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## ESTIMATION OF HOUSEHOLD CONSUMPTION EXPENDITURE OF SMALL-SCALE FISHERMEN IN INDONESIA

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### ABSTRACT

One of the causes of changes in household consumption expenditure of small-scale fishermen in Indonesia is the change of catches production and catching business income resulting from seasonal changes every year. Changes in household consumption expenditures are certainly influenced by the determinants. Based on the time dimension, this paper uses cross-sectional data sourced from primary data with the respondents of outboard motor fishermen and non-powered motor. The econometric analysis of multiple linear regressions with the classical assumption test is used in this method. The determinants of expenditure for household consumption of outboard motor are positively influenced by the number of family members covered and the difference in the area of residence of the fisherman and negatively by the household income, whereas the wife's formal education has no significant effect. In contrast, household consumption expenditures of non-powered motor fishermen are positively influenced by household income and are negatively influenced by wife education and regional differences, while the number of family members borne has no significant effect.

### KEY WORDS

Household expenditure, small-scale fisherman, outboard motor, non-powered motor, Indonesia.

International fisheries policy through the Committee on Fisheries (COFI) and Subcommittee is to support the sustainable development and safeguard of small fisheries in the context since small-scale fisheries produce two-thirds of all targeted catches for direct human consumption and provide 90% of employment in this sector (Food and Agriculture Organizations, 2016), while the objective of fisheries development in Indonesia is to improve the welfare of fishermen, fish farmers and other coastal communities (Keputusan Menteri Kelautan dan Perikanan No.18/Men/2002) through the development of economic activities, quality improvement and quantity of human resources, strengthening of socio-economic institutions, and utilize marine and fishery resources in an optimal and (Keputusan Menteri Kelautan dan Perikanan No.18/ Men/2004).

In particular traditional fishermen are small-scale fishermen (Al-Marshudi and Kotagama, 2006; Andrew and Evans, 2009; Lopes and Begossi, 2011; Gebremedhin *et al.*, 2013) or artisanal fisheries (Mozumder, *et al.*, 2018) characterized as poor and marginalized (Asiedu, *et al.*, 2013), but these small-scale fisheries support the livelihoods and wellbeing of more than 500 million people worldwide and as an important source of income in developing countries where millions of poor people live near the coast and nearly 97% of world's fishermen are located (Pomeroy and Andrew, 2011; Mauthe *et al.*, 2013) of the 36 million fishermen in the world (Mohammed, *et al.*, 2017) In Indonesia, the fishing population is dominated by small-scale fishermen (Susanto *et al.*, 2017), 95% of traditional fishermen (Sudarmo *et al.*, 2015).

Small-scale fishermen consist of outboard motor and non-powered motor while modern fishermen are using motor boats (Gebremedhin *et al.*, 2013) using catching technology in the form of outboard engines (Ele and Nkang, 2014) and simple fishing gear (Rahim and Hastuti, 2017; Rahim *et al.*, 2018), whereas according to Law no. 45 of 2009 on fisheries in Indonesia that small-scale fishermen are small fishermen with the size of fishing vessels owned by the largest 5 *gross tonnage* (GT).

Most of the small-scale fishermen in Indonesia are found in coastal areas (Rahim and Hastuti, 2018; Rahim, 2018) and become one of the economic development sections of the coastal zone (Israel *et al.*, 2004). Although part of economic development, however, the level of welfare is still below other sectors and generally occupy the lowest strata compared to other communities on land, even as marginalized groups (Asiedu, *et al.*, 2013) because it belongs to the poorest groups in all countries with the attributes of "the poorest of poor" (Wiyono and Mustaruddin, 2015), ironically 32.14% of the 16.42 million people in coastal communities in Indonesia are alive below the poverty line with an income indicator of US \$ 1 per day (Muflikhati *et al.*, 2010) or with per capita income per month US \$ 7-10 (Agunggunanto, 2011).

