Analisis Faktor-Faktor yang Mempengaruhi Pendapatan Nelayan Jaring Insang Dasar di Desa Lawulo, Kecamatan Samaturu, Kabupaten Kolaka

Analysis of factors affecting the income of bottom gillnet fishermen in Lawulo Village, Samaturu District, Kolaka Regency

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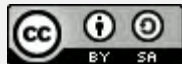
Abstrak. Kabupaten Kolaka merupakan salah satu penghasil perikanan di Provinsi Sulawesi Tenggara. Nilai ekonomi dari hasil perikanan tangkap di Kabupaten Kolaka juga terus mengalami kenaikan dari tahun ke tahun. Namun sayangnya, peningkatan ini tidak diikuti dengan peningkatan perekonomian para nelayan kecil. Banyak faktor yang mempengaruhinya. Salah satunya adalah masih tingginya praktek penggunaan peralatan tangkap yang sederhana dan manajemen usaha perikanan yang belum mumpuni. Desa Lawulo memiliki masyarakat yang bermatapencaharian utama sebagai nelayan. Pada umumnya mereka menggunakan jaring insang dalam usaha perikanan tangkap yang dijalankannya. Penelitian ini menggunakan analisis regresi linier berganda dengan tujuan untuk mengetahui faktor yang berpengaruh terhadap tingkat pendapatan nelayan jarring insang. Data yang digunakan adalah data primer yang diperoleh dari hasil wawancara kepada para nelayan. Hasil penelitian menunjukkan bahwa terdapat empat faktor yang berpengaruh nyata terhadap tingkat pendapatan nelayan jarring insang dasar, yakni umur dan tingkat pendidikan. Variabel jumlah tanggungan keluarga dan pengalaman berusaha ternyata tidak berpengaruh nyata terhadap pendapatan yang diterima oleh nelayan.

Abstract. *Kolaka Regency is one of the fisheries producers in Southeast Sulawesi Province. The economic value of capture fisheries in Kolaka Regency also continues to increase from year to year. Unfortunately, this increase is not followed by an improvement in the economy of small-scale fishermen. Many factors influence this. One of them is the still high practice of using simple fishing gear and the management of fisheries businesses that are not yet qualified. Lawulo Village has people whose main livelihood is fishing. In general, they use gill nets in their capture fisheries business. This study uses multiple linear regression analysis intending to know the factors that influence the income level of gillnet fishermen. The data used is primary data obtained from interviews with fishermen. The results showed that four factors significantly influenced the income level of basic gillnet fishermen, namely age and education level. The variable number of family dependents and business experience did not significantly affect the income received by fishermen.*

INTRODUCTION

Fisheries and marine development are part of national development directed at achieving Indonesian noble goals and ideals (Siskawati et al., 2016). One is the realization of a justified and prosperous society, both materially and spiritually, as stated in the 1945 Constitution. Indonesia is the largest archipelagic state in the world, with a coastline of more than 81,000 km, 17,508 islands, and a sea area of approximately 3.1 million km2, followed by abundant and enormous biodiversity. The coastal and marine areas of Indonesia are also known as the largest marine biodiversity in the world (Dauhan et al., 2016; Primyastanto, 2018). As described by Azizi et. al. (2017), the Indonesian coastal

region has various ecosystem types, such as mangroves, coral reefs, and seagrass beds.

Nationally, the Indonesian marine sustainable fishery resource reaches an average of 6.7 million tons/year, but the potential utilization level is only suspected at 48% (Tibrani, 2021). This condition is a challenge for fishermen to further improve their productivity, both in fishery culture and fishery capture activities. According to the Minister of Agriculture Decree in 1999, the fishing ground region in the sea has developed from near-shore waters to the high seas (fishing zone), following the fishing fleet condition (Rahim, 2017; Sahputra, 2018; Sitanggang et al., 2021).

Southeast Sulawesi Province, which covers an area of approximately 153,018.98 km^2 and two-thirds of the area of around 114,879 km^2, is a marine area with great potential for the utilization of fishery resources; however, it has not yet been explored optimally, based on the potential utilization of marine culture, which only reaches 6-7%, while the utilization of capture fisheries potential only reaches 60-70%. As a region dominated by seawater, Southeast Sulawesi Province has a fishery resource potential of 500,000 tons/year, and its sustainable potential is estimated at 250,000 tons/year (BPS, 2019). Table 1 shows that the production of capture fisheries in the Kolaka Regency fluctuates annually, but it can be generally categorized as increasing, specifically in 2017.

