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ANALYSIS OF ECONOMIC MODEL OF TERASAK FISHERMAN'S HOUSEHOLD AT MADURA STRAIT

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ABSTRACT

In dry season, the income level of fishermen is very minimal and they often do not get any catches at all. In periods of low income, fishermen's wives and children usually have to fight hard to earn money by doing all the work that brings income. The purpose of this research is to analyze Household Economic Model of Fishermen *Terasak* at Madura Strait. Samples were taken comprised of two groups, namely fishhook skipper and gillnet fishermen. Several samples were taken from each group. Respondents were determined by "purposive sampling" method. Researchers took 31 families of small-scale *terasak* fisherman at Madura Strait. Data analysis used qualitative and quantitative descriptive (regression analysis). Whereas qualitative descriptive analysis was used to analyze and compare factors that are affecting fishermen family economy. Research results showed Household Economic Model of Madura Strait *Terasak* Fishermen that the production value or fishing income of Madura Strait fishermen is strongly influenced by Production Assets, Fuel, Working time and Education Level. The working time fishermen's family's level is influenced by production assets, the number of fisherman members and non-fisheries working time. The level of non-fisheries income is strongly influenced by non-fishing business assets, non-fisheries working time, number of family members. The level of expenditure of Madura Strait fishermen is influenced by fishing income, non-fisheries income, number of family members and education of fishermen's wives. Spending levels for Madura Strait fishermen were affected by fishing income, non-fishing income, family size, and the fisherman's wife's education. Variables in fishing working time and education are not significant relate to fishing production. The non-fisheries working time variable is not significant to non-fisheries income. Variables in the production assets, number of fishermen's families, and non-fisheries working time are not significant to the fishing working time. The variables of total household income, number of family members, and education of fishermen's wives are not significant to the total of staple consumption.

KEY WORDS

Gillnet, fishermen *terasak*, household economics, Madura Strait.

Indonesia is known as maritime country that has water (sea) three times larger than the land so it has many potential in fisheries aspects. With such potential, marine development in Indonesia today has purpose to improve their resources as well as increase the functions of the national marine area, including the ZEE in a harmony and appropriate by concern in carrying capacity of the sea and its sustainability to increase people's welfare and develop business and field work opportunities [2]. Indonesia has the longest coast in the world with more than 81,000 km of the coastline. It also has 67,439 villages that approximately 9,261 villages are categorized as coastal villages and most of their citizens are poor. Coastal villages are potential pockets of poverty, especially in structural aspect. The difficulty of overcoming poverty has made citizen in this area have to bear the burden of life which cannot be ascertained when the period ends [3].

The phenomena of poverty then overfishing are complex and multidimensional. How they are lived is often used as measuring tool for poverty but is only one part in chain of factors that cause the poverty syndrome. From a political-economic point of view, poverty is understood as a product of economic forces, the relation of production, and authority which in their entirety result in the process of poverty. These pressures faced by fisherman

household that have been rooted in complex interrelated factors. Natural factors are the fluctuations in fishing season and the natural structure of economic resources whereas non-natural factors are the limited asset of fishing technology, weak marketing networks and the negative impact of policies on fisheries aspect since the last quarter century [4].

Characteristics of fishing communities are different from those of farming communities due to differences in the resources they have. Farming (agrarian) communities face controlled resources, namely land that the place to produce commodities with predictable results, it is possible to have a permanent production location, so the business can be stable, and the risk factor is relatively small. In the dry season, the income level of fishermen is very minimal, and they often do not get any fish at all. This low catch season lasts about 8 months and the accumulated savings obtained during the fishing season will not be sufficient to overcome the difficulties of daily living needs of fishermen's households. In periods of low income, fishermen's wives and children usually have to fight hard to earn a living by doing all the work that brings income [5].

