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PENULIUS : LIS M YAPANTO, NUDDIN HARAHAB, ABDUL HAFIDZ OLII

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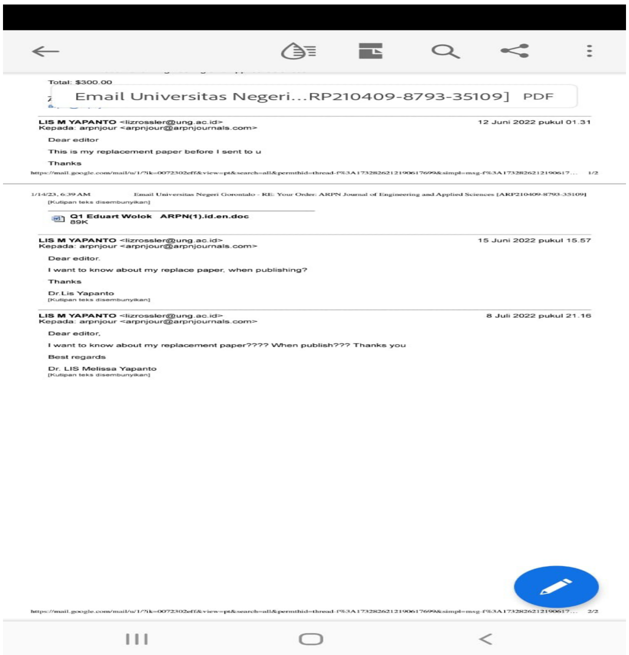

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Feasibility Test of Fishing Variables on Increasing Fishermen's Income in Tomini Bay, Gorontalo Province

Lis M. Yapanto[1] *, Nuddin Harahab[2], Sudarto[3], Abdul Hafidz Olii[4]

* [1]Postgraduate Student of the Faculty of Agricultural Sciences Brawijaya University
[2] Faculty of Fisheries and Marine Brawijaya University in Malang, Indonesia
[3] Faculty of Agricultural Sciences Brawijaya University in Malang, Indonesia
[4]Faculty of Fisheries and Marine University State of Gorontalo, Indonesia

*Correspondent author[1] *lizrossler@ung.ac.id*

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Abstract

This study aims to assess the household diversification coastal fishing on the welfare of coastal communities in the District of Kabila Bone, since August 2019-November 2019, 184 respondents, with a survey method. The data collected are primary and secondary data was done by using observation, interview techniques, documentation techniques. The lives and livelihoods of coastal fishing communities are very vulnerable to climate change and the environment. Diversification of fishermen's income sources outside of fisheries can be an effective way to overcome the adverse effects of environmental change. This study aims to analyze the effect of business diversification on welfare, environmental sustainability and the influence of welfare on environmental sustainability. The data collected are primary data and secondary data which is done by using observation, interview and documentation techniques. The independent variable is selected according to considerations based on the empirical conditions of the coastal area, the ability of the researcher and the availability of supporting theories and the characteristics of the research area. The independent or exogenous variables chosen are fishery business (X1), livestock business. Based on the model developed from the relevant theory, the endogenous variables are welfare (Y1) and environmental sustainability (Y2), the model is tested using the PLS-based Structure Equation Model (SEM). the ability of the researcher and the availability of supporting theories and the characteristics of the research area. The independent or exogenous variables chosen are fishery business (X1), livestock business. Based on the model developed from the relevant theory, the endogenous variables are welfare (Y1) and environmental sustainability (Y2), the model is tested using the PLS-based Structure Equation Model (SEM). the ability of the researcher and the availability of supporting theories and the characteristics of the research area. The independent or exogenous variables chosen are fishery business (X1), livestock business. Based on the model developed from the relevant theory, the endogenous variables are welfare (Y1) and environmental sustainability (Y2), the model is tested using the PLS-based Structure Equation Model (SEM).

Based on the model developed from the relevant theory, then tested on a model using the Structural Equation Model (SEM) based on SMART PLUS. The results of the analysis of effort diversification models suggest that the utilization of environmental services does not affect the welfare of coastal communities.

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Keywords: coastal communities; diversification; SEM-PLS; welfare; environmental sustainability.

