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The Welfare of Fishermen in Gorontalousing Structural Equation Modeling

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ABSTRACT

Results of the study with Structural Equation Modeling (SEM)to approachshowed that the welfare of fishermen model is a model that fit with the chi-square of 0.045 and p-value 0.074, and RMSEA 0.045. Coastal development, environment of coastal communities, behavioral economic adaptation of fishermen affect the welfare of fishermen. Behavioral economic adaptation of fishermen provide indirect effect most welfare of fishermen, and coastal development provides the greatest effect on the welfare of fishermen.
KEYWORDS:SEM, *welfare*, *coastal development, behavioral economic adaptation, fishermen*

1. INTRODUCTION

Indonesian government aims to realize a society that is fair and prosperous through development activities, which have been set out in a strategy called the "Triple Track strategy" to improve people's welfare [1]. Relation to the management of coastal areas in order to improve people's welfare, often in the part of the fishermen community who are less advantaged, so that they become neglected as a result of development which focuses on the economic benefits rather than taking into account the risk of loss that can arise in the future due to development results implemented. In fact, a group of fishing communities is part of the coastal communities whose existence can't be ignored either as a resident or existence in the development process.

In conjunction with the development of coastal areas in Gorontalo can be argued there has been a paradoxical development, fishing communities ultimately not be the subject of development in coastal areas Gorontalo, in the area of their own population. They even experienced a sizeable adjustment to environmental conditions as a result of development in coastal areas Gorontalo. This resulted largely from the fishing community has been marginalized even better they have changed the place of residence or have lost their livelihood and / or other professions have switched from their previous profession that has been theirs for generations [2][3]. In such circumstances has shown that the development of coastal areas in Gorontalo has ignored the approach of coastal development and is not yet fully able to improve social welfare of coastal areas evenly. [4] stated that with the pressure of population with socio-economic dynamics, as well as the magnitude of the demands of local governments to obtain the funding sources for increased acceleration of development, has an impact of less favorable for environmental sustainability [5][18] and natural resources a capital construction of the present and the future [6].

Noting that coastal development paradox has been described above, it is necessary to study the implications of coastal development on the environment and the welfare of fishermen in Gorontalo. Besides analyzing the ways and means of fishing communities in addressing environmental change with Structural Equation Modeling (SEM) to approach.

2. METHODOLOGY

The data will be analyzed in this study are primary data taken directly by giving the questionnaire questions via questionnaire to the fishing communities in Gorontalo. The sampling method to be used is probability sampling with simple random sampling [13][14] and analysis techniques used are Structural Equation Modeling (SEM).[8][9][10]

SEM is a set of statistical methods that allow testing of a relatively complex set of relationships simultaneously. The complex relationships can be built from a single or multiple dependent variables by one or more independent variables. Each dependent and independent variables can take the form factors (constructs are constructed from several indicators). These variables form a single variable that is observed or measured directly in a study. The input data used in the modeling SEM is the covariance matrix of the data sample (empirical data), which is then used to generate an estimate of the covariance matrix of the population.

[15] Modeling a complete SEM basically consists of a measurement model and structural models. Measurement models aimed at confirming the dimensions of which are developed on a factor, while the structural model of the structure of relationships that make up or explain the causality between factors[11][12]. SEM models is based on the conceptual framework of coastal development (X) consists of development

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capability (X1.1), revenue enhancement program (X1.2), infrastructure (X1.3); [18] environment of coastal communities (Y1) consists of environmental quality (Y1.1), environmental services (Y1.2);behavioral economic adaptation of fishermen (Y2) consists of functional adaptation (Y2.1), adaptation process (Y2.2); and the welfare of fishermen (Z) consists of income (Z1), savings (Z2), electricity bills (Z3), ownership of boats and fishing equipment (Z4), housing (Z5), education (Z6), health (Z7) are taken from the literature. The conceptual framework is presented as follows:

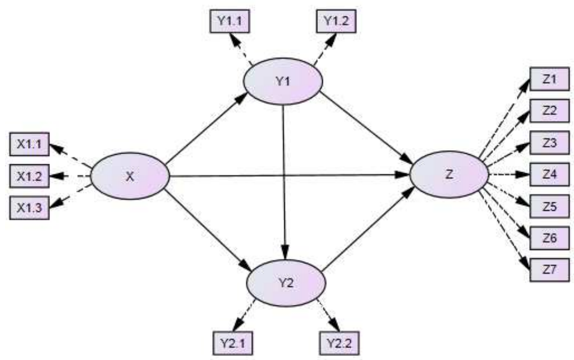

Figure 1. Conceptual Framework Fishermen Welfare

3. RESULTS AND DISCUSSION

Validity test is done by using confirmatory factor analysis [16][17] on each of the latent variables namely coastal development (X1), environment of coastal communities (Y1), behavioral economic adaptation of fishermen (Y2), and the welfare of fishermen (Z), while the reliability test use composite (construct) reliability with a minimum cut-off value is 0.7. More results are presented in the following table.

