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A Study of Household Economics on Small Scale Fisheries at Madura Strait

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Abstract
The purposes of this research are: (1) to analyze research environmental, work flow behavior of fishermen families, and fishermen production expenses. (2) to analyze Household Economic Model of Madura Strait Fishermen.Samples taken were 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 30 families of small-scale gillnet (crab gillnet, *terasak* gillnet shot and *kembung*) using purposive sampling. Samples are fishermen at Madura Strait. Data analysis used was descriptive qualitative and quantitative (regression analysis). Quantitative descriptive analysis was used to analyze research environmental, work flow behavior of fishermen families, and fishermen production expenses. Whereas qualitative descriptive analysis was used to analyze and compare factors that affecting *fishermen family* economy. Research results showed: (1) fishermen production in Madura Strait on average provide revenue to fishermen of Rp. 18,168,092/year. Sailing work flow average was 234.2 HKO/year. Fisheries Non revenue average was Rp. 2,336,667/year. Non Fisheries work flow average was 50.38 HKO/year. Fishermen consumption expenditure average was Rp. 11,276,846/year. (2) Household Economic Model of Madura Strait Fishermen was: production value level or fishermen revenue at sea was strongly influenced by Production Asset, Fuel, Work Flow and Education Level. Work Flow rate of fishermen families was affected by Asset production, number of male workforce and non fisheries workflow. Non-fishing income level was strongly influenced by non-fishery business assets, non-fishing work flow, and number of family members owned. Spending levels Madura Strait fishermen was affected by fishing income, non-fishing income, family size and fisherman's wife education.
Keywords: behavior of fishermen families, household economic, Madura Strait.

1. Introduction

Indonesia *was* a maritime country with territorial waters area three times of entire land area. Therefore, *Indonesian* country has a high potential for fisheries. *D*evelopment potential for Indonesia marine today *was* directed at utilization of marine and seabed resources as well as utilization of national territorial waters functions, including Exclusive Economic Zone in a harmonious and balanced with respect to marine capacity and sustainability to improve people *welfare* and expand business opportunities and field work (Mimit. P. 2011a). Indonesia *was* a maritime country with longest beach in the world with coastline more than 81,000 km. From 67,439 villages in Indonesia, approximately 9,261 villages were categorized as coastal village and most people were poor. Coastal villages were potential pockets of structural poverty. Difficulties to overcome poverty in *coastal* villages were made residents have to bear *uncertain* life burden without knowing when *it will over* (Kusnadi, 2000).

Anugerah Nontji (1993) stated resource potential in Indonesia *waters was* quite large, especially with announcement *of* Exclusive Economic Zone (EEZ) up to 200 miles nautical limit. Areas that can be exploited and utilized become more widespread. Based *on* evaluation results and information available, overall potential of marine fishery biological resources was 4.5 million tones per annum for Indonesia waters and 2.1 million tons per annum in Exclusive Economic Zone. *T*otal potential *was* estimated 3.5 million tones of pelagic fish per year, 2.5 million tones of demersal fish per year, 208 thousand tons of tuna fish per year, 69 thousand tons of shrimp per year, 275 thousand tons of *cakalang* fish per year and reef fish 48 thousand tons per year.

Over fishing phenomenon and poverty was complex and multidimensional. Low level live was often used as a poverty measure that was essentially just first link of a number factors of poverty syndrome. Based on political-economy, poverty was understood as a product of economic forces, production relations, and power relations. All of them make poverty process. Poverty and socio-economic pressures faced by fishermen families was also rooted in interrelated complex factors. Natural factors associated with fluctuations in natural structure of fishing season and village economic resources. Factors associated with non-natural limitations were fishing technology, poor marketing network as well as the negative impact of fisheries modernization policies that took place since last quarter century (Kusnadi, 2002).

Fishing communities characteristics was differ with farming community characteristics due differences in available resources. Farming communities (agricultural) face controlled land resource to produce a kind of commodity with predictable results. With these properties, production location can be settled. Business mobility

relatively low and business risk factors were relatively small (Stevanus, S, 2005). In dry season, fishing income level was minimal and often do not get caught at all. This law catch-season lasts about 8 months, and savings accumulation results that obtained during fishing season will not enough to overcome difficulties of daily life needs of fishermen households. In low income periods, usually wife and children of fishermen struggle to earn money by doing all work to make revenue.