Introduction

The population in the coastal areas has a relatively low economic level, where in the western season, some fishermen do not go to sea and most of them depend only on fish in the sea. By looking at the above, it is necessary to make efforts to develop a side livelihood apart from being fishermen, improving technology and human resources as well as capital as one of the ways that must be prioritized. By developing a business diversification model to optimize the empowerment of coastal communities, the community can improve their standard of living for the better. It is hoped that by increasing business diversification, not only will the economic growth of the community improve, but also guarantee economic growth that can be enjoyed fairly and proportionally by the people on the coast. Increasing the productivity of fishermen household fishing businesses through the use of modern fishing gear is very important in helping increase the production of fishermen households, especially for capture fisheries. The strategy of monitoring and imposing strict sanctions on fishing gear that is not environmentally friendly, changes in the trading system for selling catches through the auction process at TPI and developing marketing access, improving the quality of human resources (fishing communities) through guidance and training on modern and environmentally friendly fishing, guidance related to the impact of climate change on the marine environment, as well as the ease of applying for capital loans for the development of fishing business activities.

Linearity Assumption Testing

Evaluation of the partial least square analysis method, namely, first, it is necessary to test the basic assumption, namely linearity, which is to test that the relationship between the tested variables has a linear relationship. Testing the linearity of the variable relationship aims to test whether the form of influence between the independent variable and the dependent variable is linear or not.

The linear relationship that occurs can be interpreted that the increase or decrease in variation in the criterion is consistently followed by an increase or decrease in the predictor so that the relationship pattern forms a straight line. A good model is a model where the influence between the two variables is linear. The method used in testing the linearity in this study is the curve estimation test (curva of fit). The effect of the two variables is said to be linear if the significance value of the test is smaller than the alpha used, which is 5%.

According to Garson (2010) states that the relationship between variables has fulfilled the linear assumption because F Deviation from Linearity is in the insignificant range ($F = 1.054$; $p > 0.05$). Additional information shows that the assumption of linearity is quite strong because F-Linearity is in the significant range ($F = 5.116$; $p < 0.05$).The linearity relationship in this study is only related to structural equation modeling, namely the relationship between latent variables in the structural model is linear. The data linearity test aims to see whether the model used is a linear model. The following is a table that presents the results of the linearity test for the variables used in table 1.

Table 1. Test Results of Linearity Assumptions

Independent Variable	Dependent variable	Sig.	Ket.
Fishing Business (X1)	Well-being (Y1)	0.000	Linear
Fishing Business (X1)	Environmental Sustainability (Y2)	0.000	Linear
Animal Husbandry (X2)	Well-being (Y1)	0.009	Linear
Animal Husbandry (X2)	Environmental Sustainability (Y2)	0.805	Non Linear
Environmental Service Business (X3)	Well-being (Y1)	0.624	Non Linear
Environmental Service Business (X3)	Environmental Sustainability (Y2)	0.000	Linear
Well-being (Y1)	Environmental Sustainability (Y2)	0.000	Linear

Source: processed data, 2019

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Based on the results of the linearity test, the relationship between variables presented in table 1 shows that the relationship between fishing business (X1) on welfare (Y1) and environmental sustainability (Y2) can be said to be linear because the significance level is less than 5% or 0.05. For the livestock business variable (X2) it has a linear relationship with the welfare variable (Y1) with a significance value less than 5% or 0.05, but does not have a linear relationship with the environmental sustainability variable (Y2) because the significance level is greater than 5 % or

0.05. Meanwhile, the environmental service business variable (X3) does not have a linear relationship with the welfare variable (Y1) because the significance value is greater than 5% or 0.05; and the relationship with the environmental sustainability variable (Y2) is linear because the significance value is less than 5% or 0.05. Furthermore, the welfare variable (Y1) has a linear relationship with the environmental sustainability variable (Y2) where the significance level is less than 5% or 0.05. The test results concluded that not all relationships between variables contained in the structural model were linear, so that the assumption of linearity in the PLS analysis method was fulfilled. Thus, proving that the data used meets the linearity requirements can be analyzed further. the welfare variable (Y1) has a linear relationship with the environmental sustainability variable (Y2) where the significance level is less than 5% or 0.05. The test results concluded that not all relationships between variables contained in the structural model were linear, so that the assumption of linearity in the PLS analysis method was fulfilled. Thus, proving that the data used meets the linearity requirements can be analyzed further. the welfare variable (Y1) has a linear relationship with the environmental sustainability variable (Y2) where the significance level is less than 5% or 0.05. The test results concluded that not all relationships between variables contained in the structural model were linear, so that the assumption of linearity in the PLS analysis method was fulfilled. Thus, proving that the data used meets the linearity requirements can be analyzed further.

