# The Effect of Modern and Traditional Equipment Using Fisherman's Revenue During Dry Season

Setya Prihatiningtyas*
Faculty of Socials and Politics Sciences
Hang Tuah University Surabaya
Surabaya, Indonesia
*pinky.tyas04@gmail.com

*Abstract*—**The purpose of this research is to measure and analyze about the influence of using modern fishing gear and traditional fishing toward the fisherman's revenue in Kenjeran during the dry season. The population of this research is the fisherman which amounts to 228 people, and the sample used is as much as 30 fishermen. The results show that the first hypothesis; obtained the path coefficient (beta) of 0.237 which states that any addition of modern fishing gear (due to the - sign) will reduce fisherman income by 23.7% with p-value value 0.170 because p-value 0.247 greater than 0.005 then Ha rejected and Ho accepted. Significance test can also be obtained by comparing t-count with t-table. From the table above, it can be seen that t-count is 1.184 while t-table statistic value obtained by number 1,998. Then it can be concluded that Ha is rejected, and Ho accepted because the value of t-count is smaller than t-table. Second hypothesis; obtained a path coefficient (beta) of 0.089 which states that any addition of traditional fishing gear (due to sign +) will increase the income of fishermen by 4.9% with p-value 0.810 because p-value greater than 0.005 then Ha rejected and Ho accepted. Significance test can also be obtained by comparing t-count with t-table. From the table above, it can be seen that t-count is 0,243 whereas t-table statistic value obtained by 1,998. Then it can be concluded that Ha is rejected, and Ho accepted because t-count is smaller than t-table.**

*Keywords—modern fishing gear, traditional fishing gear, fisherman income*

## I. INTRODUCTION

### A. Background

Fishing communities are usually identical with poverty. Some of the things that caused it were lack of capital, lack of technology, low market access, low community participation in the processing of natural resources. With the unavailability of capital, fishermen are not able to increase production because they cannot buy boats, fishing gear and other equipment, and operational costs will not be met, so there is no higher tax [1]. The lack of knowledge of modern technology is also one of the things that hinder the increase in fishermen's income. With limited time and energy, technology is needed to help increase production because the production process can be more effective and more efficient in output quality [2]. Raw sea

conditions are dry and rainy seasons. The dry season is related to the eastern monsoon, while the rainy season with the western monsoon. The Kenjeran people, most of their lives depend on high-risk environmental and marine resources. Bad weather occurs. Areas that are vulnerable to exposure are areas because they are directly adjacent to the sea. Uncertain natural conditions and the number of people who experience changes in functions that encourage social economics of the people of the gravitational community to do adaptations that do mix.

### B. Problem Formulation

"Does the use of modern and traditional fishing gear have an influence on the fishermen's income in the dry season?"

### C. Objectives and Benefits of Research

The aim is to analyze how much influence the use of modern and traditional fishing gear on the income of Kenjeran fishermen during the dry season. While the benefits as input and consideration of relevant agencies in increasing the income of Kenjeran fishermen, especially related to seasonal behavior.

## II. RELATED WORK

### A. Fisherman

In Indonesia, fishermen usually live in coastal or coastal areas. The fishing community is a group of people who produce marine products and live in villages or coastal areas [3]. Based on the building of social structures, the fishing community consists of heterogeneous and homogeneous communities. Heterogeneous communities are those who live in villages that are easily accessible by land transportation, while homogeneous communities in remote fishing villages usually use simple fishing gear, so productivity is small.

### B. Modern and Traditional Fishing Gear

The more sophisticated technology used by fishermen can increase the productivity of the results, meaning that people earn higher income. Fishermen are categorized as someone who works to catch fish using simple fishing gear, ranging from fishing rods, nets, nets, trawls, and so on. In its

development it is categorized as a person who catches fish with more modern tools, namely fishing boats with modern fishing gear.

### C. Fisherman's Income

The income of fishermen is determined by profit and rarely received by a fixed wage/salary system received by fishermen [4]. In the profit-sharing system, the share dividend is income after deducting the cost of exploitation issued at the time of operation plus the cost of selling the results. In this case, including the cost of fuel oil, ice and salt as well as crew costs and payment of fees. In general, other costs that still include the cost of exploitation such as reparation costs are borne by the equipment owner. The fish caught by the owner are sold and the profit sharing is calculated. The amount of fishermen's income depends on the results of fishing and marketing [5]. Catching is influenced by the type of boat and fishing gear, the season of fish and the nature of the condition, especially wind and full moon.

