

Original article

Analysis of poverty factors in Sulawesi by using path analysis

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Abstract

Poverty is a human inability to meet the needs of life. Factors that affect poverty can be seen from various indicators. In this study, the path analysis method was used to analyze the factors that directly and indirectly influence poverty in Sulawesi. The results showed that the number of poor people, the labor force participation rate, the human development index, and the average length of schooling had a direct effect on the poverty depth index. Then, the human development index, the average length of schooling, and the poverty depth index have a direct effect on the poverty level. Then, the human development index and the average length of schooling also indirectly affect the poverty level through the poverty depth index.

INTRODUCTION

Poverty is a socio-economic problem that is always present in society. The level of poverty that occurs can be measure the good or bad of a country's economy. Indonesia as a developing country and has a large population cannot avoid the problem of poverty (Windra, 2016).

According to (Kuncoro, 2000) poverty is a person's inability to meet the minimum standard of living. This disability condition is characterized by low-income capabilities. Low-income ability will result in reduced ability to meet the average standard of living.

Poverty is also a complex and multidimensional problem. This means that the problem of poverty is related to problems from various other aspects of life. So to reduce poverty, it is necessary to review various factors that could influence the occurrence of poverty. According to (BPS, 2021) to determine poverty factors, it can be seen from three indicators, namely the Percentage of Poor Population (P0), Poverty Depth Index (P1), and Poverty Severity Index (P2).

Based on the September 2020 National Economic Survey released by the Central Statistics Agency (BPS) shows that in the September 2019–March 2020 period, the Poverty Depth Index has increased. The Poverty Depth Index in March 2020 was 1.61, up from 1.50 in

September 2019. Meanwhile, the percentage of the poor in September 2020 rose to 10.19 percent, an increase of 0.41 percent in March 2020 and an increase of 0.97 percent in September 2019. It was stated that the number of poor people in September 2020 was 27.55 million people, an increase of 1.13 million people in March 2020 and an increase of 2.76 million people in September 2019. While in Sulawesi the percentage of the urban poor is 5.95 percent, the percentage of the rural poor is 13.45 with the percentage of the total poor being 10.41 percent. The highest number of poor in South Sulawesi (2020) is 195.08 thousand of people. This showed that poverty is still an important problem in Sulawesi.

In a previous study related to the problem of poverty, (Cahya Indrati, 2017) entitled "Analysis of Factors Affecting Poverty in Purbalingga Regency in 2007-2015 Using Path Analysis". The results of the analysis conclude that the variables of education level, economic growth, and labor force have direct and indirect effects through unemployment on poverty, while unemployment and the poverty depth index have a direct influence on poverty levels.

Path analysis is a statistical analysis to analyze causal relationships that occur in multiple regression if the independent variables affect the dependent variable

not only directly but also indirectly (Retherford, 1993). Path analysis or cross analysis or path analysis is a direct development of multiple regression forms with the aim of providing an estimate of the importance and significance of hypothetical causal relationships in a set of variables (Streiner, 2005; Sarwono, 2007).

In accordance with its essence, path analysis is not functioned to look for causal factors, but only to create a causal model that can be used to make theoretical explanations (Amir, 2006). There are path analysis assumptions that must be met, including: 1) Inter-variables have a linear, adaptive, and normally distributed relationship; 2) The relationship model owned by path analysis only has a causal relationship or cause and effect, the arrow goes in one direction without any turning arrow; 3) The minimum dependent variable is interval and ratio scale; 4) Generally using probability sampling which gives equal opportunities to all members of the population to be a sample; 5) The observed variables are measured without any deviation (valid and reliable), meaning that the variables being tested can be directly observed; 6) The path model analyzed is researched based on significant theory with the path model theory being tested and designed based on a certain theoretical framework that can explain the causal relationship between the variables studied (Riduwan & Kuncoro, 2017).

Based on the background, the researcher is interested in raising a case regarding the factors that influence poverty in Sulawesi using path analysis.