5.4.2 Test of the Validity and Reliability of the Research Constructions (Outer Model)

In the PLS analysis, the basic evaluation carried out is the evaluation of the measurement model (outer model) in order to determine the validity and reliability of the indicators measuring latent variables. Testing the validity and reliability of indicators in this study refers to discriminant validity, convergent validity, and composite reliability.

1. Corvergent Validity

The evaluation of the latent variable measurement model with reflective indicators is analyzed by looking at the convergent validity of each indicator.

Convergent validity testing on PLS can be seen from the size of the outer loading of each indicator against its latent variable. According to Solimun (2010); Ghozali (2011), Outer loading values above 0.70 are highly recommended, but loading factor values from 0.50 to 0.60 can still be toleratedwithn t-statistic value above 1.96 or p-*value*<0.05. The outer loading of an indicator with the highest value is the strongest or most important measure in reflecting the latent variable in question. Nilai outer loading interprets the contribution of each indicator used to its latent variable.

a. Evaluation of Fishing Business Variable Measurement Model (X1)

In this study, the measurement of fishing business variables is reflected through five indicators, namely: experience (X1.1), family role (X1.2), technology (X1.3), capital (X1.4), and market (X1.5).). Evaluation of the outer model or measurement model can be seen from the outer loading value of each fishing business variable indicator. The following shows the outer loading value of the fishing business construct in Table 2.

Table 2. Result of Outer Loading of Catching Business Construction (UPI).

Indicator	*Outer Loading*	t-statistics	t-table α = 5%
UPI1 <- UPI	0.788039	5.493949	1,960
UPI2 <- UPI	0.688644	3.809672	1,960
UPI3 <- UPI	0.859145	3.075225	1,960
UPI4 <- UPI	0.740788	4.260522	1,960
UPI5 <- UPI	0.811289	3,428820	1,960

Source: Data processed, 2019

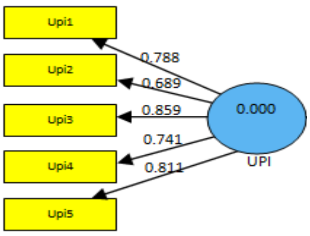

Figure 1.The results of the Outer Loading test for the fishing business variable (X1).
Source: processed data, 2019.Not have before explain about this figure

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Table 2. describes the loading value of the fishing business variable factor (UPI), where the loading factor value on the upi1 indicator, namely experience (X1.1) is 0.788, which is greater than the critical limit of 0.700; with a confidence level of 95%where the t-statistical value of the

experience indicator is greater than the t-table (1,960). Tothe loading factor value on the upi2 indicator, namely the role of the family (X1.2) of 0.689 but still above the tolerant value of 0.6 with the level of 95% confidence where the t-statistical value of innovative indicators is greater than the t-table (1,960). Upi3, upi4, and upi5 indicators, namely technology (X1.3), capital (X1.4) and market (X1.5) respectively 0.859; 0.741; and 0.811 is greater than 0.700dan is also significant at the 95% confidence level where the t-statistic value of each indicator is greater than the t-table (1,960). Thus the fishing business variable (X1) has been able to be well established or explained by the indicators of experience, the role of family, technology, capital, and the market or it can be said to be convergent valid on these indicators.

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Based on the results of data analysis, when viewed from the estimated value on the outer loading for each indicator, the indicator of the use of technology is the most important in reflecting the fishing business variables. The results of the analysis show that the highest loading factor is found at the upi3 indicator is a technology indicator of 0.859, so that this indicator is able to explain the fishing business variable (X1) better than other indicators.

