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PREFACE

Assalamu'alaikum warrahmatullahi wabarakatuh

Firstly, may we made our highest praise and thank to Allah The Almighty, for His bless so that we are able to conduct such an precious moment; First International Seminar on Public Health and Education 2014 in Semarang Indonesia, to share our knowledge and ideas with so much warm and friendship from worldwide public health and education community.

International Seminar on Public Health and Education 2014 is aimed to gather all of experts, researchers, academicians and practitioners in health education field in general as well as national and international level in one prestigious academic forum which to discuss all health-education-related issues, ranging from human resources, curriculum, institutionalization etc. The seminar also proposed to contribute to the focus of health development direction; by considering also situation and the status of local health condition from each region, both national and regional levels as well as its relation to global health trends

I would like to deliver our highest respect and appreciation to our honorable speakers, Prof. Dr. Ir. H. Musliar Kasim, M.S (Indonesia vice Minister of Education and Culture for Education Affairs) and to the Rector of Semarang State University for their support and appreciation on this seminar; and my deep gratitude to our honorable guests: Prof. Doune Macdonald (Queensland University Australia), Maria Consorcia LIM Quizon, MD (South Asia Field Epidemiology and Technology Network, Inc , Philippine), Dr. Khancit Limpakarnjanarat (WHO Indonesia Representative), and also Assist. Prof. Dr. Songpol Tornee (Srinakharinwirot University, Thailand). I really expect that this seminar will be beneficial for all of us and to the development of the Public Health and Education field.

Allow me to express my gratitude to the participants and audiences from Indonesia and other foreign countries who are enthusiastic in attending this seminar. I do hope that all audiences will gain important values and collaborate it into our own fields and make significant changes in the future. Besides that, I also convey my appreciation to all of organizing committee who has given their outstanding commitment for presenting this occasion.

Wassalamu'alaikum warrahmatullahi wabarakatuh

Sincerely yours

Rudatin Windraswara

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MODEL OF FISHING COMMUNITIES WELFARE IN COASTAL AREA IN GORONTALO UTARA DISTRICT

Rama Hiola[1], Herlina Jusuf[1], Yuniarti Koniyo[1]

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Abstract

Introduction: The aim of this study is to develop indicators of coastal development on the welfare of fishing communities by environmental factors and economy adaptation in Gorontalo Utara district with Spatial Bayesian SEM and Machine Learning. Specific targets to be achieved is the existence of the development design so that the equalization of poor households in coastal area in Indonesia, especially in Gorontalo Utara district.

Methods: Methods of data analysis used in this study are (1) descriptive and identification of data, (2) develop the coastal area development indicators, environment, economy adaptation, fishing communities walfare with Bayesian CFA methods, and obtaining structural models with Spatial Bayesian SEM to obtain the factors that influence the welfare of fishing communities in coastal area, (3) evaluate the welfare of fishing communities in coastal area by classification accuracy using CART, MARS, Bagging CART and MARS methods, (4) evaluate the classification accuracy of fishing communities in coastal area for out sample data using Bagging CART and MARS methods, (5) compare poor households models with Bagging CART and MARS models to obtain the best model.

Results: The result of this study showed that fishers welfare indicators are ship and fishing tools ownership, housing, income, electricity bills, health, savings, and education.

Keywords: Poverty, CART, MARS, bagging CART

Introduction

Poverty in this era is still a complex problem to solve. Not infrequently the problem of poverty being a reason to evaluate the performance of the government and could even bring down the government because it is considered not being able to improve the lives of people. During poverty are more likely to be associated with economic factors, this is due to the more easily measured, observed and compared. But other factors need to be considered in terms of poverty are social factors, cultural, social, political, environmental, health, education and character. At the community level, infrastructure is a major determinant of poverty. Infrastructure development indicators that are often used in econometric modeling, such as the availability of health facilities, availability of schools, lack of access to electricity, the distance to the center of administration / capital city (World Bank Institute, 2002).

