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RESEARCH ARTICLE

THE APPROACH OF LOGIT MODEL TO THE DECISION MAKING OF SMALL-SCALE FISHERMAN'S WIVES.

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Abstract

This paper aims to estimate the decision-making factors of small-scale fisherman's wives in choosing the empowerment of capture fish processing businesses in Indonesia. Determination of decisions in the form of household income, wife's age and formal education, quantity of family members working and included and differences in the area of residence. Based on the time dimension using cross-sectional data sourced from primary data with the number of respondents as many as 34 wives of small-scale fisherman. The data analysis technique used is the logit model econometric approach or qualitative response approach. This paper finds that the decisions of small-scale fishermen wives are positively influenced by the quantity of household members borne and differences in housing and negatively affected by wife's formal education, while household income, wife's age and number of active worker families have no influence significant. This paper presents that Determinants of Decision of the wives of small-scale fishermen in choosing the capture of capture fisheries business is a consideration of various dimensions of empowerment in making decisions to improve the economy of coastal households

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Introduction:-

The policies of aid programs from the Indonesia government, especially in Barru District, South Sulawesi Province, are fishing gear and outboard engines power have been done, but changes in catch production (Rahim and Hastuti, 2017) and catches (Rahim, 2018) as a consequence of uncertain climatic conditions (Gamito et al., 2015) and changes in fishing season (Rola et al., 2018) has not sufficiently fulfilled household needs, which has an impact on household consumption expenditures (Rahim et al., 2018). Therefore, the role of fishermen women is needed, in addition to working to meet their household economic needs (Gunakara and Bhattab, 2016) through empowerment efforts and decision makers in family decisions, must be seriously considered by the State Government as a strategy for developing fisheries economy (Farooqi et al., 2018).

The role of fisherwomen not only as housewives but also as breadwinners which has a dual function, first as a fisherman's wife and secondly as head of the family at the time fishermen go to sea in improving the economy of his

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household (Rahim and Hastuti, 2018). Although women's contributions to small-scale fisheries worldwide are ignored in policy making (Santos, 2015), millions of women are involved in the small-scale fisheries sector (Koralagama et al., 2017) play their role in fishing activities (Zhao et al., 2013) or reproduction (Castro et al., 2017), postharvest handling, preservation, processing, marketing of seafood products (Biswas and Rao, 2014; Lentisco and Lee, 2015), dried fish marketing (Durai and Dhanalakshmi, 2015), and food security (Harper et al., 2013), which has profound implications for management, rural poverty alleviation policies (Khodijah, 2014) and fisheries economic development worldwide (Harper et al., 2013).

Therefore, family decision making is in the hands of fishermen (Di Ciommo and Schiavetti, 2012; Mutikukuru-Maravanyika et al., 2016; Routray et al., 2017) in improving the household economy through empowerment (Nandi, 2015; Haque, 2016; Shakir, 2017; Agnihotri and Malipatil, 2018). Economic empowerment of coastal communities has an influence on the welfare of coastal communities (Rostin, 2016) through family income and household consumption expenditures (Michael, 2010). Failure of various empowerment programs because they are not supported by the strength of personal assets of leadership (Khodijah, 2014) in decision making of traditional fishing households, especially within the framework of sustainable fisheries development.

The objectives of the International Fisheries Policy through the Fisheries Committee (COFI) and the Subcommittee are to support sustainable development and small fisheries protection in the context because small-scale fisheries generate two-thirds of all catches targeted for direct human consumption and provide 90% of employment in this sector (Food and Agriculture Organizations of the United Nations, 2016), while the objectives of fisheries development in Indonesia include improving the welfare of fishermen, fish farmers and other coastal communities (Rahim, 2017) through the development of economic activities, quality improvement and quantity of resources (Rahim, 2018) sustainability, sovereignty and welfare (Rahim and Hastuti, 2018). At an international, intergovernmental level also, conventions, accords and strategic policy development in diverse themes are also increasingly embracing or even targeting small-scale fisheries and their dependent communities (Food and Agriculture Organization of the United Nations, 2016).

Research on women's decision making has been conducted in various countries, as reported by O'Neil and Bilgin (2011) in Turkey, Jahan et al., (2015) in Bangladesh, Lamidi (2016) in Nigeria, Osei-Tutu and Ampadu (2018) in Ghana. The decision of a fisherwoman discovered by Ciommo and Schiavetti (2012) in Brazil, Mutimukuru-Maravanyika et al., (2016) in Ghana, Routray et al., (2017) in India. In addition, research on the empowerment of fisherwomen has also been done as by Hashim et al. (2014) in Malaysia, Torri and Martinez (2011); Nandy, (2015); Shakir (2017) in India, Nikkiah et al., (2016) in Iran, Haghghat, (2013) in the Middle East and North Africa, while using the logit model by Acquah & Abunyuwah (2011) in Ghana and Mihalovič (2016) in the Slovak Republic. However, this finding has not discussed the determinants of factors that influence the decisions of small-scale fishermen's wives in choosing a catch fish processing business using the logit model approach.