Table 1. Test Validity and Reliability Indicators on Latent Variables

Latent variable	Indicator	Loading (λ)	p-value	variance error	p-value	C-R
Coastal development(X1)	development capability (X1.1)	.864	.000	.382	.000	0.732
	revenue enhancement program (X1.2)	.923	.000	.240	.000	
	infrastructure (X1.3)	.888	.000	.328	.000	
Environment of coastal communities (Y1)	environmental quality (Y1.1)	.879	.000	.289	.010	0.795
	environmental services (Y1.2)	.839	.000	.373	.025	
The behavior of economic adaptation of fishing communities (Y2)	functional adaptation (Y2.1)	.882	.000	.307	.040	0.780
	adaptation process (Y2.2)	.905	.000	.315	.043	
The welfare of fishermen (Z)	income (Z1)	.807	.000	.500	.000	0.875
	savings (Z2)	.634	.000	1.074	.000	
	electricity bills (Z3)	.758	.000	.649	.000	
	ownership of boats and fishing equipment (Z4)	.825	.000	.446	.000	
	housing (Z5)	.797	.000	.533	.000	
	education (Z6)	.571	.000	.809	.000	
	health (Z7)	.616	.000	.669	.000	

Table 1, shows all the indicators of each latent variable has a value of loading factor above 0.5 with a p-value less than $\alpha = 0.05$, then the indicator is valid and significant. Table 1 also means that the development of the coastal region (X1) is formed of three indicators of capability development program (X1.1), revenue enhancement program (X1.2), and infrastructure (X1.3). Environment of coastal communities (Y1) is formed of two indicators of environmental quality (Y1.1) and environmental services (Y1.2). Behavioral economic adaptation of fishermen (Y2) is formed of two indicators of functional adaptation (Y2.1), and adaptation process (Y2.2). The welfare of fishermen (Z) is formed of seven indicators of income (Z1), savings (Z2), electricity bills (Z3), ownership of boats and fishing equipment (Z4), housing (Z5), education (Z6) and health (Z7), In addition, from Table 1, also indicated that all the indicators and the latent variable error variance p value less than 0.05 and CR values above the cut-off value of 0.7 so it can be said to be reliable.

Having tested the validity and reliability of the respective latent variables, some of the prerequisites that must be met in structural modeling is a multivariate normal assumption, assuming the absence of multicollinearity or singularity and outliers. Normality of the data is one of the requirements in the modeling

Structural Equation Modeling (SEM). Multivariate CR value of 1.061 and this value lies between -1.96 to 1.96, so that it can be said that the data distribution normalmultivariate. Singularity can be seen through the determinant of covariance matrix. Results of the study provide value Determinant of sample covariance matrix by 0.042. This value is almost limited of zeros so that it can be said that there is no singularity problem on the analyzed data. Thus indirectly all latent variables no multicollinearity. Outlier is an observation that appears with extreme values are univariate and multivariate Mahalanobis value greater than Chi-square table or value p1 <0.01 saying that outlier observations. In this study, no data outliers, it can be said not occur outlier.

Having tested the validity and reliability on all latent variables are valid and reliable results, data is normal multivariate, does not occur multicollinearity and outliers below 5 percent, the latent variables can be continued in the form of path diagram analysis presented as follows:

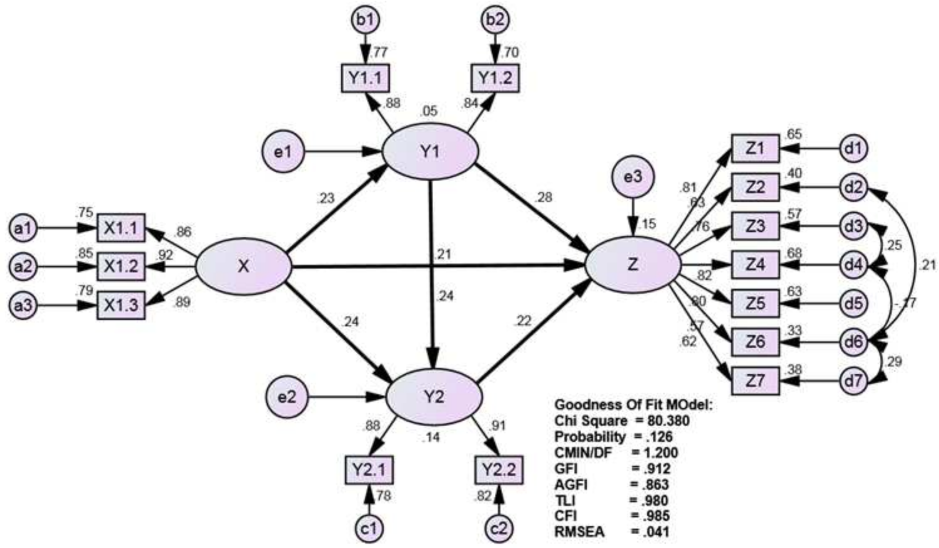

Figure 2. The relationship between the exogenous with the endogenous latent variables