In this time, the Indonesian government efforts aimed at realizing a society that is just and prosperous through development activities, which have been outlined in a strategy called the "Triple Track srategy" to improve people's welfare, namely: Pro-Job: Job creation; Pro-poor growth: economic growth and stability; and Pro-poor: poverty reduction; and within the framework of the Pro-Environment: Handling of climate change (Alisjahbana, 2010). Various government programs to improve the well-being especially coastal communities, made for this percentage is still very small in the amount of 0.02%, which credit institutions and government program focuses on the

development on the mainland, while the maritime sector to be neglected (General Directorate of fisheries , 2010)

Several studies related to the welfare conducted by Santoso & Otok (2009), examines the factors that influence exclusive breastfeeding in poor households with MARS approach. Wahyuningrum (2008) also examined the accuracy of the classification of rural / poor villages in East Kalimantan with MARS approach. In 1995 Faturokhman and Molo examine the characteristics of poor households in Yogyakarta. Rahmawati (1999), examines employment of the poor in Jakarta. Then BPS works closely with Word Bank Institute (2002) developed the basics of the analysis of poverty. Gönner, Chayat, and Haung (2007) examines poverty and household welfare, the result is a guide for the West Kutai, then Suryadarma, et al (2005) examines a family's welfare objective for targeting poverty with PCA (Principal Component Analysis). Furthermore Een & Otok (2009), doing household welfare classification with CART approach.

Results of research conducted by Sjafi'i, Bengen and Gunawan (2001) states that the amount of pressure the population with socio-economic dynamics, as well as the magnitude of the demands of local governments to obtain funding sources for increased the acceleration of development, it has an impact that is less favorable for environmental and natural resources sustainability into capital construction of the present and future. Don Chernichovsky and Oey Astra Meesok (1985) in Masfufah (2000), examines poor households characteristics in Indonesia are: number of household members with a lot of the household head as the backbone of the family, the education level of the household head and members mean low average, frequent job changes and some of them willing to accept another additional job if its offered, most expenditures to consume foods with a percentage of expenditures for most major carbohydrates, mostly main income comes from agriculture and land tenure is still marginal, the house is still very poor condition in the case of water and electricity for lighting. Rusastra and Togar (2007), the general characteristics of the poor are mostly staying in the village, working in the agricultural sector, the informal nature of the job is the job status as well as family workers in pay. Otok, Suhartono, Sutikno, Purhadi and Santi (2012), developed indicators of poor households in the 3 dimension factors of poverty, namely human resources, economics and health. Therefore this study will develop indicators of coastal development on the welfare of fishing communities through environmental and economic adaptation factors in Gorontalo Utara district with spatial Bayesian SEM and machine learning approach.

Research on poverty and welfare described above indicated that many factors that affect poor households in a region. So it is necessary to identify the factors that most affect the poor households in a coastal region of, particularly in Gorontalo Utara District, to be used as a development planning so that development will be more focused on the reduction of poor fishing communities.

SEM is an appropriate tool to measure the research variables unmeasured (latent). The latent variables can be indirectly measured by an indicator variable. SEM can also describe the

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causal relationship between variables that can not be described in ordinary regression analysis, so that it can be seen how well an indicator variable determining the latent variables.

Based on the problems mentioned above, and the opportunity of further research related to the modeling of poor households still open breadthly, so in this study the focus issues to be investigated by researchers is How to model the welfare of fishing communities of an area based on the development of coastal areas, environmental and economic adaptation factors by spatial Bayesian SEM-based?

BPS (2009) defines the poverty line as the value of rupiahs to be issued in one month in order to meet the basic needs of the calorie intake of 2100 kcal / day per capita (food poverty line) plus a minimum non-food needs is someone needs, ie clothing, schools, transportation and other basic needs of the individual household (non-food poverty line).

In explaining the relationship between the response variable with the predictor variables can be used regression curve. Regression curve approach that is often used is a parametric regression approach, which assumed the form of the regression curve (such as linear, quadratic, cubic) based on the theory that can provide connection and error is normally distributed information (Draper and Smith, 1992). However, not all patterns of relationship can be approximated by a parametric approach, in the absence of any information about the relationship shape of the predictor variables and the response variable. If the parametric model assumptions are not met then the regression curve can be predicted using nonparametric regression model approach. Whereas, if not met the normality assumption used bootstrap approach.