The case in this research is the change of expenditure for the consumption of small-scale fishermen in West coastal area of Barru District South Sulawesi Province Indonesia caused by the change of catching production and catching income (Rahim and Hastuti, 2017). Research on household consumption expenditure of fishermen has been done in many countries, as reported by Israel *et al.*, (2004) in the Philippines, Mukarrama *et al.*, (2010) in Sri Lanka, Khan *et al.*, (2012) in Bangladesh, Ofwona (2013) in Kenya, Olamedji *et al.*, (2015) in Nigeria, as well as in Indonesia itself (Zamroni and Yamao, 2011; Zulkifli *et al.*, 2015). However, the findings have not yet discussed the determinant or factors that affect the change in household consumption expenditure of small-scale fishermen.

In economics, household consumption expenditure is financial planning (Tapsin and Hepsa, 2014) considered the primary indicator of the welfare economy (Moratti and Natali, 2012) and the most important component of national income and aggregate demand (Khan, 2014). Furthermore each household seeks to maximize utility in consuming goods and services with income levels as constraints (Carrol, 2001), which refers to an independent household decision (Bonke, 2015). In general, changes in consumption are influenced by changes in income (Carrol, 2001; Ofwona, 2013), net income and time-discount rate, leisure, wealth or assets (Branson, 1989), while changes in household consumption expenditures are microeconomically affected by age, income, marital status, insurance and household size (Caglayan and Astar, 2012), while macroeconomically influenced by price level changes that have the effect of real income and real exchange rate (Bonsu and Muzindutsi, 2017).

The purpose of this paper is to estimate the consumption expenditure of small-scale fishermen households using econometric approach with a qualitative independent variable determinant model in the West coastal area of Barru District, South Sulawesi Province, Indonesia as the case study.

## MATERIALS AND METHODS OF RESEARCH

We used an Explanatory method for estimate of small-scale catch fishermen household consumption expenditure in Indonesia. Cross-Section data from a household fishermen survey. Questionnaires were administered to 107 of 586 total respondents, including 69 of outboard motor and 38 of non-powered motor boats. Number of sample about 10-20% of total respondents (Gay and Diehl, 1992)

We used a multiple regression method with exponential functions model for analyzed estimate of small-scale catch fishermen household consumption expenditure using econometric approach of qualitative independent variable (dummy variable) with method of analysis with non linear regression equation: (Gujarati and Porter, 2009).

$$CRTNPM = \beta_0 \pi RTNPM^{\beta_1} AEdIstr^{\beta_2} QAKT^{\beta_3} KTR^{\beta_4} KB^{\beta_5} KSR^{\beta_6} KBLs^{\beta_7} \mu_1 \quad (1)$$

$$CRTNPTM = \beta_4 \pi RTNPM^{\beta_5} AEdIstr^{\beta_6} QAKT^{\beta_7} KTR^{\beta_8} KB^{\beta_9} KSR^{\beta_{10}} KBLs^{\beta_{11}} \mu_2 \quad (2)$$

To facilitate the computation of equations (1) and (2) models, the equations are converted to multiple linear by double log or natural logarithms (Ln) as follows:

$$\text{LnCRTNPM} = \text{Ln}\beta_0 + \beta_2 \text{Ln}\pi\text{RTNPM} + \beta_3 \text{LnEdIstr} + \beta_4 \text{LnQAKT} + \delta_1 \text{KTR} + \delta_2 \text{KB} + \delta_3 \text{KSR} + \delta_4 \text{KBLs} + \mu_1 \quad (3)$$

$$\text{LnCRTNPTM} = \text{Ln}\beta_5 + \beta_6 \text{Ln}\pi\text{RTNPM} + \beta_7 \text{LnEdIstr} + \beta_8 \text{LnQAKT} + \delta_5 \text{KTR} + \delta_6 \text{KB} + \delta_7 \text{KSR} + \delta_8 \text{KBLs} + \mu_2 \quad (4)$$