MATERIAL AND METHODS

The data used in this study is secondary data obtained from the Central Statistics Agency (BPS) in the publications of each province on the island of Sulawesi in 2019-2020. The objects in this study consist of 81 districts/cities in Sulawesi. The variables used are:

- a. (Y₁) Poverty depth index (Index)
- b. (Y₂) Poverty rate (Percent).
- c. (X₁) Number of poor people (Thousand Souls)
- d. (X₂) Labor force participation rate (Percent)
- e. (X₃) Human development index (Index)
- f. (X₄) The average length of schooling (Year)
- g. (X₅) Unemployment (Percent)

The method used in this research is path analysis. The stages of analysis in this study are:

- 1. Make descriptive statistics of each variable.
- 2. Test the assumptions of normality, multicollinearity, and autocorrelation on each data. The classical assumption test is tested before testing the hypothesis to detect the presence or absence of errors.
- 3. Calculate the path coefficient based on the regression coefficient.

- 4. Test the significance of the path coefficients of each substructure. In this case, if there are variables that are not significant, then proceed with the trimming method, which is a method that is carried out by eliminating insignificant variables.
- 5. After the trimming method is done, repeat the 2nd and 3rd points until there are no non-significant variables.
- 6. Create a path equation model for each substructure according to the significant variables.
- 7. Calculating the error value of the path equation model for each substructure using the coefficient of determination with the formula: $\sqrt{1 - R^2}$.
- 8. Draw path diagrams and interpretations for each substructure.
- 9. Describing the overall path diagram, namely the path diagram of the incorporation of significant variables from substructure I and substructure II.
- 10. Make the conclusions.

RESULT AND DISCUSSION

Descriptive statistics

Descriptive statistics of each research variable can be seen in Table 1. Before conducting the path analysis, it is necessary to test the assumptions as a condition for modeling the path analysis. The following assumption test is divided into 2 stages, namely the assumption test for substructure model I and the assumption test for the substructure model II. The following is a test of assumptions for the substructure model I.

Table 1. Descriptive Statistics

Variable	Average	Variance	Min	Max
X ₁	24.79451	284.2143	4.3	81.36
X ₂	66.97191	28.28689	55.39	82.23
X ₃	69.53568	19.46527	63.74	83.53
X ₄	8.423395	1.450869	6.48	12.2
X ₅	4.368272	5.009999	1.17	15.92
Y ₁	1.729136	0.679454	0.36	4.15
Y ₂	11.05611	15.24605	4.28	18.87

Table 2. Normality Assumption

Kolmogorov-Smirnov Z	Asymp. Sig. (2-tailed)
1.075	0.198

Normal testing is carried out with the Kolmogorov Smirnov test which is presented in Table 5. Where the Kolmogorov Smirnov test results are 1.075 and the sig value is 0.198 where the sig value obtained is greater than (0.05) then it fails to reject H₀. So it can be concluded that the data is normally distributed.

Multicollinearity testing using the VIF value as presented in Table 3. where the VIF value of each variable is less than 10, then reject H₀. So it can be concluded that there are no symptoms of multicollinearity in the data.

Table 3. Multicollinearity Assumption O

Variable	VIF
Constant	
X ₁	1.132
X ₂	1.402
X ₃	4.565
X ₄	4.166
X ₅	2.495

Table 4. Assumptions of Autocorrelation Test Run Test

Number of Runs	Asymp. Sig. (2-tailed)	Z
77	0.431	-0.788

Table 5. Normality Assumption

Kolmogorov-Smirnov Z	Asymp. Sig. (2-tailed)
0.553	0.919

Table 6. Multicollinearity Assumption

Variable	VIF
Constant	
X ₁	5,118
X ₂	1.46
X ₃	1.398
X ₄	4.381
X ₅	2.545
Y ₁	1.73

Table 7. Assumptions of Autocorrelation Test Run Test

Number of Runs	Asymp. Sig. (2-tailed)	Z
82	1,000	0,000

Autocorrelation testing using the Run Test test as presented in Table 4 Where the result of the Run Test obtained Number of Runs is 77 and the value of sig 0.431 is greater than (0,05) then it fails to reject H₀ So it can be concluded that there is no autocorrelation in the data.

The results of the assumption test show that no data violates the assumptions. So, it can be continued testing the substructure path coefficient I.

Table 8. Substructure path coefficients I

Variable	Standardized Coefficients	
	Beta	Sig
Constant		
X ₁	0.392	0.000*
X ₂	0.183	0.012*
X ₃	-0.566	0.000*
X ₄	0.352	0.005*
X ₅	-1.776	0.078

*variable significant effect

The X₅ variable is considered not to have a significant effect on the poverty depth index (Y₁) because the sig value is greater than 0.05. Next will be the trimming method. The trimming method is carried

out when there are exogenous variables that do not affect endogenous variables.