Table 1. Capture fishery products (ton) and the economic values (Rp) in 2013 – 2017 in Kolaka Regency

Number	Year	Capture Fisheries Yield (Ton)	Economic Value (Rp)
1.	2013	19,701	146,012.35
2.	2014	16,605	114,757.25
3.	2015	18,952	170,561.70
4.	2016	19,199	172,794.60
5.	2017	19,822	390,880.90

Source: (BPS, 2019)

Several problems faced by fishermen in the capture fishery business on national and regional scales are: (a) only available in the water (Agunggunanto, 2011), (b) perishable products (Nurasih & Laapo, 2009), (c) Having a critical zone to grow and develop (Sukiyono, 2015), (d) natural influence during the exploitation, namely rainy season, strong wind, high current and wave (Prihantini et al., 2016), (e) relatively low human resource (fisherman) quality (Rahim, 2016), (f) fisherman's capital limitation to receive a proper technological improvement, so the mobility and accessibility become lower to utilize the fishery product further, and (g) low fishery management capability such as fisherman worker allocation way in a certain season due to capability limit (Ridha, 2017; Putra et al., 2017; Prihantini et al., 2017; Kholis et al., 2020).

Efforts to improve fishermen's standard of living or income in previous studies include (1) accessible fishing gear; (2) reachable fishing gear with low-interest capital assistance (accessible banking) (Rahim, 2016); (3) appropriate

fishing gear technology (adjusted to the local conditions); and (4) economical, efficient, and environmentally friendly fishing gear to support the sustainability of fishery resources (Indara et al., 2017; Syahrani et al., 2017; Ridha, 2017).

One of the fishing gear used by many fishermen in Lawulo Village, Samaturu District, Kolaka Regency, is a bottom gillnet. The bottom gillnet is a trawl fishing gear made of net material with a rectangular shape, similar mesh size, a buoy at the top, and a ballast at the bottom. The net was operated at the water base with the target of demersal and pelagic fish.

The bottom gillnet is widely known by the community in Lawulo Village, Samaturu District. Lawulo Village is a coastal region with most community members being bottom gillnet fishermen to fulfill their animal protein needs and improve their family's standard of living. Based on the ideas above, the main objective of this study was to identify the factors that influence the income of bottom gillnet fishermen in Lawulo Village, Samaturu District, and Kolaka Regency.

RESEARCH METHODS

This study used a descriptive survey method by taking several samples from the population with a questionnaire as an instrument (Singarimbun & Effendi, 1989). The population in this study was 65 bottom gillnet fishermen's households in Lawulo Village, Samaturu District. Samples were determined based on simple random sampling, but the number of samples was determined to be 30. This condition followed the suggestion of Jogiyanto (2004), who stated that the minimum limit for large samples is 30 people.

Location and Period

This study was conducted from February to June 2020 in Lawulo Village, Samaturu District, Kolaka Regency. Lawulo Village was selected as the study location, considering that this region was a coastal region, where most communities were occupied as fishermen to increase their income and family welfare.

Data Sampling Types and Methods

Primary and secondary data were collected for this study. The primary data were collected through respondent censuses and interviews. Secondary data were collected using data from the Fisheries Department of the Kolaka Regency. Data were also collected from the survey results following the questionnaires and field observations. The collected data were tabulated to obtain real data used for further analysis.

Data Analysis

The data collected from the study results were analyzed quantitatively. To test the factors that influence bottom gillnet fishermen's income in Lawulo Village, Samaturu District, Kolaka Regency, an exponential function analysis model was

used in equations 1 and 2 (Rahim, 2016). The variables used in this study were obtained from field study results, economic theory, and previous study results.

$$Y = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + e \dots\dots\dots\dots\dots\dots (1)$$

$$Log\ Y = Log\ \beta_0 + \beta_1\ Log\ X_1 + \beta_2\ LogX_2 + \beta_3\ LogX_3 + \beta_4\ LogX_4 + e \dots (2)$$

Note:
Log Y   = Income received by the fishermen (Rp)
β_0 = Intercept
$\beta_1 \dots \beta_4$ = Coefficient of the dependent variables ($X_1 \dots X_4$)
Log X_1 = Age of the fishermen (years old)
Log X_2 = The fisherman's education level (years)
Log X_3 = Number of fisherman's family members (people)
Log X_4 = The fisherman's business experience period (years)
e   = Standard error

To test whether the independent variable influences the dependent variables can be individually determined using the following hypothesis:
H0: $\beta = 0$, independent variables do not influence the dependent variables
H0: $\beta \neq 0$, independent variables influence the dependent variables
The hypothesis test in this study comprised the simultaneous significance test (F-test), individual test (t-test), and estimated determination test (R^2), whereas the statistical criteria were included in the following materials.