Where,  $\text{LnCRTNPM}$  : household consumption expenditure fisherman outboard motor boats on food and non-food (IDR);  $\text{LnCRTNPTM}$ : household consumption expenditure fisherman non-powered motor on food and non-food (IDR);  $\beta_0$  and  $\beta_5$  : intercept;  $\beta_2, \dots, \beta_4$  and  $\beta_6, \dots, \beta_8$ : independent variable regression coefficients;  $\delta_1, \dots, \delta_8$ : dummy variable coefficient;  $\pi\text{RTNPM}$ : household income of fishermen outboard motor (IDR);  $\pi\text{RTNPTM}$ : household income of fishermen non-powered motor (IDR);  $\text{EdIstr}$ : wife education (years);  $\text{QAK}$ : the number of dependent family members (people); *Dummy* small-scale fishermen regional differences;  $\text{KTR}$ : 1, for the District of Tanete Rilau; 0, for the other;  $\text{KB}$ : 1, for the District of Barru; 0, for the other;  $\text{KSR}$ : 1, for the District of Soppeng Riaja; 0, for the other;  $\text{KBLs}$ : 1, for the District of Balusu; 0, for the other;  $\mu_1$  dan  $\mu_2$ : error term

## RESULTS AND DISCUSION

Determinant or factors affecting household consumption expenditures of outboard motor and non-powered motor in the western coastal area of Barru District in addition to using multiple regression analysis models also used classical assumption assumptions of multicollinearity and heteroscedasticity (Table 1). The results of multicollinearity testing with Gujarati and Porter (2009) variance inflection factor (VIF) method do not show or indicate multicollinearity or double collinearity, VIF values less than 10 (Table 1). As for heteroscedasticity testing using park test (Gujarati and Porter, 2009), variable error as dependent variable with each independent variable and produce coefficient value ( $\beta$ ) is not significant it can be concluded there is no heteroscedasticity (Table 1).

Table 1 – Determinant of Household Consumption Expenditure of Small-scale Fishermen

Independent Variable	E.S	Outboard Motor					Non powered Motor				
		$\beta$	t-test	VIF	Park	$\beta$	t-test	VIF	Park		
Household income	+	-0,276***	-4,692	1,445	0,017 <sup>ns</sup>	-0,086***	-3,334	1,101	-8,827 <sup>ns</sup>		
Education wife	+	0,013	1,521	1,522	-0,014 <sup>ns</sup>	1,011***	40,921	1,335	-0,939 <sup>ns</sup>		
Members of the family	+	1,475***	32,007	1,201	0,065 <sup>ns</sup>	0,031	1,261	1,028	0,941 <sup>ns</sup>		
Tanete Rilau Sub-District	+	-0,028	-0,871	1,253	0,000 <sup>ns</sup>	-0,011	-0,528	1,150	0,000 <sup>ns</sup>		
Barru Sub-District	+	0,020	0,709	1,334	0,000 <sup>ns</sup>	0,069**	1,967	7,082	0,000 <sup>ns</sup>		
Soppeng Riaja Sub-District	+	-0,104*	-2,143	3,393	0,000 <sup>ns</sup>	-2,284***	6,83	2,649	0,000 <sup>ns</sup>		
Balusu Sub-District	+	0,233*	1,887	1,882	0,000 <sup>ns</sup>	0,013	0,507	1,208	0,000 <sup>ns</sup>		
Intercept		-1,980				0,986					
F-test		176,18				325,145					
Adjusted R <sup>2</sup>		0,947				0,986					
n		69				38					

\*\*\* = Significant error rate of 1% (0.01), or 99% confidence level; \*\* = Significant error rate of 5% (0.05), or 95% confidence level; \* = Significant error rate of 10% (0.10), or 90% confidence level; ns = not significant; ES is an expectation sign; If the VIF value is less than 10 then there is no multicollinearity, otherwise If VIF value is greater than 10 then multicollinearity occurs ns => not significant; if  $\beta$  value is not significant, then it is not available heteroscedasticity, otherwise if the value of  $\beta$  significant, then there is heteroscedasticity.

In the measurement of the model accuracy of the adjusted R<sup>2</sup> shows the independent variables in the expenditure function model for household consumption of outboard motor and non-powered motor the presented can explain each of the percentage of free variable contribution to household income, wife education, number of members (94.7%) and 98.6% of the variation (ups and downs) of non-free variables while the other by 5.3% and 1.4% respectively are contributions from other factors which is not included in the model (Table 1). The result of F-test that the factors influencing the expenditure for household consumption of outboard motor and non-powered motor significantly influence the error rate of 1 percent (Table 1). It can be interpreted that all independent variables together (simultaneously)

significantly affect the expenditure for household consumption of fishermen. Furthermore, individual influence (partial) from each independent variable to expenditure for household consumption of fisherman used t-test and regression coefficient value in the discussion.