### D. Season

*1) Rainy season:* The rainy season is related to the western monsoon gusts. This situation causes the wind to blow from Asia to Australia which occurs in December, January, and February which is a winter in the Northern Hemisphere and summer in the Southern Hemisphere.

*2) Dry season:* The dry season is related to the east monsoon. This situation causes the wind to blow from Australia to Asia in July to August. Monsoon occurs from June to September. In Indonesia, monsoon winds give an important sea effect. Current conditions and the rainy season waves are different from the dry season, so they influence to go to sea or not.

### E. Seasonal Changes and Their Impact on Fisherman's Life

The long dry season that occurs every year, for example, not only disrupts the production of agricultural activities, but also has an impact on fishing communities who are troubled in maintaining the survival of their families. This period is called the "famine" period. Conversely when the rainy season is a sign of the beginning of the fishing season so that the fishing community can easily meet the needs of their families [6]. When the famine comes, then to meet the daily necessities of life look for other professions that can be done such as being a pedicab driver. Meanwhile the wives of fishermen (fishermen laborers) are forced to sell all household items that are considered valuable or pawn pawnshops to fulfill their daily lives. When the season happens to fishing communities, they want help from the government to ease the burden of their lives. On the other hand, on the other hand, the government sometimes thinks that the lives of the fishermen themselves are wasteful. In the official perspective the meaning of being wasteful is that fishermen tend to spend their money to shop when in the abundant harvest period, without remembering saving for tomorrow. Demian behavior makes it difficult for fishermen to move from the poverty line [6].
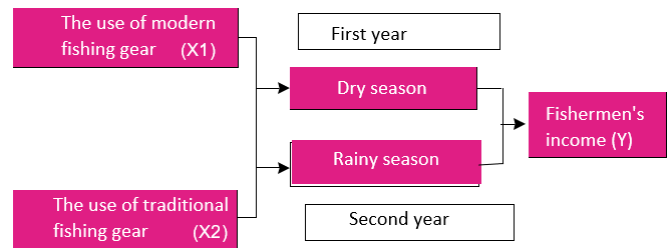
### F. Conceptual Framework



Fig. 1.  Conceptual framework.

Based on the research study model, it can be derived into a hypothetical model based on the theory described earlier. This research hypothesis model is included in the conceptual framework as shown in Figure 1. In general, it can be stated that the use of fishing gear with different forms and functions in different seasons with different seasonal characteristics, the opinion of fishermen will be affected.

### G. Hypothesis

$H_{01}$ = The use of modern fishing gear does not affect the income of fishermen in the dry season

$H_{a1}$ = The use of modern fishing gear affects the income of fishermen in the dry season

$H_{02}$ = The use of traditional fishing gear does not affect the income of fishermen in the dry season.

$H_{a2}$ = The use of traditional fishing gear affects the income of fishermen in the dry season.

## III. RESEARCH METHODOLOGY

### A. Research Methods and Types

Research methods with survey methods, namely investigations to obtain facts from existing symptoms [7]. This type of research is explanatory with a quantitative approach. Explanatory nature is an explanation to test a theory or hypothesis in order to strengthen or reject the theory or hypothesis of existing research results [8]. Whereas quantitative views of a reality can be classified, concrete, measurable, and causal variables where the research data is numerical, and the analysis uses statistics.

### B. Concept Operationalization

*1) Use of modern and traditional fishing equipment:* The use of modern fishing gear such as motorboats, nets and sophisticated fishing gear, or also the use of traditional fishing gear such as sailboats, simple hooks, and fishing gear that are still very simple.

*2) Fisherman revenue:* Fishermen's income is measured by the average monthly income or the total amount of money earned by fishermen's households from the results of fishing that can be spent on consumption and savings, also including assets owned in the form of houses and motorized vehicles during the dry season when the sea conditions relatively friendly.

## C. Measurement of Variables

Criteria for evaluating respondents' answers using a Likert scale. "Likert scale is a scale used to measure one's attitudes, opinions, and perceptions about social phenomena" [8]. The score of the questionnaire answers is shown in the following table 1.