Table 9. Coefficient Results of the Trimming Method

Variable	Standardized Coefficients	
	Beta	Sig
(Constant)		
X ₁	0.391	0.000*
X ₂	0.237	0.000*
X ₃	-0.638	0.000*
X ₄	0.313	0.012*

*Variable has a significant effect on the

The poor population (X₁), labor force participation rate (X₂), human development index (X₃), and the average length of schooling (X₄) have a significant effect on the poverty depth index (Y₁) because the sig value is smaller than 0.05. So that the equation model of the sub-structure path I is obtained as follows:

$$\hat{Y}_1 = \rho_{Y_1}X_1 + \rho_{Y_1}X_2 + \rho_{Y_1}X_3 + \rho_{Y_1}X_4 + \varepsilon_1$$

$$\hat{Y}_1 = 0.391X_1 + 0.237X_2 - 0.638X_3 + 0.313X_4 + \varepsilon_1$$

The direct influence of the poor (X₁) with a poverty depth index (Y₁) of 0.391. This means that the poor have a positive influence on the poverty depth index, namely when the number of poor people increases, the poverty depth index increases. The labor force participation rate (X₂) has a direct effect on the poverty depth index (Y₁) of 0.273, which means the labor force participation rate has a positive effect on the poverty depth index, namely when the labor force participation rate increases, the poverty depth index also increases. The direct effect of the human development index (X₃) with the poverty depth index (Y₁) is -0.638, which means that the human development index has a negative effect on the poverty depth index, namely when the human development index increases, the poverty depth index will decrease. The average length of schooling (X₄) has a direct effect on the poverty depth index of 0.313. That is, the average length of schooling has a positive effect on the poverty depth index, which means that when the average length of schooling increases, the poverty depth index will increase.

After knowing the path equation model for the sub structure I trimming method, then calculate the value of the residual coefficient (error) from the path equation above based on Table 10.

Table 10. Model Summary

Model	R	R Square
1	0.64	0.41

The coefficient of determination R^2 is used to determine how big the percentage of the influence of the independent variables together on the endogenous variables. The magnitude of the determinant coefficient (R-square) or R^2 which can be seen in Table 3. is equal to $= 0.41 = 41\%$. So the variance that occurs in endogenous variables of 41% can be explained together with by exogenous variables. So that can be calculated the influence of other variables that are not observed or not explained in sub structure I, namely:

$$\hat{Y}_1 = 0.391X_1 + 0.237X_2 - 0.638X_3 + 0.313X_4 + 0.77$$

So that the path diagram of the substructure I is obtained as follows:

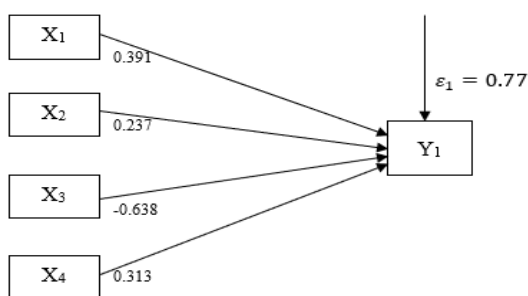


Fig 1. Substructure Path Diagram I

The poor population (X_1) has a direct effect on the poverty depth index (Y_1) of 0.391. The labor force participation rate (X_2) has a direct effect on the poverty depth index (Y_1) of 0.237. the human development index (X_3) has a direct effect on the poverty depth index (Y_1) of -0.638. The average length of schooling (X_4) has a direct effect on the poverty depth index (Y_1) of 0.313.

Normal testing is carried out with the Kolmogorov Smirnov test which is presented in Table 5. Where the Kolmogorov Smirnov test results are 0.553 and the sig value is 0.919 where the sig value obtained is greater than (0.05) then it fails to reject H_0 . So it can be concluded that the data is normally distributed

Multicollinearity testing using the VIF value as presented in Table 3. where the VIF value of each variable is less than 10, then reject H_0 . So it can be concluded that there are no symptoms of multicollinearity in the data.

Autocorrelation testing using the Run Test test as presented in Table 4 Where the result of the Run Test obtained Number of Runs is 82 and the value of sig 1,000 is greater than (0,05) then it fails to reject H_0 So it can be concluded that there is no autocorrelation in the data.

The results of the assumption test show that no data violates the assumptions. So, it can be continued testing the substructure path coefficient II.