Structural Equation Modeling (SEM) is a multivariate technique that combines aspects of the factor analysis and multiple regression analysis that allows researchers to simulate a series of dependent relationships between the measured variables and latent constructs as well as between latent constructs (Hair et al., 2006).

Methods

The study design

Operational definition and measurement of research variables that used in his study are:

Coastal area development.

Coastal area development is the construction carried out in the coastal area which is located in the Gorontalo Utara district. Operational variables of this coastal area development which will be the measurements are: Infrastructure in coastal development, indicator used to measure the infrastructure in coastal area development are: infrastructure, trade area construction, and the port; fishing community income generation programs; capacity and capability building programs. It is to see the results that have been achieved in the development of coastal areas that provide benefits to fishing communities.

Fishing community environment

Fishing community environment is the environment that is around the lives of fishing communities both physical environment, social and economic of fishing communities. Environment operational variable of fishing communities are: environmental quality and environmental services, the availability of alternative business of fishing communities, and the availability of main business supporting of fishing communities.

Welfare of fishing communities

Welfare of fishing communities are all factors that indicate the level of quality of life of the fishing community in the efforts that have been made. Operational variabel of fishering communities welfare used in this study are: income, savings, electricity bills, ownership of boats and fishing equipment, housing, health, education.

The analysis used in this study is the Spatial Bayesian SEM to obtain the factors that affect the welfare of the fishing communities of coastal areas. Spatial Bayesian SEM Analysis Stages are:

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a) Obtaining a model-based concepts and theories that developed to design the measurement model.

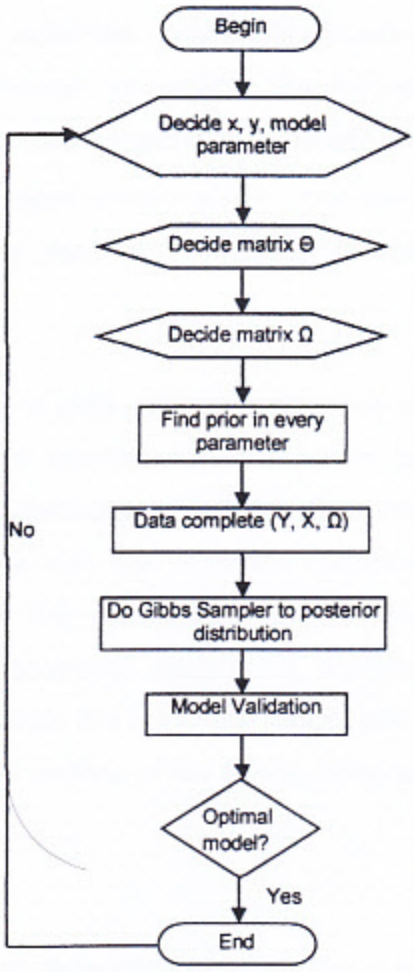

Figure 1. Spatial Bayesian SEM Analysis Stages

b) Creating structural models and pathway diagrams that may explain the pattern of the relationship between latent variable and its indicators and also involving the location effect.
c) Conversing pathway diagram into equation.
d) Estimating the parameters (weights, loading factor, pathway coefficients) and estimating the bootstrap aggregating (bagging).
e) Testing the significance of the measurement model parameters. Testing the significance of the structural model parameters. Determining the goodness of fit model.

Data collection techniques and data sources.

The data used in this study comes from the data collection of the National Socioeconomic Survey (Survei Sosial Ekonomi Nasional (SUSENAS-2010)) of Gorontalo

Utara district. Susenas is a survey designed to collect social data in a very broad scope. The data collected were related to the fields of education, health/nutrition, housing, other socio-economic, socio-cultural activities, consumption/expenditure and household income, travel and public opinion on household welfare. The following are the variables that are used as endogenous variables and exogenous variables. Variables that have been used consists of three endogenous latent variables (η). , one exogenous latent variable (ξ), 13 manifest variables (Y) which the observation is Gorontalo Utara district.