When did not sail, fishermen can work anything *on* land to earn income so household survival can be assured. However, *how far* employment opportunities can be obtained by fishermen households members *were* affected by structural characteristics *of* local village's economic resources (Mimit P. 2012). *E*conomic structure coastal village's resources depend entirely *on* marine fisheries production. Employment opportunities there were very limited. Other business sectors generally based *on* procurement of raw materials from sea. They will cease to operate so that job opportunities that could be used can not take place continuously. Fishing business was an exploitative business, including business where *the* business was at risk for not getting results because it business relies entirely *on* nature. According to Reardon, T., et al, (2006). In areas with poor agroclimate conditions, risky agriculture, and no insurance markets, non farm activities allow households to cope, with severe downturns in agricultural productivity .

A primary issue in this study was as follows, how state of Household Economics fishermen, namely:

1. How Fishermen production, work flow, revenue, household expenditure ?
2. How their household economic model?

2. Method

2.1. Research Methods

Usman and Akbar (2006) conducted a qualitative descriptive under natural setting and collecting qualitative data. More qualitative methods based on phenomelogical philosophy that promotes appreciation and try to understand and interpret *the* meaning an event interaction of human behavior in certain situations. This qualitative descriptive analysis *was* used to see and to know characteristics in this study. Case or problem *was* poverty reduction and food security experienced by small-scale fishermen at Lekok, Pasuruan District. Analysis units of this study were individuals, families, groups and communities who *become fishhook* skipper and small scale gillnet.

Survey *approach* was a research that taking samples from populations and using questionnaires as main data collection tool. It also explained that one main advantages of this research was to enable to make generalization to large populations. *S*urvey results can be used to make certain predictions about social phenomena and conduct an evaluation *of* study results (Arikunto, 2006)

2.2. Data Collection Method

This study uses qualitative and quantitative data. Qualitative data *was* used to provide additional explanation of phenomena. Data collection techniques were interviews, observation, documentation and questionnaires (Khoiriyah, 2005)

2.3. Sources and Data Types

This study collected two data type, primary and secondary data. Primary data *was* obtained through primary resources and provide information and data directly as a result of data collection (Kartini, 1990). Primary data come from parties in *research* region. Primary data was determined by questionnaire technique to small fishing and especially fishing gillnet. It was a form of structured questionnaires that preparing list of questions in order to obtain data that *was* more effective and accurate in accordance with *the* research objectives.

Secondary data *was* collected by *data* collecting agency and published to user community (Nazir. M. 2005). This data comes from various literatures as textbooks, research journals, research reports, data from relevant agencies etc. Secondary data can also be said as processed data.

2.4. Sampling Techniques

Koentjaraningrat (1991) stated *that* sample *was* part *of* population that became real research object. Population or universe was *the* total number of analysis units with alleged traits (Singarimbun and Effendi, 1987). *This study p*opulation was small fishermen, particularly fishhook skipper and gillnets fishermen.

In accordance with problems, objectives and focus *of* study, researchers need to interview several informants who were considered really know or directly involved in business activities at small fishing households, knowing fishermen problems at Lekok. Samples taken *were* comprised of two groups namely fishhook skipper and gillnet fishermen. Several samples were taken from each group. Respondents were determined by "purposive sampling" method, elements *within sample were taken* purposively if representative (Marzuki, 2005).

Researchers took 30 families of small-scale gillnet (crab gillnet, *terasak* gillnet shot and *kembung*) using purposive sampling. Sampling criteria *were* as follows: (1) capture technology used *was* simple with small size *of* boat that less than 30 Grosston (GT). (2) Using a machine less than 12 PK. (3) venture capital limited. (4) *Caching* member generally from relative, close neighbors, and or close friends. (5) Economic orientation geared to *everyday* needs basis. (5) Various food *that* used as fisherman needs

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2.5. Data Analysis Techniques

Data analysis used *was* descriptive qualitative and quantitative (regression analysis). Quantitative descriptive analysis was used to analyze research environmental, work flow behavior of fishermen families, and fishermen production expenses. Whereas qualitative descriptive analysis *was* used to analyze and compare factors that affecting *fishermen family* economy. It includes variable of family income, revenue production, family consumption and fishermen work flow time (Muhammad. S. 2002)

2.6. Regression Analysis

Most regression analysis was used to analyze *relationship* between two or more variables. So here know variable variance and influenced by other variables which affect. *Variable* affected *was* called *dependent* variable, while affecting *variable*s was called independent variables (Vredenbergt, 1985).