Table 11. Substructure path coefficient II

Variable	Standardized Coefficients	
	Beta	Sig
Constant		
X_1	0.04	0.292
X_2	0.028	0.331
X_3	-0.411	0.000*
X_4	0.141	0.036*
X_5	0.015	0.773
Y_1	0.715	0.000*

*variables have a significant effect

Variables X_1 , X_2 , X_5 , are considered to have no significant effect on the poverty level (Y_2) because the sig value is greater than 0.05. Next will be the trimming method. The trimming method is carried out when there are exogenous variables that do not affect endogenous variables.

Table 12. Coefficient Results of Trimming Method

Variable	Standardized Coefficients	
	Beta	Sig
(Constant)		
X_3	-0.393	0.000*
X_4	0.128	0.032*
Y_1	0.74	0.000*

*variable has a significant effect

Table 13. Model Summary

Model	R	R Square
1	0.917	0.842

The human development index (X_3), the average length of schooling (X_4), the poverty depth index (Y_1) have a significant effect on the poverty level (Y_2) because the sig value is smaller than 0.05. So that the equation model for the sub-structure II path is obtained as follows:

$$\hat{Y}_2 = \rho_{Y_2}X_3 + \rho_{Y_2}X_4 + \rho_{Y_2}Y_1 + \varepsilon_2$$

$$\hat{Y}_2 = -0.393X_3 + 0.128X_4 + 0.74Y_1 + \varepsilon_2$$

After knowing the path equation model for the sub-structure II trimming method, then calculate the value of the residual coefficient (error) from the path equation above based on table 13.

The coefficient of determination R^2 is used to determine how big the percentage of the influence of the independent variables together on the endogenous variables. The magnitude of the determinant coefficient (R-square) or R^2 which can be seen in Table 3. is equal to $= 0.84 = 84\%$. So the variance that occurs in endogenous variables of 84% can be explained together with by exogenous variables. So that it can be calculated the influence of other variables that are not observed or not explained in sub structure II, namely:

$$\hat{Y}_2 = -0.393X_3 + 0.128X_4 + 0.74Y_1 + 0.397$$

So that the diagram of the path of substructure II is obtained as follows:

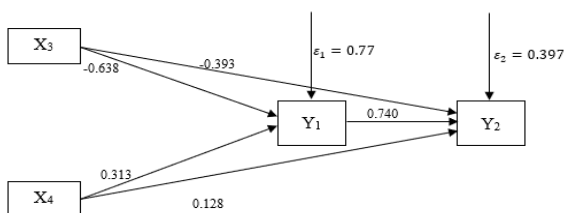


Fig 2. Diagram Path Substructure II

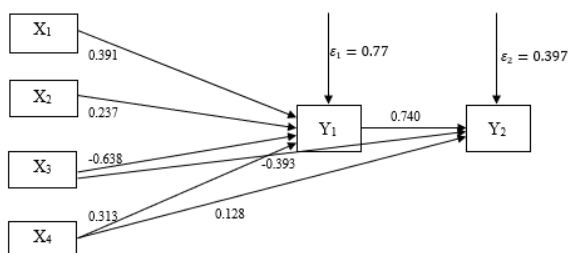


Fig 3. Overall path diagram

The human development index (X_3) has a direct effect on the poverty level (Y_2) of -0.393. The average length of schooling (X_4) has a direct effect on the poverty rate (Y_2) of 0.128. The poverty depth index (Y_1) has a direct effect on the poverty level (Y_2) of 0.740. The human development index (X_3) has an indirect effect on the poverty level (Y_2) through the poverty depth index (Y_1) of -0.472. The average length of school (X_4) has an indirect effect on the poverty level (Y_2) through the poverty depth index (Y_1) of 0.232.

CONCLUSION

Based on the results of the analysis above, it can be concluded that the variables of the poor population (X_1), labor force participation rate (X_2), human development index (X_3), and average years of schooling

(X_4) directly affect the poverty depth index (Y_1). The human development index (X_3), the average length of schooling (X_4), and the poverty depth index (Y_1) have a direct effect on the poverty level (Y_2). The human development index (X_3) and the average length of schooling (X_4) have an indirect effect on the poverty level (Y_2) through the poverty depth index (Y_1). By knowing the factors that influence poverty, it can be taken into consideration in matters relating to the problem of poverty.

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