Variable income of small-scale fisherman households either motor boat fisherman or motor boat without negative influence to household consumption expenditure at error rate of 1% or 99% confidence level, meaning that every change of household income increase hence the expenditure of capture fisherman household in coastal area West Coast of Barru District will decrease. This is due to the decline in demand for food items, and to switch to secondary non-food needs in the form of education, clothing, health, and the need for fishing (fuel and fish bait). If it is related to the theory of the elasticity of demand for income, then the change in income increase leads to a decrease in inferior good demanded (Henderson and Quant, 1980).

These findings are consistent with Kartika (2012) in Mataram City, that the higher the family income, the proportion of expenditure on food consumption declines, followed by an increase in the proportion of non-food expenditure. The results of this study are different from other research areas, ie, income has a positive effect on household consumption expenditure in Madura Strait (Primyastanto *et al.*, 2013) and Donggala (Zulkifli *et al.*, 2015) and Khan *et al.* (2012) that the management of Community Based Fisheries (CBFM) in Bangladesh has a positive and significant impact on fishermen income and household expenditure. Changes in household income of fishermen will affect household expenditures derived from productive fishery conditions, such as those occurring in West Africa (Weigel *et al.*, 2018), fishing season in Tamil Nadu, India (Colwella and Axelrod, 2016), and climate change in the West Pacific Palau (Wabnitz *et al.*, 2018).

Empirically, the average expenditure for traditional fisherman household consumption expenditure in 5 sample sub-districts in Barru District y both food and non-food within a month, outboard motor fishermen (IDR 2.84 million = USD 218) and non-powered motor fishermen (IDR 1, 63 million = USD 125). Food consumption is the largest of non-food consumption, ie motor boat fishermen (IDR 1.8 million = USD 138) and non-motorized boat fishermen (IDR 1 million = USD 130) in the form of rice, side dishes, gas / kerosene, cooking oil, tea / coffee, and sugar. According Primyastanto *et al.*, (2013); Zulkifli *et al.*, (2015) the amount of expenditure for household consumption of fishermen in Indonesia comes from food and non-food. These findings are consistent with findings in Donggala District (Zulkifli, *et al.*, 2015) and Oladimeji *et al.*, (2015) in Nigeria that 77% of total monthly fisheries household expenditure and the remaining 23% for non-food are in the form of payments for energy, clothing, health and education.

Unlike the case with findings Musemwa *et al.*, (2013) most household consumption expenditure in South Africa is used to buy food rather than agricultural production because in that area it does not explore its agricultural potential. According to Erdogen *et al.*, (2011) food consumption, especially seafood is an important ingredient to improve intelligence in education and much needed parents, such as fish as the most inexpensive and affordable source of animal protein (Ogundari and Ojo, 2009). Furthermore, this finding is different from the findings that occurred in Sri Lanka that the expenditure for household consumption of fishermen has no effect on food security (Mukarrama *et al.*, 2010). According to Budiwinarto (2006) the greater the level of household income, the proportion of expenditure (consumption) for food is smaller than non-food, this is said to be the level of prosperity (welfare) of the economy getting better, as happened in Bangladesh that fishermen's welfare is determined by changes in household income and expenditure (Khan *et al.*, 2012).

The education of wife without a motor has a positive effect on the change of household consumption expenditure at a 1% error level or 99% confidence level, meaning that the high level of formal education of wife will decrease the expenditure for fisherman household consumption in West coastal area of Barru District. This indicates that the existence of formal education wife can help manage the family finances both expenditure for food consumption and non-food. The benefits of education are investment (Psacharopoulos & Patrinos, 2002) for the increase of income and consumption and their welfare (Agarwal *et al.*, 2009;

Rabearisoa and Norsis, 2013) because the higher the level of education, the decision will be more rational and lead to improved welfare economy of his family.