Furthermore, the loading factor of the market availability indicator is 0.811; experience of 0.788; availability of capital of 0.741; and the smallest is the family role indicator of 0.689. On the other hand, the t-value shows that the indicator of experience is the strongest

usedn to measure the fishing business variable because the greatest value is obtained 5,4939which is significant at the 95% confidence level (1,960) compared to the indicators of capital, family role, the availability of markets and technology with t-count values of 4.2605 each; 3,8097; 3,4288 and 3,0752. Explain if you used some word about UP2and UP3

DengaHowever, it can be concluded that the fishermen's experiencein achieving business goals appearThis is the most important indicator in reflecting fishing effort variables.

b. Evaluation of the Measurement Model of Animal Husbandry variables

The measurement of livestock business variables is reflected through five indicators, namely: type of livestock (X2.1); number of livestock (X2.2); technology (X2.3); capital (X2.4); and family roles (X2.5). Evaluation of the outer model or measurement model can be seen from the outer loading value of each indicator of the livestock business variable. The following is the outer loading value of the livestock business construct in Table 3.

Indicator	Outer Loading	t-statistics	t-table α = 5%
UPT1 <- UPT	0.901053	5.153765	1,960
UPT2 <- UPT	0.683483	2.997548	1,960
UPT3 <- UPT	0.961804	5.171301	1,960
UPT4 <- UPT	0.948060	5.034131	1,960
UPT5 <- UPT	0.949310	4.911276	1,960

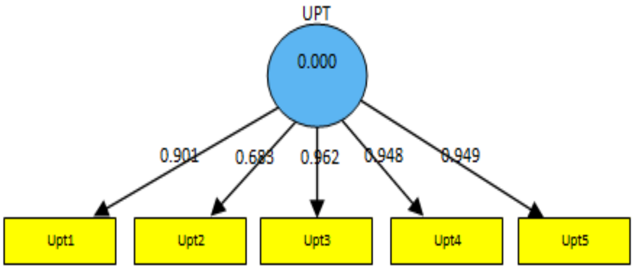

Figure 2.The results of the Outer Loading of Animal Husbandry Business variables (X2)

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Source: Data processed, 2019

Table 3 describes the factor loading value of the livestock business variable (UPT), where the factor loading value on the five indicators of the livestock business variable on average for each indicator is above 0.700; however the upt2 indicator, namely the number of livestock (X2.2) is only 0.689, which is less than the critical limit of 0.700; but it is still above the tolerant value of 0.6 with a confidence level of 95% where the t-statistical value of the number of livestock indicators is greater than the t-table (1,960). UPT1 indicator; upt3; upt4; and upt5, namely the type of livestock (X2.1); technology (X2.3); capital (X2.4); and the role of family (X2.5) is also significant at the 95% confidence level where the t-statistic value of each indicator is greater than the t-table (1,960). Thus the livestock business variable (X2) has been able to be established or well explained by indicators of the type of livestock; number of livestock; technology; capital; and the role of the family or it can be said to be convergent valid on these indicators.

Based on the results of data analysis, when viewed from the estimated value on the outer loading for each indicator, the technology indicator is the most important in reflecting the livestock business variables. The results of the analysis show that the highest loading factor is in the upt3 indicator, namely the indicator of technology use at 0.962, so that this indicator is able to explain the livestock business variable (X2) better than other indicators. Furthermore, the loading factor of

the indicator for the number of livestock is the lowest amounting to 0.689; while the other indicators are in a value between 0.901 to 0.949.

In addition, the t-value shows that the strongest technology indicator is used to measure the livestock business variable because the highest t-value is 5.1713 which is significant at the 95% confidence level (1,960) compared to the other four indicators with the t-count value. each between 2.9975 and 5.1537. Thus it can be concluded that, the use of technology, namely in terms of livestock maintenance, ease of obtaining feed sources and handling of livestock if the sick have been properly implemented so that business owners can improve welfare and maintain environmental sustainability are the most important indicators in reflecting on livestock business variables.

c. Evaluation of the Measurement Model of Environmental Service Business variables

Measurement of environmental service business variables is reflected through five indicators, namely: type of material (X3.1), availability of raw materials (X3.2), regulations (X3.3), capital (X3.4), and the role of the family (X3.5). . Evaluation of the outer model or measurement model can be seen from the outer loading value of each environmental service business variable indicator. The following is the outer loading value of the environmental service business construct in Table 4.