Methods of data analysis

Furthermore, the method of data analysis performed in this study can be explained as follows: (1) Descriptive and identification data. Descriptive aimed to determine the characteristics of the data. Identification includes the identification of the relationship between the response variable with the predictor variables that can be shown on the matrix plot and the value of the correlation; (2) Develop indicators of coastal area development, environmental, economic adaptation, welfare of fishing communities with Bayesian CFA method, and obtain the structural model with the Spatial Bayesian SEM to obtain the factors that affect the welfare of the fishing communities of coastal areas.

Results and Discussion

Validity test

Validity test is intended to determine whether the questions in the questionnaire is quite representative. Validity test is done by using confirmatory factor analysis on coastal area development variable (X1), the environment of coastal communities (Y1), the behavior of the economic adaptation of fishing communities (Y2), and the welfare of fishing communities (Y3) through AMOS 20 program.

Development of coastal area (X1)

Coastal area development (X1) is an exogenous latent variable measured by three (3) variables: capability development program (X1.1), income generation program (X1.2), and the provision of infrastructure (X1.3). So to determine whether coastal area development (X1) is a latent variable, confirmatory factor analysis used and the results by the AMOS program can be seen in the following figure:

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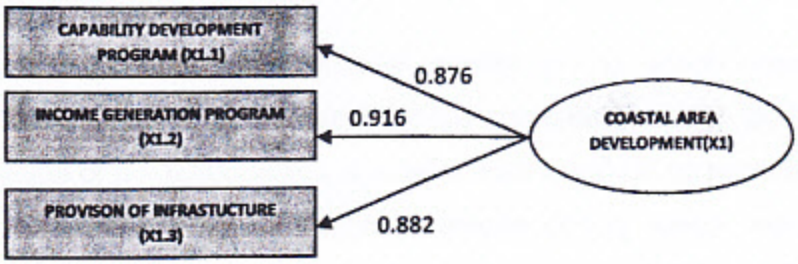

Figure 2. Coastal area development (x1) validity test

The results of such testing presented in Figure 5.1 shows that the value of the factor loading in three indicators above is greater or equal to 0.5. Each of these can be explained as follows:

(1) Loading value 0.876 for the capability development program (X1.1) which means statistically significant in assessing coastal area development (X1) of 0.876, it can be seen by the value of p = 0.000 which is smaller than α = 0.05 on the regression weight;

(2) Loading value 0.916 for income generation program (X1.2) which means statistically significant in assessing coastal development (X1) of 0.916, it can be seen by the value of p= 0.000 which is smaller than α = 0.05 on the regression weight;

(3) Loading the value 0.882 for the provision of infrastructure (X1.3) which means statistically significant in assessing coastal area development (X1) of 0.882, it can be seen by the value of p = 0.000 which is smaller than α = 0.05 in regression weight;

Thus there are three (3) indicators that can be used to measure coastal area development (X1). The three inddicators are capability development program (X1.1), income generation program (X1.2), and the provision of infrastructure (X1.3);

The environment of fishing communities (Y1)

Fishing communities environment (Y1) is the exogenous latent variable measured by 2 (two) variables:environmental quality (Y1.1), and environmental services (Y1.2). So to find out if a fishing community environment (Y1) is a latent variable, confirmatory factor analysis used and the results with the AMOS program can be seen in the following figure:

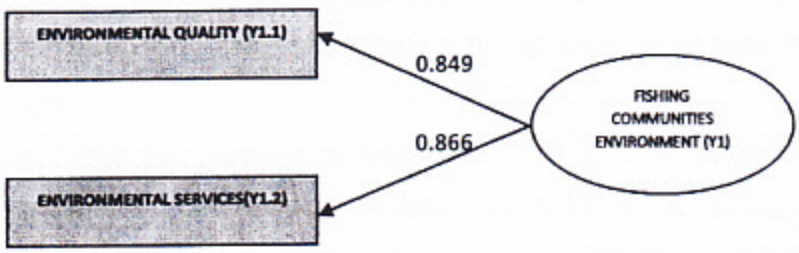

Figure 3. Fishing communities environment (y1) validity test

The results of such testing presented in Figure 3, shows that the of the factor loading value in three indicators is greater or equal to 0.5. Each of these can be explained as follows:

