the effect of the variable cost of fishing (X_4) on profitability (Y), the test hypothesis was first determined as follows:
Ho: the variable cost of fishing (X_4) has no significant effect on profitability (Y);
Ha: the variable cost of fishing (X_4) has a significant negative effect on profitability (Y).
Based on the test results, it is known that the t_{count} value for the variable cost of fishing (X_4) is -6.603>-2.080 with a significance level of 0.000<0.05, then H0 is rejected, and Ha is accepted. It means a significant negative effect of the variable cost of fishing (X_4) on profitability (Y). Such evidence confirms that the fourth hypothesis is accepted. It means that the cost of fishing has a negative and significant effect on the profitability of small pelagic capture fisheries in the Nusaniwe sub-district.

Discussion

The effect of investment on profitability of small pelagic capture fisheries business in Nusaniwe sub-district. Capture fisheries activities are highly dependent on investment factors and fish availability. Investment is a way to increase capacity. Therefore, investment is a dynamic factor affecting the capture fisheries business (Kimani et al 2020). The results of hypothesis testing show that investment has no effect on profitability. The hypothesis test results scientifically confirm that there are still opportunities to make new investments or carry out additional fishing fleets for fishers who have already undergone fishing activities in the Nusaniwe sub-district. The opportunity to develop a capture fishery business by utilizing ring trawl fishing gear will not be disturbed by adding the number of ring seine bodies around the Nusaniwe sub-district. There are opportunities for the entry of new fishing businesses in the research area. However, an investment in fishing equipment has a very long life span. Most fishing gear such as boats, machines and nets are investments that have been around for a long time, including boats and engines. This situation causes investment spending to be sporadic in less than 5 years and even rare up to 10 years. The fishers mostly do repairs independently of their fishing gear and they even repair the damaged nets by themselves. This situation is in line with the findings of Kadfak (2020), that the investment value in the fishing industry in Russia on assets is high. However, the rate of addition of new investment is meager due to the relatively long investment life. Investment for small capture fisheries businesses has experienced a slow development, although investment is an essential factor. However, the long investment age has slowed the addition of new, occasional investments (Halim et al 2018).

Spending on the procurement of fishing gear occurs rarely, which explains why investment does not affect profitability. Many of the main fishing gear are economically

past their economic age but are still suitable to be used to carry out fishing activities at sea.

The effect of sea experience on the profitability of small pelagic capture fisheries in Nusaniwe sub-district. Knowledge of fishing activities is a determining indicator for business success and it depends on the experience. This situation makes the fishing experience an essential element in the implementation of fishing activities. Suitable fishing activities provide the potential for no waste of motion, which in turn minimizes costs and increases opportunities for profit (Olukunle 2017; Cashion et al 2018). The estimation of the fishing experience variable shows that experience has a positive influence on profitability. Fishing activities, especially when circling the floating lift net to spread nets, must be in sync with the floating lift net shift so that the catching process can be carried out properly without surprising the fish gathered in the floating lift net. This process will work well if the fishers who carry out the fishing are experienced. Therefore, the more experienced fishers will provide opportunities to get more catches. The ability to manage fishing activities from a fisher is obtained along with the routine of fishing activities which will ultimately affect the profitability of small pelagic capture fisheries in the Nusaniwe sub-district. The results of this analysis indicate that operational management is essential for the fishing outcome. The profitability of the capture fisheries varies with the skills of the fishers. In small pelagic fish catching with circular nets it is important to avoid alerting fish by incorrect maneuvers, so that the prey might leave the floating began reducing the outcome. These findings are in line with the findings of Samah et al (2019), stating that the more the fisherman's experience results in a higher number of catches, in the fishing process.

The effect of fishing frequency on profitability of small pelagic capture fisheries business in Nusaniwe sub-district. The tested hypothesis is that frequency of fishing has a positive and significant effect on the profitability. The volume of fish captured in a certain period is determined by the outcome of each fishing trip. Also, it is certain that an increased fishing frequency improves the chances to produce a higher outcome, by creating opportunities. Around the Banda Sea WPP, the observed frequency of fishing with floating nets is 5 times a week, up to6 times a week. Sometimes, a fishing frequency of 2 times a day may be justified by the abundance of fish in the FADs. At a constant price and costs, a positive impact on the income from the sale of fish is observed, ending up with an increase in the profitability.

The effect of fishing costs on the profitability of small pelagic capture fisheries in Nusaniwe sub-district. The calculation results show a negative and significant effect, with a coefficient value of 0.126. It means that an increase in the cost of fishing will decrease profitability at a rate equal to the regression coefficient. The results of this estimation indicate that the cost of fishing has a strongly significant contribution to the profitability. However, at a closer look, small pelagic fishing in the research area can only be carried out a maximum of 1 or 2 times a day with a good productivity rate. The increase in fishing costs is rare considering the time to return to home base is around 06.00 to 09.00. The increase in fishing costs often occurs because the number of fish caught exceeds the capacity, so that they have to return to fishing in the area. The increase of the fishing costs will reduce profitability. However, in reality, the costs incurred at the beginning of the trip will finance fishing activities throughout the day. The cost of fishing consists of crew ration costs, fuel costs and maintenance costs. The cost of fishing has a significant variability.

The analysis results indicate that new employment and business development opportunities still exist, allowing for new fleet capacities. This assumption is based on the finding that investment does not affect profitability. However, activities targeting small pelagic fish capture must be controlled, in particular for limiting the waste fuel oil (Boopendranath 2012). The results of this analysis also show that catching small pelagic fish, which is the focus of this research, requires a control of the fishing costs also in order to avoid cascading costs that are less relevant to the fishing activities.

Conclusions. Through the findings of this research, it was determined how the variables investment (X_1), fishing experience (X_2), fishing frequency (X_3) and fishing costs (X_4) influence the profitability (Y) of small pelagic capture fisheries in Nusaniwe sub-district. From the results of this study it can be inferred: 1) the investment (X_1) does not affect the profitability; 2) the experience of fishing (X_2) has a significant positive effect on the profitability; 3) the frequency of fishing (X_3) has a significant positive effect on the profitability; 4) the cost of fishing (X_4) has a significant negative effect on the profitability. Some recommendations can be formulated, according to these findings: 1) Managing the fishing costs is a factor that must be controlled, 2) Adding new fleets is still possible, the fish stock allowing for additional investments in capture fisheries.

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