Likewise, when not at sea, fishermen can work anything on land to earn income so the live of their household can be guaranteed. However, how far these job opportunities can be obtained by fisherman's household is influenced by the characteristics of the local village economic resource structure. [6]. In coastal villages whose economic resource structures depend entirely on marine fishery production, job opportunities are very limited and other business sectors that usually rely on the raw materials procurement from marine products will stop operating so that employment opportunities cannot continue continuously. According to [7] fishing business is an exploitative business, where this business includes a risky business not getting results because this business depends entirely on nature.

A primary issue in this study; how is the household economic and economic model of *terasak* fishermen at Madura Strait.

MATERIALS AND METHODS OF RESEARCH

The method using qualitative descriptive on natural situation and collecting qualitative data. Qualitative methods are based on phenomenological philosophy that prioritizes appreciation and seeks understanding and interpreting the human behavior interaction in certain situations [8]. This qualitative descriptive analysis is used to see and find out the characteristics in this study which become cases or problems, namely poverty alleviation and food security experienced by small-scale fishermen in Lekok Pasuruan District. The unit of study in the case study can be individuals, families, groups, and certain communities who are small-scale fishing and gillnet skipper fishermen.

While the survey approach is research that takes sample from population and uses questionnaire for the primary data collection tools. It is also explained that one of the main advantages of this study is that it allows generalizations to a large population. Survey method can be used to predict the certain condition of social phenomena and evaluate research results [9].

This research used qualitative data and quantitative data. The use of qualitative data is used for providing detail explanations about the existing phenomena. The techniques of data collection were carried out by documentation, interviews and questionnaires [10].

The data collected in this research need two kinds of data which includes primary and secondary data. Primary Data is based on primary information sources and provides information and data that directly get from self-collection [11].

The primary data were sourced from related parties in the research area. Primary data is determined by structured questionnaire technique that distributed to small fishermen, especially fishing tools and gillnets [12]. Secondary data is data that has been collected by outside researcher and published in general [13]. This data comes from various literatures such as textbooks, journals of research, research reports, data from relevant agencies, etc. Secondary data also can be said as processed data.

The sample taken is part of the population which is the real object in a study [14]. while the population or universe is the total number of units of analysis whose characteristics will

be estimated [15]. In this study, the population was small scale fishermen, especially terasak fisherman skipper and gillnets who do fishing activities.

In accordance with the problems, objectives, and research focus. Researchers need to interview several informants who are considered to really know or are directly involved in small fishermen's household business activities in Lekok, knowing the problems of fishermen in Lekok. In this case, the samples taken consisted of two groups of small fishermen, namely small-scale gillnet fishermen. From each group, several samples were taken. In this case the respondents who are taken are determined by the "purposive sampling" method, namely sampling where in taking the intended elements in the sample it is done intentionally with a record sample taken representative [16].

In this study, the researchers took 31 families of small-scale gillnets grinded by purposive sampling with the following sampling criteria: 1) The fishing technology used is simple with a small boat size of less than 30 Grosston (GT) 2) use less than 12 PK mesin engine, 3). The amount of business capital is limited, 4) The number of members of the organization is generally based on relatives, close neighbors, and/or close friends. 5) Its orientation on economics is relate to basic daily needs and 5) Types of food used to meet the needs of fishermen [17].

The data analysis techniques used descriptive analysis on qualitative and quantitative with regression analysis. Quantitative descriptive analysis was used for analyzing the environmental conditions of the research location, the work behavior of the fishermen's families, and the expenditure of fishermen's production costs. While the descriptive qualitative analysis is used for analyzing and comparing the factors that effect to the economy owned by the fishermen's h, which include the variables of family income, production income, family consumption and the outpouring of fisherman's working time. [18].

Analysis of regression is generally used for analyzing the relationship between 2 or more variables. So, it is known which variables are influenced by other variables and which ones are affected. The variable that get impact is called the dependent variable, while the variable that give effect is called independent variable [19].