Another case education of outboard motor fishermen's wife does not significantly affect the changes in spending for household consumption of outboard motor fishermen both food and non-food expenditure. This happened because the average of formal education level of traditional fisherman wife of Barru District is not 55 (51,40%) primary school, followed by junior high level 29 (27,10%), elementary 17 soul (15,89%), senior high school as many as 6 people (5.61%), and college does not exist. This research is in line with Ningsih *et al.*, (2013) study that education level has no significant effect on food consumption pattern and fisherman household fishery in Tungkal Ilir Sub-district, Tanjung Jabung Barat District, and the level of education of women in fishery households in Vietnam is lower so that little chance to work in processing fish despite having access to credit (Hao, 2012).

The variable of the quantity of family members who bear the positive effect of the expenditure for household consumption, meaning the more the number of family members there is a tendency of spending for household consumption more and more. Another case expenditure for household consumption of non-powered motor is not affected by the number of family members borne. This study is different from the findings of Lantika (2009) that the number of family members has a negative effect on household consumption in Samaan Malang City. The quantity of family members who will use a small amount of income will result in low levels of consumption because the number of family dependents will encourage fishermen to work hard to meet the needs of family members (Rahim and Hastuti, 2017). This affects the productivity of work, intelligence and declining ability to invest so as to affect the level of welfare, such as Roumah (2015) findings on coastal fishing communities in Malaysia, that the size or number of family members will greatly determine the poverty of fishermen other than income, Education, and marital status.

Empirically, the quantity of family members in the household of motor boat fishermen of Barru District consisting of his wife and children and other family members between 1 - 5 people who live in a fisherman's household thus affect the changes in household consumption expenditure such as food needs (rice, side dishes, cooking oil, kerosene, gas, sugar, tea and coffee), non-food (education, clothing, health, and the necessities of fishing like fuels and fish baits).

Dummy of differences in the areas where have a positive and negative impact on household consumption expenditure of fishermen in the western coastal area of Barru District at error rate of 1%, 5% and 10% as a comparison of the high or low expenditure consumption of traditional fishermen. Empirically, the consumption expenditure per sub-district within a month, that is the motor boat fisherman of Barru District as the capital of Barru District (IDR 3.1 million = USD 238) is bigger than the fishermen of Tanete Rilau Sub-district (IDR 1.6 million = USD 123) and more small from Balusu sub-district fishermen, IDR 3.6 million = USD 276. Unlike the case of the consumption of non-motorized boat fishermen in Kecamatan Barru (IDR 1.6 = USD 123) smaller than Soppeng Riaja fishermen (IDR 1.8 million = USD138) and Mallusetasi (IDR 1.9 million = USD 146). This result is different from the Saptanto *et al.*, (2011) study by comparing the amount of food and non-food household expenditure of each coastal fisherman in each sub district in Indramayu without using dummy variable regression determinant model such as this research.

Coastal fishing communities are a group of people living in coastal areas forming and having a distinctive culture associated with its dependence on the utilization of coastal resources in conducting economic activities (Fahrunnisa, 2015). This refers to the opinion of Ostorm and Hess (2007), that coastal coastal communities have rights over common property resources that provide the benefits and efficiency of the sustainability of existing resources. The role of common property provides (1) important roles in livelihoods, (2) minimizes the possibility of disputes or conflicts, and (3) shapes the community into a compact and control of shared resources (Fahrunnisa, 2015).

## CONCLUSION AND RECOMMENDATIONS

Expenditures for household consumption of outboard motor small-scale fishermen are positively influenced by the number of family members covered and the different areas of the fisherman's residence, and then negatively influenced by household income, whereas the wife's formal education has no significant effect. Another case, household consumption expenditure of non-powered motor fishermen is positively influenced by household income and is negatively influenced by wife education and regional differences, while the number of family members covered is not significant

The increase in household income of outboard motor fishermen decreased their consumption expenditure, as a result of greater food consumption of non-food consumption. This is done by continuing to improve the pattern of food through subsidized rice distribution program or poor rice (*raskin*), especially during famine season (west season). In terms of education, the low education of the wife of outboard motor fishermen and non-powered motor so that consumption expenditures tend to not change in terms of quality because the income only comes from the sale of fish. Therefore, it is necessary to optimize the role of fishermen wife through the strategy of developing productive economy through empowerment program of fisherman wife such as cultivation of fish catch, fish cracker, fish meal and so on.

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