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Application of Pathway Analysis Factors Affecting the Human Development Index in North Sumatra in 2021-2022

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Abstract. The Human Development Index (IPM) measures human development achievements based on a number of basic quality of life components. As a measure of quality of life, HDI is built through a basic three-dimensional approach. These dimensions include a long and healthy life; knowledge, and a decent life. These three dimensions have a very broad meaning because they are related to many factors. To measure the health dimension, life expectancy at birth is used. Furthermore, to measure the dimensions of knowledge, a combination of literacy rate indicators and the average length of schooling is used. This study aims to determine the relationship or influence between variables on the human development index. These variables are the average length of schooling, life expectancy, and the percentage of poor people. This research uses survey data from BPS North Sumatra for the 2021-2022 period. Data processing uses path analysis with the help of SPSS version 23 software. The path equation obtained in this study is Y = 0.672X1 + 0.297X2 − 0.223Z + 0.081. The results showed that there was a significant influence between the average length of schooling, life expectancy, and the percentage of poor people on the human development index.

Keyword: Path Analysis, Average Length of Schooling, Life Expectancy, Percentage of Poor People, Human Development Index

Abstrak. *Indeks Pembangunan Manusia (IPM) mengukur pencapaian pembangunan manusia berdasarkan sejumlah komponen dasar kualitas hidup. Sebagai ukuran kualitas hidup, IPM dibangun melalui pendekatan tiga dimensi dasar. Dimensi tersebut termasuk umur panjang dan kesehatan; pengetahuan, dan kehidupan yang layak. Ketiga dimensi ini memiliki pengertian yang sangat luas karena berkaitan dengan banyak faktor. Untuk mengukur dimensi kesehatan, harapan hidup saat lahir digunakan. Selanjutnya, untuk mengukur dimensi pengetahuan, kombinasi indikator tingkat melek huruf dan rata-rata lama sekolah digunakan. Penelitian ini bertujuan untuk mengetahui hubungan atau pengaruh antar variabel terhadap indeks pembangunan manusia. Variabel-variabel ini adalah rata-rata lama sekolah, harapan hidup, dan persentase orang miskin. Penelitian menggunakan data survei BPS Sumatera Utara periode 2021-2022. Pengolahan data menggunakan path analysis dengan bantuan software SPSS versi 23. Persamaan jalur yang diperoleh dalam*

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penelitian ini adalah Y = 0,672X1 + 0,297X2 − 0,223Z + 0,081. Hasil penelitian menunjukkan pengaruh yang signifikan antara rata-rata lama sekolah, harapan hidup, persentase penduduk miskin terhadap indeks pembangunan manusia.

Kata Kunci: *Analisis Jalur, Rata-rata Lama Sekolah, Harapan Hidup, Persentase Penduduk Miskin, Indeks Pembangunan Manusia*

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1 Introduction

The current development paradigm is economic growth as measured by human development as seen by the level of quality of human life. In [1], UNDP introduced an indicator that it had developed, namely an indicator that can describe the development of human development in a measurable and representative way, the Human Development Index (HDI). HDI ranges from 0 to 100. The closer to 100, the better the indication of human development. Several studies have proven that HDI affects poverty levels, including: [2-3] shows that HDI has a negative and significant effect on poverty levels in districts / cities of Papua Province. Likewise, Silswanto's research that HDI plays a role in overcoming poverty levels in Indonesia. Although there are several studies that state that HDI does not have a significant effect on poverty and it is stated that there is no causality relationship between HDI and poverty in Indonesia in the period 1990-2013 [4-5]. Based on the description above, the author is interested in trying to analyze the causal relationship caused by other factors to the Human Development Index (HDI) in North Sumatra Province. The goal is to determine the relationship / influence between variables, namely the average length of schooling, life expectancy, percentage of poor people, and HDI in North Sumatra Province using the path analysis method. It will be examined whether there is an effect of average length of schooling and life expectancy, and the percentage of poor people on the human development index in parsial or simultaneously [6]. The data used in this study are per capita expenditure, number of poor people, gini ratio, and gross regional domestic product for 2021-2022 in North Sumatra. The results of this study are expected to increase knowledge related to the method ofanalyzing the flow in direct or indirect influences based on between causal variables against other variables which are consequent variables and increase knowledge about the influence between existing factors on HDI [7-9].