Multiple regression analysis *was* a dependency technique. To use it, we should be able to divide *variable*s into dependent and independent variables. Regression analysis *was* a statistical tool that *was* also used when *dependent* and independent variables were matrix. However, in certain circumstances there were nonmetric variables (dummy, ordinal or nominal variable) that can also be used (Sulaiman, 2010).

Multiple linear regression analysis was used to analyze *relationship* between factors that *affect* food security in *fishermen households. It* includes factors in *variable* of production income, revenue, consumption expenditure, and work flow time.

This study uses a dependent variable namely *sail production* PRM (Q), non-fishing income (PDNP), work flow time at sea (CKM), and total staple consumption (TKP).

Nachrowi and Usman (2002) states *that* regression model was used to make *relationship* between one dependent variable and several independent variables. It was called multiple regression models. Multiple linear regression models that used to analysis research data was follows.

a. Sailing Production Income

$$Y = a + b_1x_1 + b_2x_2 + b_3x_3 + \text{.....} + b_kx_k + e$$

$$Q = a + b_1 + b_2\ ASK + b_3\ BBM + b_4\ CKM + b_5\ PDD$$

Description: Q (PRM): Sailing Production (kg/yr). ASK: Ship asset value and fishing tool (Rp).BBM: operations fuel amount for sailing (Ltr/yr). CKM: Sailing work flow (HOK/yr) PDD: Education (yr)

b. Non revenue Fisheries

$$Y = a + b_1x_1 + b_2x_2 + b_3x_3 + \text{.....} + b_kx_k + e$$

$$PDNP = a + b_1\ CKNP + b_2\ JAK + b_3\ ASKNP$$

Description: PDNP: non fishing income (Rp/yr). CKNP: Non fishery work flow (HOK/yr) JAK: Fishermen family members (People) ASNP: non fishing business asset (Rp)

c. Sailing work flow

$$Y = a + b_1x_1 + b_2x_2 + b_3x_3 + \text{.....} + b_kx_k + e$$

$$CKM = a + b_1\ ASK + b_2\ JKNL + b_3\ CKNP$$

Description: CKM: Sailing w*ork flow* (HOK/yr). ASK: Ships asset value and fishing tool (USD) JKNL: Fishermen families number (People) CKNP: non fishery work flow (HOK/yr)

d. Household Goods Consumption Fishermen

$$Y = a + b_1x_1 + b_2x_2 + b_3x_3 + \text{.....} + b_kx_k + e$$

$$Scene = a + b_1\ PDNP + b_2\ PDP + b_3\ JAK + b_4\ PisN$$

Description: TKP: Total staple consumption (Rp/yr). PDP: Revenue of fishery (Rp/yr). PDNP: non fishing income (Rp/yr) JAK: Fishermen family number (People). PisN: Fisherman's wife education (Years)

3. Results

3.1. Regression Analysis of Sailing Production Income

A factor that may *affect on sailing* production income (PRM) was a production asset/Rp (ASK), amount of fuel/Ltr (BBM), *sailing work flow /*HOK (CKM), education/yr (PDD). *C*alculations results to determine *relationship* of independent variables with *dependent* of *sailing* production income variable (PRM) *was* follows:

a. Regression coefficients

Analysis result of regression equation was follows:

$PRM = -49.892 \times 10^7 + 6.337\ ASK + 0.030\ BBM + (-0.043)\ CKM + 1.581\ PDD$

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Table 1. Regression Results of Factors Affecting Fishermen Household (Sailing Production Income) (PRM)

Variables	Coef.	t	Sig.
Constant	- 49.892E7	-1.71	0.098*
(ASK)	6.337	2.065	0.049**
(BBM)	0.030	3.361	0.002 ***
(CKM)	-0.043	-1.056	0.301
(PDD)	1.581	0.767	0.450
Adjusted R^2	0.585		
F	8.818		0.000***
N	30		