Determination Coefficient Test (R^2)
The determination coefficient refers to the capability of the independent variables (X) to explain the (Y) variable. The determination coefficient was used to identify the influence level of the independent variable on the dependent variable. The highest R^2 value was 1 and the smallest R^2 was 0. If R^2 is similar to 0, then the regression line cannot be used for the dependent variable estimation, whereas the independent variables entered into the regression equation do not influence the dependent variable.

There was no exact value of R^2 to clarify whether the selected variables were correct. If R^2 has a larger value or is close to 1, the model is almost correct. For survey data on cross-sectional characteristics, if the data obtained from the respondents in a similar period have an $R^2 = 0.3$, then the variables are quite good (Cleff, 2019).

Simultaneous Significance Test (F-test)
An F-test was used to determine the significant influence of the independent and dependent variables. If $f_{count} > f_{table}$, then H_0 is denied, which means that the independent variables significantly influence the dependent variable. If $f_{count} < f_{table}$, then H_0 is accepted, which means that the independent

variables do not significantly influence the dependent variable with a significance level of 5%. Coefficient determination analysis was used to measure the independent variable's influence on the dependent variable (Cleff, 2019).

Individual/Partial Parameter Significance Test (t-test)

A t-test was used to determine the significance level of the influence of each independent variable on the dependent variable. To determine the independent variable, its influence on the dependent variable can be shown in the following hypothesis:

H1: $\beta 1 = 0$, means no significant influence

H1: $\beta 1 > 0$, means a positive significant difference

H1: $\beta 1 < 0$, means a negative significant difference

$\beta 1$ is the first independent variable coefficient as a hypothesis parameter value. In general, the β value is considered zero, which means that there is an X variable influence on the Y variable. If $t_{count} > t_{table}$, then H_0 is denied which means a significant influence, while if $t_{count} < t_{table}$, then H_0 is accepted, which means no significant influence. The t-test is used to decide whether the hypothesis is proven or not at a 5% significance level (Cleff, 2019).

RESULT AND DISCUSSION

Description of respondent characteristics as components of the gillnet business in this study are age of respondets, level of education, number of family dependents, and work experience of the respondents.

Age of Respondents

The physical condition of a fisherman can be influenced by the age factor where the age level can affect one's mindset in trying and taking action. Fishermen who are still of productive age tend to have stronger physical abilities and find it easier to receive information and keep abreast of technological developments. Age is the age of the respondent fishermen recorded at the time of data collection in the research area in units of years. The research shows that the age of fishermen in the study area ranges from 17 years to 65 years. In Table 2 it is stated that the productive age of fishermen is greater than the non-productive age.

Table 2. Age of Fishermen in Lawulo Village, Samaturu District, Kolaka Regency

No.	Age (years)	Number of Fishermen (Org)	Percentage (%)
1.	Productive (17 – 55)	19	63,33
2.	Non Productive (> 55)	11	36,67
	Total	30	100%

Level of Education

For every human being, education is an important thing in life, both formal and non-formal because each level of education that is passed is of course different experience and knowledge gained because knowledge and experience

can affect one's mindset and attitude. Based on Table 3, we can see that the results of the research show that overall the fishermen in Lawulo Village have a low level of education and none of the fishermen have gone through a tertiary level of education.

Table 3. Fisherman Education Level in Lawulo Village, Samaturu District, Kolaka Regency

No.	Level of education	The number of fishermen	Percentage (%)
1.	High School/Equivalent	3	10
2.	SLTP/Equivalent	11	36,67
3.	SD/Equivalent	16	53,33
	Total	30	100

Number of Family Members

The number of family members is the number of people who live in one house or outside the house whose daily needs are the responsibility of the fisherman concerned. The number of family dependents who are still of productive age is a resource that can become additional staff in the family. Based on the table above, it means that the required workforce is sufficiently available (Tabel 4)

Table 4. Total Dependents of Fishermen's Families in Lawulo Village, Samaturu District, Kolaka Regency

No.	The number of dependents (Person)	Number of Fishermen (Person)	Percentage (%)
1.	1 – 3	20	66,67
2.	4 – 6	10	33,33
	Total	30	100

Fishermen's Business Experience

Fishermen's business experience is one of the supporting factors to better know how to work properly. Because the longer a person pursues a business, the more skilled he is in managing his business. As a fisherman, experience at sea is needed, because with experience most fishermen can know when and where to get the type of fish that is the target of catching. According to the result that all respondent who are quite experienced, it means they have capability to do their work (Table 5).