2 Research Methods

The data used is secondary data obtained based on a survey conducted by the Central Statistics Agency (BPS) of North Sumatra. The variables used in this study were average length of schooling (X1) and life expectancy (X2) as independent variables, HDI (Y) as dependent variables, and gross regional domestic product (Z) as intervening variables [10]. The methods used are literature research methods, data collection methods, and data analysis. In conducting this research, books and journals related to the object of research are read and studied to obtain information. The data taken is secondary data from BPS North Sumatra Province. The data that

has been collected is then organized, arranged and presented in the form of numbers to get a clear picture of the set of data [11-12]. For data analysis, the stages carried out are collecting research data, determining exogenous variables and endogenous variables, determining the use of path diagram models, formulating structural equations, calculating correlation matrices, calculating path coefficients, and determining the magnitude of direct and indirect influence of exogenous variables on endogenous variables [13-14].

3 Research Results and Discussion

3.1 Observation Data and Variables

Data was collected through data from the Central Statistics Agency (BPS) in North Sumatra Province. The data is in the form of Number of Population (X 1), Average Expenditure (X2), Unemployment (Y) and Number of Poor People (Z) in North Sumatra Province in 2021-2022 [15].

3.2 Classical Assumption Test

According to Ghozali (2014), the classical assumption tests carried out are normality tests, multicolonicity tests, autocorrelation tests, and heteroscedasticity tests.

3.2.1 Normality Test

Based on the normality test with Kolmogorov-Smirnov structure 1, namely RLS (X1) and AHH (X2) against HDI (Y), an Asymp Sig. value of 0.200 was obtained, where the value was greater than 0.05 so that it can be concluded that the research data used are normally distributed. In addition,based on the normality test with Kolmogorov-Smirnov structure 2, namely RLS (X 1) and AHH (X2) against HDI (Y) through PPM (Z), also obtained an Asymp Sig. value of 0.200, where the value is greater than 0.05 so that it can be concluded that the research data used are normally distributed.

3.2.2 Multicollinearity Test

From the results of multicollinearity testing, the tolerance value of the RLS (X 1) and AHH (X2) variables was obtained more than 0.10 and the VIF value was also not more than 10. Therefore, it can be concluded that between independent variables there are no symptoms of multicollinearity (Ghozali, 2018). In addition, the tolerance value of the variables RLS (X 1), AHH (X2), and PPM (Z) is also more than 0.10 and the value of VIF is also not more than 10 so that it can be concluded that between independent variables there are no symptoms of multicollinearity (Ghozali, 2018).

3.2.3 Autocorrelation Test

From the Durbin Watson test results for structure 1, the value of Durbin Watson Test is 1,500 with a value of 1,507ddl. Because , autocorrelation occurs. In accordance with the rules of autocorrelation, if there is a positive autocorrelation when Durbin Watson test is performed, it can be continued with the Cochrane Orcutt test. d<dlFrom the results of autocorrelation testing using the Cochrane Orcutt method, Durbin Watson Test scores (d were obtained at 1.817 with a value of 1.507dl. Because , it can be concluded that in this research regression model there is no autocorrelation.d>dl Meanwhile, the Durbin Watson Test () value for structure 2 is 1.860 with a value of 1.507. Because , no autocorrelation occurs.

3.2.4 Heteroscedascticity Test

Based on the Glejser test table, the significance value of RLS (X 1) is 0.321 and AHH (X2) is 0.480 against residual (ABS_RES) > 0.05. These results showed that there were no symptoms of heteroscedasticity in this study. In addition, the significance value of RLS (X 1) is 0.282, AHH (X2) is 0.41 and PPM (Y) is 0.696 against residual (ABS_RES) > 0.05. These results showed that there were no symptoms of heteroscedasticity in this study.