(1) Loading value 0,849 for environmental quality (Y1.1) which means statistically significant in measuring environmental fishing communities (Y1) of 0,849, it can be seen by the value of p = 0.000 which is smaller than α = 0.05 on regression weight;

(2) Loading value 0.866 for environmental services (Y1.2) which means statistically significant in measuring environmental fishing communities (Y1) of 0.866, it can be seen by the value of p = 0.000 which is smaller than α = 0.05 at regression weight.

Thus there are two (2) indicators that can be used to measure the fishing community environment (Y1). The two indicators are the environmental quality (Y1.1), and environmental services (Y1.2).

Economic adaptation behaviour of fishing communities (Y2)

The economic adaptation behavior of the fishing communities (Y2) is the exogenous latent variable measured by 2 (two) variables, namely functional adaptation (Y2.1), and processual adaptation (Y2.2). So as to determine whether the economic adaptation behavior of the fishing communities (Y2) is a latent variable, confirmatory factor analysis has been used and the results with the AMOS program can be seen in the following figure:

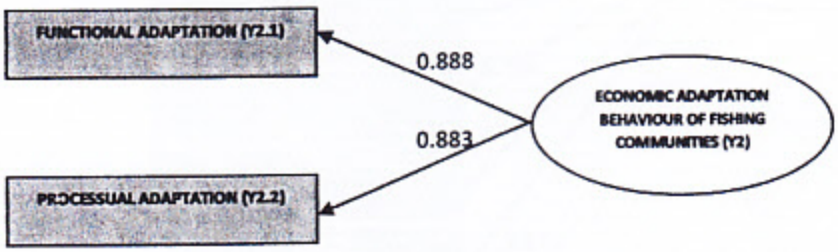

Figure 4. The economic adaptation behaviour of fishing communities (Y2) validity test

The results of such testing presented in Figure 4, shows that the loading value of the three indicator above is greater or equal to 0.5. Each of these can be explained as follows:

(1) Loading value 0,849 for functional adaptation (Y2.1) which means statistically significant in measuring the economic adaptation behavior of the fishing communities (Y2) of 0,849, it can be seen by the value of p = 0.000 which is smaller than α = 0.05 in regression weight;

(2) Loading value of 0.866 for processual adaptation (Y2.2) which means statistically significant in measuring the economic adaptation behavior of the fishing communities (Y2) of 0.866, it can be seen by the value of p = 0.000 which is smaller than α = 0.05 in regression weight

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Thus there are two (2) indicators that can be used to measure the the economic adaptation behavior of the fishing communities (Y2) are a functional adaptation (Y2.1), and processual adaptation (Y2.2).

Fishing communities welfare (Z)

Fishing communities welfare (Z) is the exogenous latent variable are measured by the 7 (seven) such as the income (Z1), savings (Z2), the electric bill (Z3), ownership of boats and fishing equipment (Z4), housing (Z5), education (Z6) and health (Z7). So as to know whether the fishing communities Welfare (Z) is a latent variable, confirmatory factor analysis has been used and the results by using the AMOS program can be seen in the following figure:

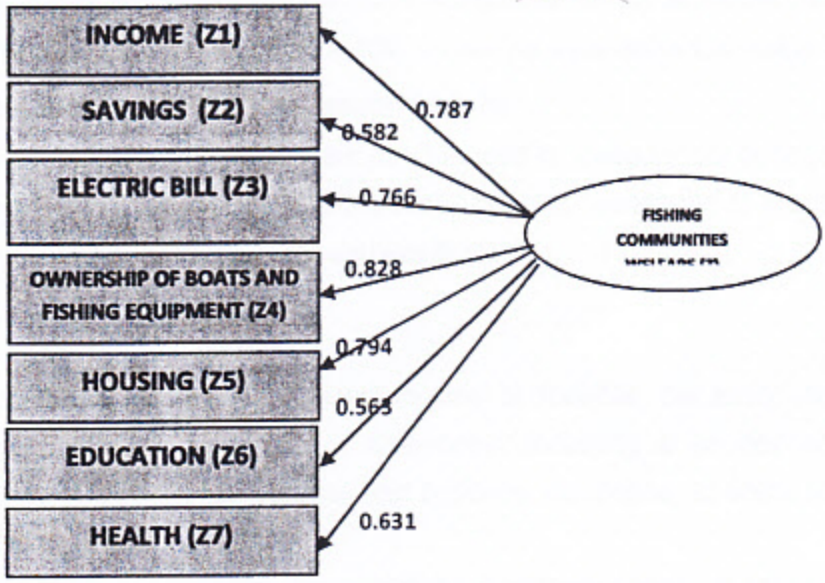

Figure 5. Fishing communities welfare (Y2) validity test

The results of such testing presented in Figure 5 shows that the loading value in seven indicators above is the greater or equal to 0.5. Each of these can be explained as follows

(1) Loading value 0.787 for income (Z1) which means statistically significant in measuring the fishing communities welfare (Z) of 0.787, it can be seen by the value of p = 0.000 which is smaller than α = 0.05 in regression weight;

(2) Loading value of 0.582 for savings (Z2) which means statistically significant in measuring the fishing communities welfare (Z) of 0.582, it can be seen by the value of p = 0.000 which is smaller than α = 0.05 in regression weight;

(3) Loading value of 0.766 for loading electric bill (Z3) which means statistically significant in measuring the fishing communities welfare (Z) of 0.766, it can be seen by the value of p = 0.000 which is smaller than α = 0.05 in regression weight;

(4) Loading value of 0.828 for ownership loading boats and fishing equipment (Z4) which means statistically significant in measuring the fishing communities welfare (Z) of 0.828, it can be seen by the value of p = 0.000 which is smaller than α = 0.05 on the regression weight

(5) Loading value of 0.794 for housing (Z5) which means statistically significant in measuring the fishing communities welfare (Z) of 0.794, it can be seen by the value of p = 0.000 which is smaller than α = 0.05 in regression weight;

(6) Loading value 0.563 for education (Z6) which means statistically significant in measuring the fishing communities welfare (Z) of 0.563, it can be seen from the value of p = 0.000 which is smaller than α = 0.05 in regression weight;

(7) Loading value 0.631 for health (Z7) which means statistically significant in measuring the fishing communities welfare (Z) of 0.876, it can be seen from the value of p = 0.000 which is smaller than α = 0.05 in regression weight;

Thus there are 7 (seven) indicators which can be used to measure the fishing communities welfare (Z) are income (Z1), savings (Z2), the electric bill (Z3), ownership of boats and fishing equipment (Z4), housing (Z5), education (Z6) and health (Z7).

Reliability test

The second measurement tool test (questionnaire) is Reliable, the index which indicates which the measuring instrument is reliable or trustworthy. Reliability is an internal consistency measure of the indicators of a formed variable that indicates the degree to which each indicator that indicates a common formed variable.

In this study in calculating reliability using reliability composite (contruct) with a 0.7 minimum cut-off value. The calculation is as follows:

$$CR = \frac{(\sum \text{standardized loading})^2}{(\sum \text{standardized loading})^2 + \sum e_j}$$

Based on calculations, the latent variable coastal area development (X1) gives the value of CR at 0.732 above its cut-off value of 0.7 so that it can be said coastal area development (X1) reliable. Similarly, on each indicator, all error variance p values less than 0.05 it is said to be reliable. Latent variable fishing communities environment (Y1) gives the value of CR at 0,795 above its cut-off value of 0.7 so that it can be said the fishing community environment (Y1) reliable. Similarly, on each indicator, all error variance p values less than 0.05 it is said to be reliable. Latent variable economic adaptation behavior of fishing communities (Y2) gives the value of CR at 0.780 above its cut-off value of 0.7 so that it can be said the economic adaptation behavior of fishing communities (Y2) reliable. Similarly, on each indicator, all error variance p values less than 0.05 it is said to be reliable. Latent variables fishing communities welfare (Z) gives the value of CR at

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0.808 above its cut-off value of 0.7 so that it can be said fishing communities welfare (Z) reliable. Similarly, on each indicator, all error variance p values less than 0.05 then said to be reliable.