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Table 4. Result of Outer Loading Calculation for Environmental Service Business Constructs

(UPL

Indicator	Outer Loading	t-statistics	t-table α = 5%
UJL1 <- UJL	0.926732	46.357789	1,960
UJL2 <- UJL	0.935039	61.470012	1,960
UJL3 <- UJL	0.786435	17.334489	1,960
UJL4 <- UJL	0.921696	34.434470	1,960
UJL5 <- UJL	0.708268	15.350415	1,960

Source: Data processed, 2019

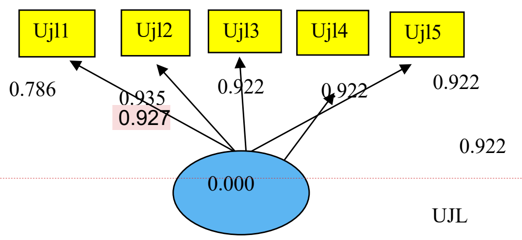

Figure 3. Results of Outer Loading Testing for Environmental Services Business variables (X3). Source: Data processed, 2019

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Table 4 describes the loading value of the environmental service business variable (UJL), where the factor loading value on the test indicator1 is the type of material of 0.9267, the test indicator is the availability of raw materials of 0.935; the test indicator 3, namely the regulation of 0.786; the test indicator 4, namely the capital of 0.922; and the upl5 indicator, namely the role of the family of 0.708, so that the average indicator value used is greater than 0.700 and significant at the 95% confidence level where the t-statistic value of each indicator is greater than the t-table (1.960). Thus the environmental service business variable (X3) has been able to be formed or well explained by indicators of the type of material, availability of raw materials, regulations, capital, and the role of the family or it can be said to be convergent valid on these indicators.

Based on the results of data analysis, when viewed from the estimated value on the outer loading for each indicator, the indicator of raw material availability is the most important in reflecting the environmental service business variables. The results of the analysis show that the highest loading factor is found in the UPL2 indicator, namely the indicator of raw material availability at 0.935, so that this indicator is able to explain the environmental service business variable (X3) better than other indicators. Furthermore, the loading factor of the material type indicator is 0.927; capital indicator of 0.922; regulatory indicator of 0.786; and the smallest is the family role indicator of 0.708.

Furthermore, the t-value which can indicate the level of significance that the indicator of raw material availability remains the strongest is used to measure environmental service variables because the greatest value is obtained, namely 61.47 which is significant at the 95% confidence level (1,960) compared to indicators of types of materials, regulations. , capital and family roles. Thus it can be concluded that the availability of raw materials as reflected by the availability of sufficient materials and having economic value is the most important indicator in reflecting the environmental service business variables.

Evaluation of the Welfare Variable Measurement Model

Measurement of the welfare variable is reflected through six indicators, namely: income (Y1.1), labor (Y1.2), education (Y1.3), home (Y1.4), home facilities (Y1.5), and health (Y1. .6). Evaluation of the outer model or measurement model can be seen from the outer loading value of each welfare variable indicator. The following shows the value of the outer loading of the welfare construct in Table 5.

Table 5. Results of the Outer Loading of Welfare Construction (KSJ)

Indicator	Outer Loading	t-statistics	t-table α = 5%
KSJ1 <- KSJ	0.614584	4.962165	1,960
KSJ2 <- KSJ	0.646412	3.141292	1,960
KSJ3 <- KSJ	0.659272	4.891431	1,960
KSJ4 <- KSJ	0.874387	3.175848	1,960
KSJ5 <- KSJ	0.891404	3.323201	1,960
KSJ6 <- KSJ	0.865737	3.697818	1,960

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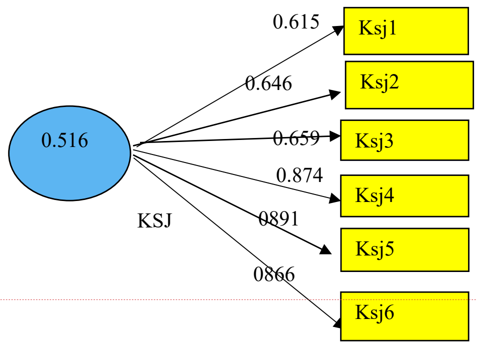
Source: Data processed, 2019



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Picture 4. The Outer Loading Test Results for the Welfare variable.

Source: Data processed, 2019

Table 5. describes the factor loading value of the welfare variable (KSJ), where the factor loading value on the ksj1 indicator; ksj2; and ksj3, namely income, labor and education, respectively 0.615; 0.646; 0.659, which is less than the critical limit of 0.700; but it is still above the tolerant value of 0.6 with a confidence level of 95% where the t-statistical value of income, labor and education indicators is greater than the t-table (1,960). Furthermore, on the ksj4 indicator; ksj5; and ksj6, namely houses, housing and health facilities, the loading value of each factor was 0.874; 0.891; 0.866, which is greater than the critical limit of 0.700, with a confidence level of 95% where the t-statistical value of the indicators of houses, housing and health facilities is greater than the t-table (1,960).