Literature Review

Estimates of the decision-making factors of small-scale fishermen's wives in choosing the empowerment of capture fish processing businesses in proxy from logit model (Borooah, 2002). This model is based on the dependent variable model dichotomy. Logit model derived from the probabilistic distribution to explain the qualitative response of the dependent variable or the cumulative logistic probability function model as follows:

$$P_i = F(Z_i) = (\beta_0 + \beta_0 X_i) = \frac{1}{1 + e^{-Z_i}} = \frac{1}{1 + e^{-(\beta_0 + \beta_1 X_i)}} \quad (1)$$

Where

- e Natural Logarithm with Value 2,718
- P_i Probability with a Value between 0 and 1
- Z between $-\infty$ and $+\infty$

Equation (1) can be manipulated by multiplying $1 + e^{-Z_i}$ on both sides, resulting in the following equation:

$$(1 + e^{-Z_i})P_i = \frac{1}{1 + e^{-Z_i}} = (1 + e^{-Z_i}) \quad (2)$$

or

$$(1 + e^{-Z_i})P_i = 1 \quad (3)$$

If equation (3) is divided by P_i and then subtracted by 1, it will produce the following equation:

$$= \frac{(1 + e^{-Z_i})P_i}{P_i - 1} = \frac{1}{P_i - 1} \quad (4)$$

$$= e^{-Z_i} \frac{1}{P_i - 1} - 1 = \frac{(1 - P_i)}{P_i} \quad (5)$$

$$= \frac{1}{e^{-Z_i}} = \frac{(1 - P_i)}{P_i} \quad (6)$$

or

$$e^{-Z_i} \frac{P_i}{(1 - P_i)P_i} \quad (7)$$

Equation (7) can be transformed into a natural logarithmic model so as to produce equation (8) as follows:

$$Z_i = \ln\left(\frac{P_i}{1 - P_i}\right) \quad (8)$$

If $e^{-Z_i} = Z_i$ then equation (8) can be written to

$$Z_i = \ln\left(\frac{P_i}{1 - P_i}\right) = \beta_0 + \beta_0 X_i \quad (9)$$

Materials and Methods:-

This research is sourced from primary data by using data based on time dimension, that is cross-section data with the number of respondents as many as 34 small-scale fishermen wives conducted by census from all population working on fish processing business on the scale of household business. Furthermore, to test and analyze the estimation of the factors that influence the decision of the small-scale fishermen wives to choose the empowerment of capture fish processing Barru District South Sulawesi, Indonesia by using the estimation model of multiple regression equations by referring to logit model estimates (Borooah, 2002) or qualitative responses (Gujarati and Porter, 2009) as follows:

$$DSSFW = \left(\frac{P_i}{1 - P_i}\right) = \beta_0 + \beta_1 H\pi C + \beta_2 WAg + \beta_3 WFE d + \beta_4 QWF + \delta_1 DmTRSd + \delta_2 DmBSd + \delta_3 DmSRSd + \delta_4 DmBLSd + \mu \quad (10)$$

Where, *DSSFW* is decision of small-scale fisherman's wives, probability $P_i = P(Y = 1)$ when choosing an effort to empower catch fish processing, β_0 is intercept, β_1, \dots, β_4 is independent variable regression coefficients, $\delta_1, \dots, \delta_4$ is dummy variable coefficient, P_i is probability with a value between 0 and 1, *HπC* is household income from catching, *WAg* is wives age, *WFE d* is wives formal education, *QWF* is quantity of working family, *QHMB* is quantity of household members borne, Dummy difference of residence that is *DmTRSd* is 1, for Tanete Rilau Sub-district, 0, for others; *DmBSd* is 1, for Barru Sub-district, 0, for others; *DmSRSd* is 1, for Soppeng Riaja Sub-district; 0, for others; *DmBLSd* is 1, for Balusu Sub-district; 0, for others; and μ is error term

Results and Discussion:-

Variable of Household income from small-scale fishermen fishing businesses in the West coast region of Barru District have no significant effect (Table 1) on the decisions of small-scale fishermen wives (combined outboard motors and non-powered motor) in choosing the empowerment of household catching periodic fish processing, such as “*Abon tuna*” and “*Jabu-jabu*” on the West Coast Coast of Barru District.