TABLE I.        SCORING QUESTIONNAIRE ANSWERS

| Answers | Score | Criteria |
|---------|-------|----------|
| A | 5 | Strongly agree |
| B | 4 | Agree |
| C | 3 | Doubtful |
| D | 2 | Not Agree |
| E | 1 | Disagree |

## D. Preparation Stage

- Determination of Location, at Kenjeran Beach, Kenjeran Subdistrict, Surabaya City.

- Preliminary Observation immediately observed the incident at Kenjeran Beach in Surabaya City to formulate the problem.

- Literature Study, by studying the literature, articles relating to the use of technology and fishermen's income.

- Determination of Population and Sample. The researcher took the entire population of fishermen in Kenjeran Beach, Kenjeran Subdistrict, Surabaya City, amounting to 228. Sampling with probability sampling technique using the Slovin formula:

$$n = \frac{N}{1 + Ne^2}$$

n   =   Sample size
N   =   Population size
E   =   Percent looseness of inaccuracy due to sampling errors that can still be tolerated or desirable 10%

Based on the formula above, the recommended sample is 70 with the following details:

$$n = \frac{228}{1 + 228(0,1)^2}$$

$$n = \frac{228}{1 + 2,28}$$

$$n = 69,51219 \approx 70$$

The amount is assumed to be adequate because there are still around 50% of the recommended sample size. The minimum sample size in a good study is 30 [9].

## E. Data Collection Stage

*1) Observation:* Direct observations were made in the Kenjeran Beach area of Surabaya City to obtain accurate information about the use of modern and traditional fishing gear and the income of fishermen.

*2) Questionnaire:* The distribution of the questionnaire was addressed to Kenjeran Fishermen to fill out questionnaires objectively. The data obtained were analyzed to test the truth of the hypothesis proposed.

*3) Documentation:* Documentation is a technique by reviewing documents and reports from secondary data related to the purpose of the study.

## F. Data Analysis Techniques

*1) Validity test:* Calculate the correlation of question item scores with a total score of a question. Calculation is done by Product Moment with the formula [10]:

$$r_{xy} = \frac{N \sum xy - (\sum x)(\sum y)}{\sqrt{\{N \sum x^2 - (\sum x)^2\}\{N \sum y^2 - (\sum y)^2\}}}$$

$r_{xy}$   =   Correlation coefficients  and y
N   =   Numbers of respondents
x   =   Score of each item x
y   =   Total score y
$\sum x$   =   Number of item x scores
$\sum y$   =   Number of item y scores

The questionnaire is said to be valid if the statement reveals something that will be measured. Validation test is calculated by comparing correlated item-total correlations with r table values. To find out the score of each valid or not statement item, then set the following statistical criteria:

- If r counts > r table and is positive, then the variable is valid.

- If r counts < r table, then the variable is invalid.

*2) Reliability test:* Reliability is an index that shows the extent to which a measuring device can be trusted or reliable [11]. The reliability formula uses the cronbach's alpha coefficient formula in the form of:

$$r_{11} = \frac{k}{k-1} + \left[ 1 - \frac{\sum \sigma_b^2}{\sigma_1^2} \right]$$

$R_{11}$   =   Instrument reliability
k   =   Number of variable items
$\sum \sum b^2$   =   Variant of grain variants
$\sum_1^2$   =   Total variant

In this study testing the validity and reliability is done using SPSS 16.0. Reliability testing is done by looking at the results of the calculation of the cronbach alpha (a). If the alpha value> 0.7 means sufficient reliability (sufficient reliability) while if alpha> 0.80 means all items are reliable, consistent, and strong. There are also those who interpret it with the provisions:

- If alpha> 0.90, the reliability is perfect

- If alpha is 0.70 – 0.90, then the reliability is high

- If alpha is <0.50, the reliability is low or not good

### G.  Data Analysis Method

*1)  Analysis of multiple linier regression:* Used to determine the accuracy of the prediction of the effect that occurs between the independent variable (X) on the dependent variable (Y), using the formula according to Sugiyono [8], namely:

$$Y = a + b_1X_1 + b_2X_2 + e$$

Y     =    Fisherman income
*a*     =    Constant value
$x_{1,2}$    =    The use of modern, traditional fishing gear
$b_{1,2}$    =    Regression coefficient $x_1, x_2$
e     =    Standard error

*2) Hypothesis testing*

*a)  Determination coefficient ($R^2$):* Measure how far the ability of the model in explaining the variation of the dependent variable. The coefficient of determination ($R^2$) between zero and one.