Multiple regression analysis is dependency technique. So, for using it, we should be able to determine the variable into dependent variables or independent variables. Regression analysis is statistical tool that used when the dependent and independent variables are in the form of a matrix. However, in some certain circumstances, non-metric data variables (dummy variables, ordinal data or nominal data) can be used. [20].

Multiple linear regression analysis was used to analyze the relation between the factors that influence food security in fisherman households, which includes the factors that exist in the variables of production revenue, income, consumption expenditure, and working time.

In this study there are several dependent variables, namely the dependent variable of Fishing Production Revenue (FPR), the dependent variable of non-fishing income (NFI), the dependent variable of fishing working time (FWT), and the dependent variable of Total Staple Consumption (TSC).

Regression model used to see the relation between one dependent variable with several independent variables [21]. It called multiple regression models. The multiple linear regression model used in this data analysis.

a. Fishing Production Revenue (FPR):

$$Y = a + b_1x_1 + b_2x_2 + b_3x_3 + \dots + b_kx_k + e$$

$$FPR = a + b_1 + b_2 PA + b_3 FFO + b_4 FWT + b_5 FE + e^u$$

Where:

FPR: Fishing Production Revenue (kg/year);
 PA: Production Aset (IDR);
 FFO: Fuel Amount for Fishing Operations (Ltr/year);
 FWT: Fishing Working Time (HOK/year);
 FE: Fishermen Education (year).

b. Non-Fisheries Income (NFI):

$$Y = a + b_1x_1 + b_2x_2 + b_3x_3 + \dots + b_kx_k + e$$

$$NFI = a + b_1 NWF + b_2 FFM + b_3 NBA + e^u$$

Where:

NFI: Non Fisheries Income (IDR /year);
 NWT: Non Fisheries Working Time (HOK/year);
 FFM: Fishermen Families Members (Person);
 NBA: Non Fishing Business Asset (IDR).

c. Fishing Working Time (FWT):

$$Y = a + b_1x_1 + b_2x_2 + b_3x_3 + \dots + b_kx_k + e$$

$$WFT = a + b_1 PA + b_2 FFM + b_3 NWF + e^u$$

Where:

WFT: Fishing Working Time (HOK/year);
 PA: Production Asset (IDR);
 FFM: Fishermen Families Members (Person);
 NWT: Non Fisheries Working Time (HOK/year).

d. Total Staple Consumption Fishermen (TSC):

$$Y = a + b_1x_1 + b_2x_2 + b_3x_3 + \dots + b_kx_k + e$$

$$TSC = a + b_1 FI + b_2 NFI + b_3 FFM + b_4 FWE + e^u$$

Where:

TSC: Total Staple Consumption Fishermen (IDR/year);
 FI: Fisheries Income (IDR/year);
 NFI: Non Fisheries Income (IDR/year);
 FFM: Fishermen Family Members (Person);
 FWE: Fisherman's wife education (Years).

RESULTS OF STUDY

There are several variables that are hypothesized affecting Fishing Production Revenue (FPR), namely production assets (PA), Fuel Amount for Fishing Operations (AFO), Fishing Working Time (FWT), Fishermen Education (FE). The results of the calculation to determine the relationship of these independent variables with the dependent variable fishing production revenue (FPR) as follows:

Table 1 – Regression Results of Factors Affecting Fishermen *Terasak* Household: Fishing Production Revenue (FPR)

Variables	Coef.	t	Sig.
Constant	- 48.785E7	- 1.83	0.098*
PA	5.859	2.059	0.049**
AFO	0.041	3.285	0.002 ***
FWT	- 0.395	- 1.049	0.301 NS
FE	1.497	0.693	0.450 NS
Adjusted R ²	0.653		
F	8.785		0.000***
N	31		

From the table 1, it can be seen the regression equation is:

$$FPR = - 48.785 \times 10^7 + 5.859 PA + 0.041 AFO - 0.395 FWT + 1.497 FE + e^u$$

Constanta of $-48.785.049.892 \times 10^7$ states that if all variables not affected, fisherman will be a loss for IDR $-48,785,000$.