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Based on the results of data analysis, when viewed from the estimated value on the outer loading for each indicator, the indicator of home facilities is the most important in reflecting the welfare variable. The results of the analysis show that the highest loading factor is found in the ksj5 indicator, namely the home facilities indicator at 0.8914, so that this indicator is able to explain the welfare variable (Y1) better than other indicators. Furthermore, the loading factor of the house indicator is 0.874, the health indicator is 0.866; education indicator 0.6592; the job calm indicator is 0.6464, and the smallest is the income indicator of 0.615. On the other hand, the t-value which shows the level of significance that the income indicator shows is the strongest used to measure the welfare variable because the largest value is obtained, namely 4,962, which is significant at the 95% confidence level (1,960) compared to other indicators. Thus, it can be concluded that income, which is reflected in the profit earned from fishing, livestock farming and environmental service businesses, with an increase in sales volume is the most important indicator in reflecting the welfare variable.

d. Evaluation of Measurement Model for Environmental Sustainability Variables

Measurement of environmental sustainability variables is reflected in three indicators, namely: knowledge (Y2.1), attitude (Y2.2), and behavior (Y2.3). Evaluation of the outer model or measurement model can be seen from the outer loading value of each indicator of the environmental sustainability variable. The following is the outer loading value of the environmental sustainability construct in Table 6.

Table 6. Calculation Results of Outer Loading Constructions for Environmental Sustainability (KL).

Indicator	Outer Loading	t-statistics	t-table α = 5%
KL1 <- KL	0.923878	8.466075	1,960
KL2 <- KL	0.647676	2.290008	1,960
KL3 <- KL	0.896433	6.451619	1,960

Source: Data processed, 2019

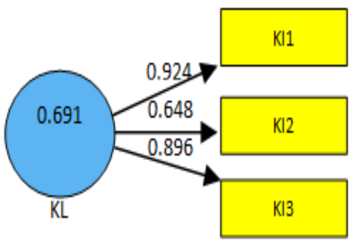

Figure 5.The Outer Loading Test Results for Environmental Sustainability (Y2)

Source: Data processed, 2019

Table 6 describes the value of the loading factor for the environmental sustainability variable (KL), where the factor loading value on the indicator KL1; and kl3, namely knowledge and behavior of 0.924 respectively; 0.896, which is greater than the critical limit of 0.700, with a 95% confidence level where the t-statistical value of knowledge and behavior is greater than the t-table (1.960). Furthermore, the kl2 indicator, namely the attitude of the loading factor value is smaller than the critical limit of 0.700; but it is still above the tolerant value of 0.6 with a confidence level of 95% where the t-statistical value of the attitude indicator is greater than the t-table (1,960). Thus the environmental sustainability variable (Y2) has been able to be well established or explained by indicators of knowledge, attitudes and behavior or can be said to be convergent valid on these indicators.

Based on the results of data analysis, when viewed from the estimated value on the outer loading for each indicator, the indicator of knowledge is the most important in reflecting the environmental sustainability variable. The results of the analysis show that the highest loading factor is found in the Kl1 indicator, namely the knowledge indicator of 0.924, so that this indicator is able to explain the environmental sustainability variable (Y2) better than other indicators. Furthermore, the loading factor of the behavior indicator is 0.896, and the smallest is the attitude indicator of 0.648. Furthermore, the t-value which can indicate the level of significance that the indicator of knowledge shows is the strongest used to measure environmental sustainability variables because the largest value is obtained, namely 8.466 which is significant at the 95% confidence level (1.960) compared to other indicators. Thus it can be concluded that, knowledge that is reflected from knowledge of marine and coastal resources, knowledge of coastal and coastal environmental conditions and knowledge of the benefits of protecting the coastal and coastal environment are the most important indicators in reflecting environmental sustainability variables.

Conclusion

1. The indicators used in the variable Capture Fisheries, Animal Husbandry, and Environmental Service Businesses are valid and appropriate to be used as indicators.

2. The more influential indicators are the technology indicator, the role of family and capital

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