Table 5. Fisherman Business Experience in Lawulo Village, Samaturu District, Kolaka Regency

No.	Business Experience (Year)	Number of Respondents (Person)	Percentage (%)
1.	0 – 5	10	33,33
2.	6 – 10	14	46,67
3.	> 10	6	20
	Total	30	100

Fishermen's Income

Fishermen's income is the value of selling fish caught every day, the units are expressed by (skewer/tie). The fish catches of fishermen are affected by the short length of the gill nets used because the short length of the nets can affect the small number of catches obtained. Revenue from the sale of fish every day minus the costs incurred by fishermen every day is what is considered. Based on the results of the study, all respondents were profitable even though they had experienced weather and unfortunate factors (Table 6).

Table 6. Average Income of Bottom Gill Net Fishermen in Month, Samaturu District, Kolaka Regency

No.	Description	Total number	Average
1.	Production	13380	446
2.	Revenue	Rp200.700.000,-	Rp6.690.000,-
3.	Total cost	Rp118.236.667,-	Rp3.941.222,-
4.	Income	Rp82.463.333,-	Rp2.748.778,-

Determination Model (R^2) Analysis

The determination coefficient value (R^2) = 0.933 in Table 7, which means that the correlation of age, educational level, number of family members, and fisherman's business experience significantly influences the bottom gillnet fishermen's income. This condition indicates that 93.3% of the income variable is influenced by age (X_1), educational level (X_2), number of family independences (X_3), and fisherman's business experience (X_4). This condition also indicates that other variables influence the bottom gillnet fishermen's income at 6.7%, but not included in this equation model. Moreover, the influence of independent variables on the dependent variable is at 93.3%, while other factors influencing the fishermen's income are at 6.7%.

Simultaneous Model Analysis

The simultaneous correlation coefficient (R) = 0.966 in Table 7 presents that there is a positive and relatively close correlation between the independent and dependent variables. To determine whether the independent variables influence the dependent variable, the F-test from the regression analysis was performed. To perform the F-test, below are the steps that should be followed: If $H_0 > H_1$, then no significant influence is available in age, educational level, number of family members, and business experience on the bottom gillnet fishermen's income. However, if $H_1 > H_0$, then a significant influence is available in age, educational level, number of family members, and business experience on the bottom gillnet fishermen's income.

To determine the significance level with α = 5% (significance value of 5% or 0.05 is the standard measurement used in this study). Based on the Table above, the f_{count} was 90.134, using the confidence level of 95%, α = 5%, and df = 3 or 30-3-1=26, the f_{table} was obtained at 2.98. To determine the testified criteria, if $f_{count} > f_{table}$, then the H1 is accepted and H0 is denied, while if $f_{count} < f_{table}$, then H0 is accepted and H1 is denied, by comparing the f_{count} and f_{table}, it can be shown that

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the f_{count} > f_{table} (90.134 > 2.98), which means that H1 is accepted and H0 is denied. Therefore, age, educational level, number of family members, and business experience have a significant influence on bottom gillnet fishermen income.

Partial Coefficient Regression Analysis (t-test)

This test is used to determine whether the independent variable in the regression model (X_1, X_2, X_3, X_4) has a significant influence partially on the dependent variable (Y). Furthermore, regression analysis of age, educational level, number of family members, and business experience variables based on the F-test and t-test results obtained a Cobb-Douglas function in Table 7. Based on the analysis results, two variables influence very significantly on income, namely age (X_1) and educational level (X_2), while the number of family members (X_3) and business experience (X_4) has no significant influence on the model designed in this study.

Table 7. Regression Coefficient of Influenced Factors based on F-test and T-test on The Bottom Gillnet Fishermen Income in Lawulo Village Samaturu District in 2020

No.	Variable	Coefficient	t_{count}	Sig.
1.	Constant	0.431	11.436	0.190
2.	Age	2.580	7.789	0.000
3.	The educational level	2.312	5.249	0.000
4.	The number of family members	0.412	1.057	0.300
5.	The business experience	0.076	0.223	0.825
	F-count = 90.134			
	F-table = 2.98			
	t-table = 1.706			
	Sig = 0.000			
	N = 30			
	R = 0.966			
	R^2 = 0.933			
	R = 0.922			