SEM on Coastal Area Development Against the Welfare of The Fishing Communities Through Environmental and Economic Adaptation Behavior of The Fishing community

After having validity and reliability tested on each latent variable, several prerequisites that must be met in structural modeling is the assumption of normal multivariate, assuming the absence of multicollinearity or singularity and outliers

Normality test

Normality of the data is one of the prerequisite for Structural Equation Modeling (SEM). Normality testing emphasis on multivariate data by looking at the value of skewness, kurtosis, and statistically can be seen by the value of Critical Ratio (CR). If you used a significance level of 5 percent, then the value of CR is between -1.96 to 1.96 (-1.96 ≤ ≤ 1.96 CR) said normal distribution of data, multivariate and univaariat either.

Singularity and multicollinearity test

Singularity can be seen through the determinant of the covariance matrix. Value of the determinant is very small or close to zero indicates the singularity problem, so it can not be used for research. The results of the study provide value Determinant of the sample covariance matrix of 0.042. This almost makes approximately value of zero so that it can be said that there is no singularity problems in the data analyzed. Thus indirectly all latent variables no multicollinearity.

Outlier is an observation that appears to the extreme values by multivariate and uniariate way, that arise due to the combination of its unique characteristics and looks so outlying from other observations. If there is a outlier can be done special treatment but we have to know how the emergence of unknown origin outlier. Outlier test results in this study presented on the Mahalanobis distance or Mahalanobis d-squared. Mahalanobis value greater than the Chi-square table or p1 value <0.01 is said that outlier observation. In this study, no data are outliers, it can be said no outliers occur.

Having the validity and reliability tested of all latent variables, the results are valid and reliable, the data is multivariate is normal, multicollinearity and outliers do not occur below 5 percent, then the latent variables can be continued in the analysis.

Effect of inter-research variables

In a structural equation with many variables and paths between variables there are effect among the variables which include the direct effect, indirect effect and total effect. For it will be discussed in detail each of the above-mentioned effect.

(1) Direct Impact Between Research Variables

A direct relationship between the latent exogenous variables (coastal area development (X)) with the endogenous latent variables mediating/intervening (fishing communities environmental (Y1), economic adaptation behavior of fishing communities (Y2)) and endogenous latent variables (fishing communities welfare (Z)). The following table presents the direct result of the direct relationships that occur between the exogenous and endogenous latent variables:

Table 1. Direct Impact Between Research Variables

Direct Effect		Endogenous Variabel		
		Fishing Communities Environment (Y1)	Economic Adaptation Behavior of Fishing Communities (Y2)	Fishing Communities Welfare (Z)
Exogenous Variabel	Coastal area development (X1)	0,238	0,214	0,264
	Fishing communities environment (Y1)	0,000	0,224	0,261
	The economic adaptation behavior of the fishing communities (Y2)	0,000	0,000	0,237

From the table above, can be explained large direct effect (direct effects) of exogenous latent variables on endogenous latent variables. Coastal area development (X) gives the largest direct effect on the fishing communities welfare (Z), and fishing community environment (Y1).