3.3 Correlation Coefficient Test

From the results of the correlation test, the significance value between variables is obtained and which means that there is a significant relationship between variables, except for the significant value of AHH (X0,000<0,050,018<0,052) to PPM (Z) > 0.05 which means that there is no significant relationship between variables. The correlation coefficients RLS (X 1) to AHH (X 2), RLS (X1) to HDI (Y), and AHH (X 2) to HDI (Y) are positive so that it can be concluded that there is a positive relationship. The correlation coefficient RLS (X1) to PPM (Z), AHH (X2) to PPM (Z), and PPM (Z) to HDI (Y) is negative so that it can be concluded that there is a negative relationship.

3.4 Test the hypothesis

This analysis aims to determine the magnitude of the direct and indirect influence of RLS (X_1) and AHH (X 2) variables on HDI (Y) and RLS (X_1) and AHH (X_2) variables on HDI (Y) through PPM (Z).

3.4.1. Structure Analysis 1

The coefficient of determination for substructural equation 1 obtained is 0.538, which means that the influence of the variables RLS (X1) and AHH (X2) simultaneously on HDI (Y) is 89.3%. Other variables that were not explained in the study and also influenced the

percentage of poor people, namely or 10.7%.$(e) = \sqrt{1 - R^2{}_{yx_1x_2}} = \sqrt{(1 - 0{,}893)^2} = 0{,}107$ Then, obtained the value of Fhitung = 268.919 > Ftable (0.05; 2;62) = 3.14 and p-value = 0.000 < 0.05 which means that the variables RLS (X 1) and AHH (X2) together have a significant effect on HDI (Y). The effect of RLS (X1) on HDI (Y) is 0.831. That is, every time there is an increase in RLS (X1), the HDI value (Y) will increase by 0.831. It was also obtained that the value of t hitung = 19.473 > ttable(0.025;63) = 1.998 with a significance value of 0.000 < 0.05 which means there is a positive and significant influence. The effect of AHH (X 2) on HDI (Y) is 0.271 which means that every time there is an increase in the value of AHH (X 2), the HDI value (Y) will increase by 0.271. It was also obtained that the value of t hitung = 6.350 > ttable (0.025;63) = 1.998 with a significance value of 0.000 < 0.05 which means there is a positive and significant influence. Thus, the path diagram of substructure 1 is obtained as follows.

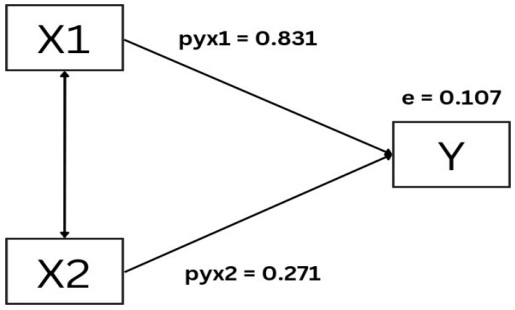

Figure 1. Substructure 1

The equation of substructure path 1 is as follows:

$$Y = 0{,}831X_1 + 0{,}271X_2 + 0{,}107.$$

The regression equation of substructure 1 is as follows:

$$\widehat{Y} = 11{,}648 + 2{,}748X_1 + 0{,}441X_2.$$

3.4.2. Structure Analysis 2

The coefficient of determination for substructural equation 2 obtained is 0.919, which means that the influence of variables RLS (X 1), AHH (X2), and PPM (Z) simultaneously on HDI (Y) is 91.9%. Other variables that were not explained in the study and also influenced the percentage of poor people, namely or $(e) = \sqrt{1 - R^2_{z(x_1x_2)}} = \sqrt{(1 - 0{,}919)^2} = 0{,}0818.1\%$. Then, obtained the value Fhitung = 241.704 > Ftable(0.05;3;61) = 2.75 and p-value = 0.000 < 0.05 which means that the variables RLS (X 1), AHH (X2), and PPM (Z) together have a significant effect on HDI (Y). The effect of RLS (X1) on HDI (Y) is 0.672. That is, every time there is an increase in RLS (X1), the HDI value (Y) will increase by 0.672. It was also obtained that the value of t hitung =