The test results over the complete model with AMOS complete program can be seen in the following table:

Table 2. Results of Suitability Test Model Welfare of Fishermen Society

Criteria	Value Cut – Off	Results Calculation	Description
Chi – Square	Expected to be small	88.946	$\chi^2$with df = 71is 96.189 Good
Significance Probability	≥ 0,05	0.074	Good
RMSEA	≤ 0,08	0.045	Good
GFI	≥ 0,90	0.906	Good
AGFI	≥ 0,90	0.862	Good Enough
CMIN/DF	≤ 2,00	1.253	Good
TLI	≥ 0,95	0.974	Good
CFI	≥ 0,95	0.980	Good

Based on the table above, shows that 7 (seven) criteria used to judge the worth / absence of a model turned out to proclaim Good. It can be said that the model is acceptable, which means there is a match between the model with data.

Of a suitable model, it can be interpreted each path coefficient. The coefficients of these pathways is hypothesized in this study, which can be presented in the following structural equation:

$$Y1 = 0.238\ X$$
$$Y2 = 0.214\ X + 0.224\ Y1$$
$$Z = 0.264\ X + 0.261\ Y1 + 0.237\ Y2$$

with,

X = Coastal development
Y1 = Environment of coastal communities
Y2 = Behavioral economic adaptation of fishermen
Z = The welfare of fishermen

Testing the path coefficients in Figure 2 and equation above in detail presented in the following table:

Table 3. Coefficient LineTesting Results Model Fishermen Welfare Society

Variables	Coefficient	C.R.	Prob.	Description
Coastal development (X) →Environment of coastal communities (Y1)	0.238	2.318	.020	Significant
Coastal development (X)→Behavioral economic adaptation of fishermen (Y2)	0.214	2.216	.034	Significant
Coastal development (X) →The welfare of fishermen (Z)	0.264	2.617	.009	Significant
Environment of coastal communities (Y1)→Behavioral economic adaptation of fishermen (Y2)	0.224	2.103	.035	Significant
Environment of coastal communities (Y1)→The welfare of fishermen (Z)	0.261	2.419	.016	Significant
Behavioral economic adaptation of fishermen (Y2) →The welfare of fishermen (Z)	0.237	2.240	.025	Significant

Based on Table 3, the interpretation of each path coefficients are as follows:

- Coastal development (X) positive and significant impact on environment of coastal communities (Y1). This can be seen from the path marked positive coefficient of 0.238 with CR values of 2.318 and gained significance probability (p) of 0.020 which is smaller than the significance level (α) which is set at 0.05. Thus the construction of the coastal area (X) directly affect environment of coastal communities (Y1) of 0.238, which means that every increase in coastal area development (X) will raise environment of coastal communities (Y1) of 0.238.
- Coastal development (X) positive and significant impact on behavioral economic adaptation of fishermen (Y2). This can be seen from the path coefficient is positive for 0.214 with a value of CR for 2.216 and obtained a significance probability (p) of 0.034 which is smaller than the significance level (α)which was set at 0.05. Thus the construction of the coastal area (X) directly affect behavioral economic adaptation of fishermen (Y2) of 0.214, which means that every increase in coastal area development (X) it will raise behavioral economic adaptation of fishermen (Y2) of 0.214.
- Coastal development (X) positive and significant impact on the welfare of fishermen (Z). This can be seen from the path coefficient is positive for 0.264 with a value of CR for 2.617 and obtained a significance probability (p) of 0.009 which is smaller than the significance level (α) specified at 0.05. Thus the construction of the coastal area (X) directly affect the welfare of fishermen (Z) of 0.264, which means that every increase in coastal area development (X) will raise the welfare of fishermen (Z) of 0.264.
- Environment of coastal communities(Y1) positive and significant impact on behavioral economic adaptation of fishermen (Y2). This can be seen from the path coefficient is positive for 0.224 with a value of CR for 2.103 and obtained a significance probability (p) of 0.035 which is smaller than the significance level (α) specified at 0.05. Thus environment of coastal communities (Y1) directly affect behavioral economic adaptation of fishermen (Y2) of 0.224, which means that every increase in environment of coastal communities (Y1) will raise behavioral economic adaptation of fishermen (Y2) of 0.224.
- Environment of coastal communities (Y1) positive and significant impact on the welfare of fishermen (Z). This can be seen from the path coefficient is positive for 0.261 with a value of CR for 2.419 and obtained a significance probability (p) of 0.016 which is smaller than the significance level (α) specified at 0.05. Thus environment of coastal communities (Y1) directly affect the welfare of fishermen (Z) of 0.261, which means that every increase in environment of coastal communities (Y1) will raise the welfare of fishermen (Z) of 0.261.
- Behavioral economic adaptation of fishermen (Y2) positive and significant impact on the welfare of fishermen (Z). This can be seen from the path coefficient is positive for 0.237 with a value of CR for 2.240 and obtained a significance probability (p) of 0.025 which is smaller than the significance level (α) specified at 0.05. Thus behavioral economic adaptation of fishermen (Y2) directly affect the welfare of fishermen (Z) of 0.237, which means that every increase in behavioral economic adaptation of fishermen (Y2) will raise the welfare of fishermen (Z) of 0.237.