This result is not consistent with the findings of Michael et al., (2010) in Peninsula Malaysia that family income is a causal factor that influences human capital investment decisions because investment it self is used for household consumption expenditure. Empowering women is a prerequisite for the development and power of women's

decision-making in any country, an indicator of women's empowerment (Jahan et al., 2015) because fishing women also make substantial contributions to household livelihoods and food security such as in Ngazidja island, Comoros East Africa (Hauzera et al., 2013).

The age of small-scale fishermen's wives in the West Coast Coast of Barru District also did not have a significant effect on the decision of the fishermen's wife in choosing a business to empower a household business. This result is not in line with the findings of Musonera and Heshmati (2017) that age has a negative effect on women's empowerment in Rwandan Africa. According to Acharya et al., (2010) that women's autonomy in decision making is positively related to age, work, and number of living children. The age level affects the ability of women in this case fishermen's wives which affect productivity based on physical strength and work experience as fishermen's wives.

Formal education of the wife of small-scale fishermen has a negative influence on the error rate of 5% or 99% confidence level in the decency of the fisherman's wife in choosing the empowerment of catch fish processing businesses in Barru District (Table 1). This result is different from women's empowerment in Rwanda which is influenced by positive and significant education (Musonera and Heshmati, 2017) and the findings of Osei-Tutu and Ampadu (2018) in Ghana that the achievement of women's education can function as a final decision in household decision making. According to Farooqi et al., (2018), besides that the literacy rate of fishermen women and children is also low so that the low ability weakens their bargaining position on the market

The benefits of education are investment (Psacharopoulos & Patrinos, 2002) for income and consumption improvement and 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 improvement the economic welfare of their families, since women's participation can be made an innovative educational program in rural areas (Murphy-Graham, 2010). Women with higher education are more empowered than illiterate, primary and secondary educated women, so it can be concluded that access to education and knowledge plays an important role in enhancing women's empowerment (Nikkhah et al., 2016) in decision making.

Table 1:-Estimation of the decision of a small-scale fisherman's wife in choosing empowerment effort with a logit model approach

Independent Variable	E.S	β_i	t-test	Sig
Household income of fishermen	+	2.316	1.612	0.120
Wives age	+	-0.002	-0.663	0.514
Wives formal education	+	-0.026**	-2.381	0.026
Quantity of working family	+	-0.037	-1.167	0.225
Quantity of household members borne	+	0.036*	1.864	0.075
Dummy Tanete Rilau Sub-district	+	0.364***	3.849	0.001
Dummy Barru Sub-district	+	0.355***	3.617	0.001
Dummy Soppeng Riaja Sub-district	+	0.371***	3.661	0.001
Dummy Balusu Sub-district	+	0.330***	2.837	0.009
Intercepts				0.353
F-test				2.998
Adjusted R ²				0.353
n				34

Note: *** = 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, E.S = expectation sign

The variable quantity of active family members of the family did not significantly influence the decision of the small-scale fishermen's wife in choosing a fish processing household business, while the family members who actively worked from the fisherman's wife's household from the fishermen did not have a significant influence (Table 1). Conversely, the variable quantity of family members borne in the household has a negative and significant effect on the 5% error rate on the decisions of small-scale fishermen's wives. Family size has a significant positive impact on household consumption expenditure (Kiran and Dhawan, 2015) so that it can have an impact on the decisions of family members in the household.

Dummy difference of residence area (Tanete Rilau Sub-district, Barru Sub-District, Soppeng Riaja Sub-District, and Balusu Sub-District) each positively and positively influence at 1% error level (99% confidence) small-scale fishermen's wives in choosing empowerment (Table 1), it means that there is a tendency of decision of small-scale fisherman wife to be more dominant in certain area compared to other region to get additional income for household, such as Osei-tutu and Ampadu (2016) findings that residence area affect woman ability in decision making house stairs.

Conclusion and Recommendation:-

Based on the results and brief discussion it was found that the decisions of small-scale fishermen in choosing the empowerment of fish processing businesses in Barru District, South Sulawesi Province, Indonesia was positively influenced by the number of household members borne and differences in residential areas, then negatively by the formal education of wives, while household income from the results of responding, the age of the wife, and the quantity of active family members working did not have a significant effect. Changes in household income, quantity of household members borne, and differences in residential areas provide an increasing trend in the economy of female fishermen households in the West Coast region of Barru District.

The decision of the small-scale fishermen wives in choosing the empowerment of catch fish processing businesses to improve the household economy must be given support and opportunities to access capital through loans and credit and insurance facilities in implementing and developing fisheries development programs, especially in the coastal fisheries sector. Furthermore, to form a group of wives of fishermen who process the fishing industry with environmentally friendly technology through training and skills from the assistance of shareholders or related institutions so that this recommendation is a consideration of various dimensions of women's empowerment in making the right decisions.

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