Influence of Age on The Fishermen's Income: $Y = 0.431(X_1)^{2.580}$

The t-test results indicate that the age factor has a very significant influence on the bottom gillnet fishermen's income at the 95% confidence level = 0.05 (t-count = 7.789 > t-table = 1.706), while the regression coefficient is 2.580, which means that if the intensity of the age factor is increased by 100% according to the recommendation it will be able to increase the bottom gillnet fishermen income by 258%. Kasturi (2012); Leasiwal (2017); Putri & Wulandari (2020) mentioned that the fisherman's age affected the income level obtained from the farming or fishing business. This condition means that productive age can certainly influence the business productivity level. Younger fishermen tend to have more power in performing the fishery business (in terms of fishing in the sea), resulting in a larger number of captured fish and income than older fishermen.

Influence of Educational Level on The Fishermen's Income: $Y = 0.431(X_2)^{2.312}$

The t-test results indicate that the education level factor has a very significant influence on the bottom gill net fishermen income at 95% confidence level = 0.05 (t-count = 5.249 > t-table = 1.706), while the regression coefficient is 2.312, which means that if the intensity of the education level is increased by 100% as recommended, it can increase the income level by 231.2%. Syahrani et. al. (2018) and Nurhaeda (2019) also had the same model because their study results showed that the educational level of fishermen had a significant influence on the level of fishermen's income. Based on the production economic theory (Mubyarto, 1985), the educational level can describe the readiness level to accept technology, before applying it in their business. A farmer or a fisherman who has a higher educational level tends to have the ability to accept higher agricultural or fishing production technology than a fisherman or a farmer who has a lower educational level. Sahputra (2018) concluded similar condition that fishermen who graduated from middle or high school were more adaptive to the latest fishing technology. This ability could certainly influence the number of captured fish and income.

Influence of Family Members on The Fishermen's Income: $Y = 0.431(X_3)^{0.412}$

The t-test results indicate that the number of family members has no significant influence on the income of bottom gill net fishermen at 95% confidence level = 0.05 (t-count 1.057 < t-table 1.706), while the regression coefficient is 0.412, which means that if the intensity of the family members is increased by 100% as recommended, the income will increase by 41.2%. Based on the economic theory of agricultural production, a positive coefficient value indicates a consistent correlation between the number of family members and income. A positive influence can be interpreted as a family member increase will motivate the fishermen to earn a living as the backbone of the family (Rahim, 2017). These study results are different from Rahim (2017). However, although this variable has no significant influence on the fishermen's income, the correlation between these two variables is theoretically correct (Sukiyono, 2015; Widihastuti & Rosyidah, 2018).

Influence of Business Experience on The Fishermen's Income: $Y = 0.431(X_4)^{0.078}$

The t-test results indicate that the business experience has no significant influence on the income of basic gillnet fishermen at 95% confidence level = 0.05 (t-count 0.223 < t-table 1.706) with a regression coefficient of 0.078, which means that if the intensity of the business experience is increased by 100% accordingly, it can increase the income of bottom gill net fishermen by 7.8%. Rahim (2017) stated that fishing experience had no significant influence on the business income of motorboat and non-motorboat fishermen. Putra et. al. (2017) and Maulana et. al. (2020) also had no significant influence between the business experience and income variables. This condition occurred because there are fishermen who had

an experience of less or equal to 10 years in the three coastal areas of South Sulawesi. However, Sahputra (2018) had different results, whereas the 12.4% of fishermen's income was significantly influenced by the business experience variable.

CONCLUSION

Based on the study results that have been described, it can be concluded that age, educational level, number of family members, and business experience together have a significant influence on the income of bottom gillnet fishermen in Lawulo Village. Age, educational level, number of family members, and business experience influence income is 93.3%. Apart from these four variables, there are still 6.7% of other variables that can influence the income of bottom gillnet fishermen in Lawulo Village. Individually (partially), age and educational level have a significant influence on the income of bottom gill net fishermen, while the number of family members and business experience have no significant influence on the income of bottom gill net fishermen in Lawulo Village, Kolaka Regency. It is recommended that the bottom gillnet fishermen should be more open in accepting the latest fishing technology to increase the number of captured fish, obtain adequate income, and improve family welfare.

AUTHORS CONTRIBUTION STATEMENT

The authors hereby declare that the contribution of each author to the preparation of this paper is Ramlah Saleh as main contributor, Muhtar Amin, as member, and Campina Illa Prihantini as correspondent author. The author has attached a statement of author declaration.

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