Direct influence, indirect influence and total influence in modeling SEM seems to be the important. For that will be discussed in detail each of these influences. Direct relationship occurs between exogenous latent variables (Development of coastal area (X)) with endogenous latent variables mediating / intervening (environment of coastal communities (Y1), behavioral economic adaptation of fishermen (Y2)) and endogenous latent variables (the welfare of fishermen (Z)). The following table presents the direct result of the direct relationship that occurs between latent variables exogenous and endogenous:

Table 4. Direct Effect Variables Research

Direct Effect		InterveningVariables		EndogenousVariable
		Environment of coastal communities (Y1)	Behavioral economic adaptation of fishermen (Y2)	The welfare of fishermen (Z)
Exogenous Variable	Coastal development (X)	0.238	0.214	0.264
InterveningVariables	Environment of coastal communities(Y1)		0.224	0.261
	Behavioral economic adaptation of fishermen (Y2)			0.237

From Table 4 it can be explained much influence directly (direct effects) of a latent variable exogenous to the endogenous latent variables. Coastal development (X) gives the most direct effect on the welfare of fishermen (Z), and further provides the largest direct effect on the welfare of fishermen (Z) is environment of coastal communities (Y1).

Indirect effect occurring between exogenous and endogenous latent variables are presented in the following table.

Table 5. Indirect Effect Variables Research

Pengaruh Tidak Langsung		**Intervening Variables**		**Endogenous Variable**
		Environment of coastal communities (Y1)	**Behavioral economic adaptation of fishermen (Y2)**	**The welfare of fishermen (Z)**
Exogenous Variable	Coastal development (X)		0.054	0.126
Intervening Variables	Environment of coastal communities (Y1)			0.053
	Behavioral economic adaptation of fishermen (Y2)			

From Table 5, can be explained much influence indirectly (indirect effects) of a latent variable exogenous to the endogenous latent variables. Environment of coastal communities (Y1) and behavioral economic adaptation of fishermen (Y2) provides the largest indirect effect on development of coastal region (X) on the welfare of fishermen (Z).

The net effect occurring between exogenous and endogenous latent variables are presented in the following table.

Table 6. Total Effect Variables Research

Pengaruh Langsung		**Intervening Variables**		**Endogenous Variable**
		Environment of coastal communities (Y1)	**Behavioral economic adaptation of fishermen (Y2)**	**The welfare of fishermen (Z)**
Exogenous Variable	Coastal development (X)	0.238	0.267	0.390
Intervening Variables	Environment of coastal communities (Y1)		0.224	0.314
	Behavioral economic adaptation of fishermen (Y2)			0.237

From Table 6, can be explained much influence total (total effects) of a latent variable exogenous to the endogenous latent variables. Coastal development (X) gives the largest total effect on the welfare of fishermen (Z), and further provides the largest total effect on the welfare of fishermen (Z) is the environment of coastal communities (Y1). Coastal development (X) gives the largest total effect on the welfare of fishermen (Z).

4. CONCLUSION

The results showed that all the indicators of each latent variable has a value of loading factor above 0.5 with a p-value less than $\alpha = 0.05$, then the indicator is valid and significant, and then the model of the welfare of the community of fishermen is fit model. Coastal development (X), the environment of coastal communities (Y1), behavioral economic adaptation of fishermen (Y2) affect the welfare of fishermen (Z), while the behavioral economic adaptation of fishermen (Y2) provide indirect effect most welfare of fishermen (Z).

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