Constant of – 49.892 x10^7 states that when did not effected by production assets, fuel amount, *sailing work flow*, and education, it will loss of Rp. – 49,892,000. Regression coefficient of 6337 states that any increase in production assets by 1 unit will increase revenue by 6,337 times to fish production. Regression coefficient of 0.30 states that any addition 1 liter fuel will increase revenue by 0.3 times fish production. Regression coefficient of -0.43 state that each additional 1 HOK of sailing *work flow* will reduce sailing revenue of -0.43 times. It *was* because someone has maximum 8 hours working for 1 day. When *working time increase, it reduces* revenue. Also, over *fishing* condition *of* sea fisheries makes non optimal work flow. Regression coefficient of 1,581 states that any increase in production assets 1 unit will increase production revenues by 1,581 times at sea, so it needs to improve ships technology and fishing tool to increase fishermen productivity (Mimit P, 2011c).

3.2. Multiple Regression Analysis of Sailing Work Flow Time

Factors that affecting the *sailing* work flow (CKM) *was* asset production/USD (ASK), *fisherman* families number (JKNL), *non sailing work flow* /HOK (CKNP). *C*alculations results to determine *relationship* of independent variables with *dependent* variable of non-fishery income was follows.

Regression coefficients

From data analysis, it known the regression equation was:

CKM = 377.52 +(-1.476) ASK + (-17.267) JKNL +(-0.185) CKNP

Table 2. Regression Results of Factors Affecting Fishermen Household (Sailing Work Flow) (CKM)

Variables	Coef.	t	Sig.
Constant	377.52	3.203	0.004***
ASNP	- 1.476	-1.192	0.244
JKNL	- 17.267	-0.430	0.671
CKNP	-0.185	-0.542	0.592
Adjusted R^2	0.076		
F	0.709		0.555
N	30		

Constant was 377.52. It mean if not *affected by* production assets, *total work*force fishermen, and non-fishing work flow, then fishermen will have sailing work flow of 377.52 HOK. Regression coefficient of -1.476 states that any increase in production assets will reduce work flow of 1,476 person-days at sea fishing. This negative result was due to addition of production assets will increase fishermen productivity because technological improvements will lower physical labor with better technology. Weather factor/season also can not be predicted, and there was Indications Sea *fishing* already over fished. In this case, it need to develop local wisdom like *andun* to look for other untapped fishery resources (Mimit P. et al .2013 a). Regression coefficient of -17.267 states that any increase in *workforce* fishermen will lower *sailing work flow* at 17.267 HOK. Negative result shows that waters in *Lekok waters already* over fishing. It corresponds to results obtained from negative CKNL and also small number of male fishermen family, because they work as artisans, workshops worker, construction workers (Mimit. P, et al.2013b). Regression coefficient -0.185 states that every additional sailing work flow for non fishing, it will make *the* results obtained from increase in number of work flow will be negative. It due to workforce time was transferred from fishery to non-fishery to get maximum results in 8 hours . Non sailing work flow it self *was* very small volume. Therefore, main income was sailing. Lower work flow time for fisheries will allow time to seek alternative income, especially fishermen wife to voluntarily working in fish processing as local wisdom in fishing communities (Mimit. P, 2011b)

3.3. Regression Analysis of Non Fisheries Income

Factors that suspected *affect on* non-fishing income (PDNP) *were variables of* non fishery business asset /Rp(ASNP), *work flow for* non fishing/HOK (CKNP), number of family members (JAK). *C*alculations results to determine *relationship* of independent variables with *dependent* variable of non-fishery income was follows:

Regression coefficients:

From *processed* data, it can be seen *the* regression equation was :

PDNP = -0.065 + 0.009 ASNP + 0.040 CKNP +0.017 JAK

Table 3. Regression Results of Factors Affecting Fishermen Household (Non revenue Fisheries) (PDNP)

Variables	Coef.	t	Sig.
Constant	-0.065	-0.032	0.975
(ASNP)	0.009	2.741	0.011***
(CKNP)	0.040	2.760	0.011***
(JAK)	0.017	0.322	0.750
Adjusted R^2	0.449		
F	6.791		0.020***
N	30		

Constants of -0.065 states if there was no e*ffect from* non-fishing business assets, non fishery work flow, and number of family members will lose non-fishing income of 0.065. Regression coefficient of 0.009 states that increase 1 unit in non fishery business assets will increase non-fishing income of 0.009. Regression coefficient states that each additional 0.040 of non fisheries work flow 1 HOK will increase non fishery income of 0,040. Regression coefficient of 0.017 states that each additional 1 family member will increase non fishery income of 0,017.