The Regression coefficient of 5.859 PA states that for each additional 1 unit of production assets, it will increase fishing production revenues by IDR 5.859.

The Regression coefficient of 0.041 AFO states that each addition of 1 liter of fuel oil will increase the acceptance of fishing production by IDR 0.041 fish production.

The Regression coefficient of -0.395 states that each additional 1 HOK of fishing work will reduce fishing revenues by IDR 0.039 [22]. this is because a person's maximum work in 1 day is 8 hours, so if an additional number of working hours, it will reduce the maximum revenue and also the condition of fisheries resources are overfishing so that working time of fishing is not optimal.

The Regression coefficient of 1.497 FE states each addition of 1 unit of production assets will increase fishing production revenues by IDR 1.47. So, improving technology and fishing gear will increase the productivity of fishermen [23].

3.2. Regression Analysis of Non-Fisheries Income (NFI)

The factors that affect non-fisheries income (NFI) are several variables, namely Production Asset (PA), Fishermen Families Members (FFM) and Non-Fisheries Working Time (NWT). The results of calculations to determine the relation of these independent variables with the dependent variable of non-fisheries income as follows:

Table 2 – Regression Results of Factors Affecting Fishermen *Terasak* Household: Non Fisheries Income (NFI)

Variables	Coef.	t	Sig.
Constant	- 0.072	- 0.033	0.978
NWT	0.039	2.751	0.011***
FFM	0.021	0.320	0.765 NS
NBA	0.013	2.767	0.011***
Adjusted R ²	0.519		
F	6.795		0.021**
N	31		

From the table 2, it can be seen the regression equation is:

$$NFI = -0.072 + 0.039 NWT + 0.021 FFM + 0.013 NBA + e^u$$

Constanta of -0.072 stated that if that if all variables not affected, fisherman will lose non-fishing income for IDR 0,072.

The regression coefficient of 0.039 NWT states that each additional 1 unit of non-fisheries business assets will increase non-fisheries income by IDR 0.039.

The regression coefficient of 0.021 FFM states that each additional 1 HOK non-fishing working time, it will increase non-fisheries income by IDR 0.021.

The regression coefficient of 0.013 states that for each additional number of family members 1 person, it will increase non-fisheries income by IDR 0.013 [24].

The factors that are hypothesised to affect non-fisheries income (NFI) are several variables, namely Production Asset (PA), Fishermen Families Members (FFM), Non-Fisheries Working Time (NWT). Calculations results to determine relation of independent variables with dependent variable of non-fishery income as follows.

Table 3 – Regression Results of Factors Affecting Fishermen *Terasak* Household: Fishing Working Time (FWT)

Variables	Coef.	t	Sig.
Constant	368.75	3.201	0.004***
PA	- 1.505	- 1.195	0.244 NS
FFM	- 16.769	- 0.428	0.671 NS
NWT	- 0.190	- 0.545	0.592 NS
Adjusted R ²	0.075		
F	0.697		0.555 NS
N	31

From the table 3, it can be seen the regression equation is:

$$FWT = 368.75 - 1.505 PA - 16.769 FFM - 0.190 NWT + e^u$$

Constanta of 368.75 states that if all variables not affected, then fishermen have fishing working time of 368.75 HOK.

The regression coefficient -1.505 PA states that each additional number of production assets will reduce the fishing working time by 1.505 HOK. This negative relation because the addition of production assets will increase the productivity of fishermen from the technological improvement so that fishermen work less physically with using better technology. Unpredictable weather/season and overfishing waters indication are the other factors. This requires the development of local wisdom and to find fishery resources which is not optimal yet [25].

The regression coefficient -16,769 FFM states that every increase in the number of male fishermen's labor force will reduce the outpouring of fisherman's working time at sea by 16,769 HOK. It was obtained negative results indicating that the waters in Lekok were over fishing, this was related to the negative results obtained from FFM and also the small number of male fishing families. Because they work as carpenters, workshops and construction workers [26].