*b)  Simultaneous test (F):* Used to determine the effect of independent variables on the dependent variable. The F test formula is stated by Sugiyono [8] in the form of:

$$F_{hitung} = \frac{R^2/k}{(1 - R^2)/(n - k - 1)}$$

$R^2$    =    Multiple correlation coefficients
k     =    Number of independent variables
n     =    Number of samples

The basis of decision making according to uses a number of significance probabilities, namely comparing the calculated Fh value with the Ftable value [12]. If the calculated F value is greater than the value of F table, then Ho is rejected and accepts Ha.

- If sig> ά (0.05), then Ho accepted Ha rejected

- If sig <ά (0.05), then Ho is rejected by Ha accepted.

*c) Partial test (t):* To determine the significance of the influence of independent variables on the dependent variable individually. T test formula as stated by Sugiyono [8]:

$$t = \frac{\beta}{Sb}$$

$T_{hitung}$    =    T test calculation value
B     =    Regression coefficient value
Sb    =    Standard error

## IV.  RESULTS AND DISCUSSION

### A.  Research results

This research was at Kenjeran Beach, Kenjeran Subdistrict, Surabaya City. Cantrang fishing gear included in the classification of circumferential bag trawl consists of net bag, net body, wing, buoy, ballast, top rope, and bottom rope. Cantrang boats are made of wood, usually teak wood; tamarind wood; or johar wood. Cantrang ships use diesel fuel with a peak season requirement of 300-600 liters, while in the dry season it only requires around 30-90 liters of diesel. Cantrang boats are equipped with hatches, to store fish catches of 3m in length, 2m in width, in 2m (fig. 2).



Fig. 2.   Cantrang ship.



Fig. 3.   Catching of pari fish.

The catch of fishermen from Kenjeran Beach, Kenjeran District, Surabaya City is Keting, Pari, Rajungan, and Crab (fig. 3 and fig. 4).

| Use of Modern Fishing Equipment ($X_1$) | 0,846 | Reliable |
|---|---|---|
| Use of Treaditional Fishing Equipment ($X_2$) | 0,667 | Reliable |
| Fisherman Revenue (Y) | 0,623 | Reliable |

Cronbach's alpha value on 3 variables shows $\geq 0.60$. So it is stated that the instrument items to measure the variables of the use of modern fishing gear, the use of traditional fishing gear, and fishermen's income are said to be valid and reliable and are suitable to be used to measure these variables.

### C. Analysis of Multiple Linier Regression

After the variables have been tested for validity and reliability, the next step is to describe the significance of each variable, which shows the influence or not the influence of the use of modern and traditional fishing gear on fishermen's income. Each of the variables tested represents the hypothesis in this study.

$$Y = a + b_1X_1 + b_2X_2 + e$$
$$Y = 13{,}97 + 0{,}170X_1 + 0{,}089X_2 + e$$

| | | |
|---|---|---|
| Y | = | Fisherman revenue |
| $a$ | = | Constant value |
| $x_{1,2}$ | = | The use of modern, traditional fishing gear |
| $b_{1,2}$ | = | Regression coefficient $x_1, x_2$ |
| e | = | Standard error |

### D. Hypothesis Test

*1) Determination coefficient ($R^2$):* Based on the test results of the coefficient of determination hypothesis (R2) using SPSS 16.0, the results of the use of modern fishing gear and the use of traditional fishing tools have an effect on 5% of fishermen's income, while 95% are influenced by other variables not examined. A small R² value means that the ability of independent variables in explaining dependent variations is very limited.

*2) Simultaneous test (F):* Based on simultaneous testing of X1 and X2 against Y, using SPSS 16.0, the results of the Fcount value of 0.717 were obtained with a probability value (sig) = 0.497. Fcount value (0.717)> Ftable (2.61), and sig value. greater than the probability value of 0.05 or the value of 0.497 <0.05; then Ho is rejected and Ha is accepted.

*3) t test:* Testing the significance level of the hypothesis that has been set in this study using the t test at $\alpha = 0.005$. Following the results of hypothesis testing based on the t test:



Fig. 4. Catching crab and crab fish.

### B. Validity and Reliability Test

*1) Validity test:* A question item is declared valid if it has a correlation value (r) $\geq$ value of r table. The r value of the table is from the Product Moment r value table with a value of 0.246.