13.052 > ttable(0.025;62) = 1.999 with a significance value of 0.000 < 0.05 which means there is a positive and significant influence. The effect of AHH (X 2) on HDI (Y) is 0.2 97 which means that every time there is an increase in the value of AHH (X 2), the HDI value (Y) will increase by 0.2 97. It was also obtained that the value of t hitung = 7.862 > ttable (0.025;63) = 1.998 with a significance value of 0.000 < 0.05 which means there is a positive and significant influence. The effect of PPM (Z) on HDI (Y) is −0.223 which means that every time there is an increase in the value of PPM (Z), the HDI value (Y) will decrease by 0.223. D is also obtained the value of t count = |−4.500| > ttable(0.025;63) = 1.998 with a significance value of 0.000 < 0.05 which means there is a negative and significant influence. Thus, the path diagram of substructure 2 is obtained as follows.

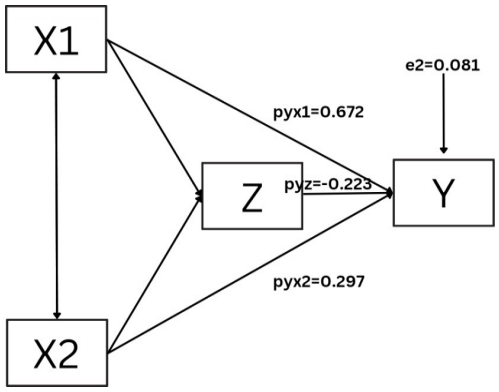

Figure 2. Substructure path diagram 2

The equation of substructure 2 is as follows:

$$Y = 0{,}672X_1 + 0{,}297X_2 - 0{,}223Z + 0{,}081.$$

The regression equation of substructure 2 is as follows:

$$\hat{Y} = 15{,}254 + 2{,}221X_1 + 0{,}438X_2 - 0{,}195Z.$$

Thus, a causal model of analysis of substructure paths 1 and 2 is obtained as follows:

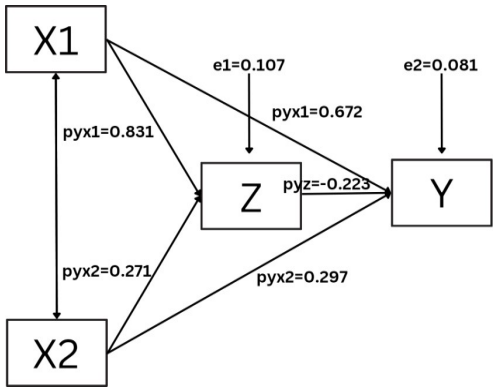

Figure 3. Combination model path diagram

4 Conclusion

The path analysis model for the first structure is $Y = 0{,}831X\_1 + 0{,}271X\_2 + 0{,}10$. Theaverage length of schooling and life expectancy on the human development index was 89.3%. Meanwhile, the effect of other women who were not explained in the study but also affected the percentage of poor people was 0.107 or 10.7%. Inaddition, a path analysis model for the second structure was obtained $Y = 0{,}672X\_1 + 0{,}297X\_2 - 0{,}223Z + 0{,}081$. Theaverage length of schooling and life expectancy on the human development index was 89.3%. Other variables that were not explained in the study and also influenced the percentage of poor people were 0.081 or 8.1%. There is a positive and significant influence between the average length of schooling on the human development index, there is a positive and significant influence between life expectancy on the human development index, and there is a negative and significant influence between the percentage of poor people on the human development index. Theaverage effect of development on the development index was 83.1% and the magnitude of the effect on the human development index was 27.1%. The magnitude of the average influence of the length of schooling on the human development index through the percentage of poor people is 14.9% and the magnitude of the influence of life expectancy on the human development index through the percentage of poor people is 6.6%. The average effect of total length of schooling on the human development index through the percentage of poor people is 68.2% and the magnitude of the total influence of life expectancy on the human development index through the percentage of poor people is 4.8%.

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