3.4. Multiple Regression Analysis of Total Staple Consumption

Factors that suspected affect *on* total staple consumption (TKP) were: total household income (TPD), *number* of family members (JAK), and fisherman's wife education (PisN). *C*alculations results to determine *relationship* of independent variables with *dependent* variable of staple consumption (KPP), as follows:

Regression coefficients:

From *processed* data, it can be seen *the* regression equation was :

TKP = 13.821+(-0.011) PDP +(-0.159) PDNP +(-0.514) JAK + 0.213 PisN

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Table 4. Regression Results of Factors Affecting Fishermen Household (Household Goods Consumption Fishermen) (TKP)

Variables	Coef.	t	Sig.
Constant	13.821	3.983	0.001***
(PDP)	- 0.01	- 3.13	0.757
(PDNP)	- 0.159	- 6.03	0.552
(JAK)	- 0.514	- 8.40	0.409
(PisN)	0.213	0.50	0.594
Adjusted R^2	0.054		
F	0.355		0.838
N	30		

Constants of 13,821 states if there was no *affect from food and non* consumption, number of fisherman families and, fisherman's wife education, fishermen have total staple consumption by 13,821 per year. Regression coefficient -0.01 PDP states that revenue increase would reduce total staple consumption of 0.01 per year. This *related to* desire to increase business investment in order to increase revenue alternatives, also *effect* of fisheries revenue where marine resources already over fishing. Regression coefficient of -0.159 states that non-fishing income addition would lower total staple consumption of 0.159 fishermen. Results of non-fishing income were low because very few fishermen work non-fishery field. It means fishermen still rely *on* results *of sailing* income. Regression coefficient of -0.514 states that any increase in *number* of family members will lower total staple consumption of 0.514. It was *because* number addition of family members linearly will increase amount of staple and non-staple consumption. So *that* quantity and quality will go down with relatively fixed amount of income but amount of consumption increases. Regression coefficient of 0.213 states that any increase in education level of fishermen will increase total staple consumption as much as 0.213. The higher fishermen human resources, linearly the greater education fund for total consumption expenditures of Madura Strait fishermen families.

4. Discussion

This research conducted on fishermen of crab gillnet, *terasak* gillnet shot and *kembung*. It can be concluded that (1) fishermen production in Madura Strait on average provide revenue to fishermen of Rp. 18,168,092/year. Sailing work flow average was 234.2 HKO/year. Fisheries Non revenue average was Rp. 2,336,667/year. Non Fisheries work flow average was 50.38 HKO/year. Fishermen consumption expenditure average was Rp. 11,276,846/year. (2) Household Economic Model of Madura Strait Fishermen was: production value level or fishermen revenue at sea *was* strongly influenced by Production Asset, Fuel, Work Flow and Education Level. Work Flow rate of fishermen families was affected by Asset production, number of male workforce and non fisheries workflow. Non-fishing income level *was* strongly influenced by non-fishery business assets, non-fishing work flow, and number of family members owned. Spending levels Madura Strait fishermen was affected by fishing income, non-fishing income, family size and fisherman's wife education.

This study *suggestion were* follows: (1) Fisherman Household Economic Model examination show fishermen should met basic needs as food, clothing, shelter, health and education. (2) Providing infrastructure and production facilities (Production Asset) locally so allow Madura Strait fishermen communities to obtain with cheap price and good quality. (3) Enhance institutional role of Madura Strait fisherman communities as collective action platform to achieve individual goals. (3) Promoting productive economic activities in areas with characteristics based on local resources, has a clear market, carried out continuously with attention to resource capacity, it owned and implemented and affecting on local communities, and appropriate use of advanced technologies derived from process of assessment and research. (4) Realizing economic structure of Madura Strait fishermen communities based on economic activity in coastal and marine areas as a form of natural sea resources utilization.

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