(2) Indirect Effects Between Research Variables

Indirect relationship between the exogenous latent variables (coastal area Development (X)) with the endogenous latent variables mediating/intervening (fishing communities environmental (Y1), economic adaptation behavior of fishing communities (Y2)) and endogenous latent variables (fishing communities welfare(Z)). The following table presents the results of Indirect regarding the direct relationship between the variables that occur - exogenous and endogenous latent variables:

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Table 2. Indirect effects between research variables

Indirect Effects		Endogenous Variabel		
		Fishing Communities Environment (Y1)	Economic Adaptation Behavior of Fishing Communities (Y2)	Fishing Communities Welfare (Z)
Exogenous Variabel	Coastal area development (X1)	0,000	0,054	0,126
	Fishing communities environment (Y1)	0,000	0,000	0,053
	The economic adaptation behavior of the fishing communities (Y2)	0,000	0,000	0,000

From the table above, can be explained that much influence indirectly (indirect effects) of exogenous latent variables on endogenous latent variables. Fishing communities environment (Y1) and economic adaptation behavior of fishing communities (Y2) gives the largest indirect effect on the coastal area development (X1) on the fishing communities welfare (Z).

(3) Total Effect of Inter- Research Variable

The total effect is the sum of the direct and indirect influence between exogenous latent variables (coastal area development (X)) with the endogenous latent variables mediating/intervening (fishing communities environmental (Y1), the economic adaptation behavior of the fishing communities (Y2) and endogenous latent variables (fishing communities welfare (Z)). The following table presents the results of the total direct and indirect relationships that occur among the exogenous and endogenous latent variables.

Tabel 3. Total effect of inter- research variable

Direct Effect		Endogenous Variabel		
		Fishing Communities Environment (Y1)	Economic Adaptation Behavior of Fishing Communities (Y2)	Fishing Communities Welfare (Z)
Exogenous Variabel	Coastal area development (X1)	0,238	0,267	0,390
	Fishing communities environment (Y1)	0,000	0,224	0,314
	The economic adaptation behavior of the fishing communities (Y2)	0,000	0,000	0,237

From the table above, the total effect can be explained large (total effects) of exogenous latent variables on endogenous latent variables. Coastal area development (X) gives the largest

total effect on the fishing communities welfare (Z), and the next largest total effect on the fishing communities welfare (Z) is a fishing community environment (Y1).

Closing

Fishing communities welfare of an area based on coastal area development, environmental factors and economic adaptation based on spatial Bayesian SEM produces a model with the following values. Factors that affect the fishing communities welfare are coastal development for 0264 with capability development program indicators (0876), income generation program (0.916), and the provision of infrastructure (0.866), the environment (0,849), and environmental services (0.866) and economic adaptations behavioral of fishing communities 0.237 with functional adaptation indicator (0.888), and processual adaptation (0.883). Factors that influence the economic adaptation behavior of fishing communities (Y2) are a coastal area development at 0.214 with a capability development program indicator (0.876), the income generation program (0.916), and the provision of infrastructure (0.882), the fishing communities environment (Y1) of 0.224. With indicators of environmental quality (Y1.1) and environmental services (Y1,2).

Factors that affect the fishing communities environment (Y1) is a coastal area development at 0.238 with a capability development program indicator (0.876), the income generation program (0.916), and the provision of infrastructure (0.882). Fishing communities environment (Y1) and economic adaptation behavior of fishing communities (Y2) gives the largest indirect effect on coastal area development (X) on the fishing communities welfare (Z) is equal to 0.126. Dominant factor mempegaruhi welfare of fishermen (Z) is pemmbangunan coastal area (X) equal to 0.390 and the environment of coastal communities (Y1) of 0.314. Indicators of the welfare of fishermen (Z) is the ownership of boats and fishing equipment (Z4) 0.828; housing (Z5) 0.794; pendapaatan (Z1) 0.787, electric bill (Z3) 0.766, health (Z7) 0.631; savings (Z2) 0.582, and education (Z6) 0.563. Dominant factor that effect fishing communities welfare (Z) is coastal area development (X) equal to 0.390 and the coastal communities environment (Y1) of 0.314. Fishing communities welfare indicators (Z) is the ownership of boats and fishing equipment (Z4) 0.828; housing (Z5) 0.794; income (Z1) 0.787, electric bill (Z3) 0.766, health (Z7) 0.631; savings (Z2) 0.582, and education (Z6) 0.563.

It is expected that the government of Gorontalo Utara district can consider that the dominant factors affecting the fishing communities welfare.

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