TABLE II. VARIABLE VALIDITY TEST

| Variable | Value of r Result | Value of r Table | Information |
|---|---|---|---|
| *Use of Modern Fishing Equipment ($X_1$)* | | | |
| M1 | 0,999 | 0,246 | Valid |
| M2 | 1,000 | 0,246 | Valid |
| M3 | 0,719 | 0,246 | Valid |
| *Use of Traditional Fishing Equipment (X2)* | | | |
| T1 | 0,629 | 0,246 | Valid |
| T2 | 0,368 | 0,246 | Valid |
| T3 | 0,667 | 0,246 | Valid |
| *Fisherman Revenue (Y)* | | | |
| P1 | 0,860 | 0,246 | Valid |
| P2 | 0,520 | 0,246 | Valid |
| P3 | 0,280 | 0,246 | Valid |
| P4 | 0,534 | 0,246 | Valid |

Variable use of modern fishing tools is measured using 3 question items indicating that all three question items are valid and can be further analyzed. In the traditional fishing gear usage variables measured using 3 question items indicate that all three question items are valid and can be further analyzed (table 2). The fisherman income variable is measured using 4 question items and shows the results that all four question items are valid and can be further analyzed.

*2) Reliability test:* Reliability test results of this study using SPSS software on each variable and obtained values as in table 3 below.

TABLE III. VARIABLE RELIABILITY TESTING

| Variable | Nilai *Cronbach's Alpha* | Information |
|---|---|---|

TABLE IV. T TEST RESULT

| Hypothesis | Variable Free | Variable Bound | Beta | $t_{hitung}$ | $t_{tabel}$ | p-value | Information |
|---|---|---|---|---|---|---|---|
| First | $X_1$ | Y | 0,170 | 1,184 | 1,998 | 0,247 | $H_a$ refused $H_o$ accepted |
| Second | $X_2$ | Y | 0,089 | 0,243 | 1,998 | 0,810 | $H_a$ refused $H_o$ accepted |

Based on table 4 above can be done research hypothesis testing. The results of multiple linear regression analysis using SPSS software obtained the results:

- The first hypothesis; obtained path coefficient (beta) of 0.170 stated that each addition of the use of modern fishing gear (because of the sign -) will reduce fisherman income by 23.7% with a p-value of 0.247 because the p-value is greater than 0.005 (0.247> 0.005) then Ha is rejected and Ho is accepted. Significance test was obtained by comparing tcount with t table. From the table above, it can be seen that t count is 1.184 while the statistical value of t table is 1.998. Then it was concluded that Ha was rejected and Ho was accepted because the tcount was smaller than t table (1.184 <1.998) or in other words that the use of modern fishing tools had no significant effect on fishermen's income.

- Second hypothesis; obtained path coefficient (beta) of 0.089 states that each addition of the use of traditional fishing gear (because of the + sign) will increase fishermen's income by 4.9% with a p-value of 0.810 because the p-value is greater than 0.005 (0.810> 0.005) then Ha is rejected and Ho is accepted. Significance test was obtained by comparing tcount with t table. From the table above, it can be seen that t count is 0.243 while the statistical value of t table is 1.998. So it can be concluded that Ha is rejected and Ho is accepted because the tcount is smaller than t table (0.243 <1.998) or in other words that the use of traditional fishing tools has no significant effect on fishermen's income.

## V. RESULTS AND DISCUSSION

This study shows that the variables of the use of modern fishing gear (X1) and the use of traditional fishing gear (X2) are independent variables, and the fisherman income variable (Y) is the dependent variable. The results of the analysis using the t test showed that there was no significant influence between the use of modern fishing gear and the income of fishermen with an effective contribution of 23.7%, this was due to the lack of knowledge owned by fishermen and the lack of socialization about the use of modern fishing gear. The results

of the analysis using the t test showed that there was no significant effect between the use of traditional fishing gear on the income of fishermen with an effective contribution value of 4.9%, this was due to the weather that occurred during the dry season which was closely related to the east monsoon . The wind is the wind that occurs because of the high-pressure center above the Australian mainland and the low-pressure center above the Asian mainland.

## VI. CONCLUSIONS AND FUTURE SCOPE

During the dry season the use of fishing gear, both modern and traditional, does not significantly influence the income of fishermen in Kenjeran Beach, Kenjeran District, Surabaya City. The influence of the use of modern fishing gear and the use of traditional fishing gear is only 5% of fishermen's income, while 95% is influenced by other variables that are not examined in this study.

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