The regression coefficient -0.190 NWT states that each additional non-fisheries working time will reduce fisheries working time by -0,190 HOK. this is due to the amount of working time switching from fisheries to non-fisheries sector but the amount of non-fisheries working time is small so the main income is from fishing, so that non fisheries working time usually done by other family member especially the fishermen's wives who do fish processing according to local wisdom that exists in the fishing community [27].

The factors that are hypothesised affected the Total Staple Consumption Fishermen (TSC) was Non Fisheries Income (NFI), Fishermen Family Members (FFM), and Fisherman's wife education (FWE). Calculations results to determine relation of independent variables with dependent variable of Total staple consumption Fishermen (TSC), as follows:

Table 4 – Regression Results of Factors Affecting Fishermen *Terasak* Household: Total Staple Consumption Fishermen (TSC)

Variables	Coef.	T	Sig.
Constant	14.143	3.201	0.001***
FI	- 0.014	3.995	0.757 NS
NFI	- 0.205	- 3.118	0.552 NS
FFM	- 0.497	- 8.395	0.409 NS
FWE	0.197	0.496	0.594 NS
Adjusted R ²	0.055		
F	0.349		0.838 NS
N	31		

From the table 4, it can be seen the regression equation is:

$$TSC = 14.143 - 0.014 FI - 0.205 NFI - 0.497 FFM + 0.197 FWE + e^u$$

Constanta of 14,143 states that if all variables not affected, fishermen have a total Staple consumption of IDR 13,821.

The regression coefficient -0.014 FI states that each additional fisheries income will reduce total staple consumption by IDR 0.014. This is because to increase business investment in order to increase alternative income, as well as the influence of fisheries income where marine resources are already over fishing.

The regression coefficient -0.205 NFI states that each additional non-fisheries income will reduce the total consumption of fishermen by IDR 0.205. The negative relation with non-fisheries income because very few fishermen work in non-fisheries sector. This means that fishermen still depend on their income from fishing.

The regression coefficient -0.497 states that each additional number of fishermen's family members will reduce the total family staple consumption by IDR 0.497. This is linear with the increase in the number of fisherman's family members, the total expenditure on food consumption and non-food consumption of basic consumption will also increase. So that the quantity and quality will decrease with a relatively constant amount of income but the amount of consumption increases. This is appropriate with the theory of meeting basic needs on other consumption (28).

The regression coefficient of 0.197 states that every increase in the level of fishermen's education will increase the total level of basic consumption by IDR 0.197. its because the higher fishermen's human resources, the higher the education budget will be spned on the total consumption of Madura Strait fishermen's families (29).

CONCLUSION

This research was conducted on fishermen of *terasak* gillnet. It can be concluded that the Fisherman's Household Economic Model in the Madura Strait:

- The production value or fishing income of Madura Strait fishermen is strongly influenced by Production Assets, Fuel, Working time and Education Level;
- The working time fishermen's families level is influenced by production assets, the number of fisherman members and non-fisheries working time;
- The level of non-fisheries income is strongly influenced by non-fishing business assets, non-fisheress working time, number of family members;
- The level of expenditure of Madura Strait fishermen is influenced by fishing income, non-fisheries income, number of family members and education of fishermen's wives.

From the Study of Fishermen's Household Economics, it is suggested:

- Economic Model of *Terasak* Fisherman should fulfill basic needs as food, clothing, shelter, health and education;
- Government should provide enough infrastructure and production facilities (Ships asset value and fishing tool) so small-scale fisherman could get cheap price with good quality;
- Need improvement institutional role of Madura Strait fisherman communities as collective action goals;
- Need improving of promotion productive economic activities in areas based on local characteristic resources; make a great market but also considering for sustainability of fisheries resources capacity and local communities and using appropriate technology for catch the fish.

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