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Determination Of Poverty Indicators Based On The Dimensions Of Health Quality And Economic Quality Using Confirmatory Factor Analysis (CFA) In The Province North Sumatera

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ABSTRACT

Poverty is one of the problems in Indonesia's complex and fundamental economy. Poverty is a condition where a person is unable to fulfill his basic needs. Solutions need to be found to overcome or at least reduce poverty. To overcome the problem of poverty, indicators need to be considered that affect poverty levels. In this study poverty is seen through two dimensions, namely Health Quality and Economic Quality. This research was conducted to determine poverty indicators based on dimensions of health quality and economic quality with the Confirmatory Factor Analysis (CFA) method. Confirmatory Factor Analysis (CFA) is used unidimensionally to identify indicator variables that can measure health and economic quality. The analysis used was 25 districts and 8 cities in North Sumatra Province. The results showed that health quality can be measured through 10 indicators and economic quality can be measured also through 10 indicators.

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1. INTRODUCTION

Poverty is a condition where a person is unable to fulfill his basic needs such as clothing, food, shelter, education and proper health. Poverty has become a global problem, where every country has community members who are below the poverty line.

The most important purpose of poverty measures is to enable comparisons of poverty. This is needed for the overall assessment of an area's poverty alleviation process or evaluating a particular policy.

the measurement or operationalization stage of research variables Analysis Factor Confirmatory (CFA) itself is known as a statistical tool that is useful in determining the form of the construct of a set of manifest variables, or testing a variable on the assumptions of the manifest that builds it.

Analysis Factor Confirmatory (CFA) itself is known as a statistical tool that is useful in determining the form of the construct of a set of manifest variables, or testing a variable on the assumptions of the manifest that builds it. So Confirmatory Analysis is very suitable for testing a theory of variables on the manifest or the indicators that build it, where the variables are assumed to only be measured by these indicators.

2. RESEARCH METHODE

1. Confirmatory Factor Analysis (CFA)

Confirmatory Factor Analysis (CFA) is an advanced method of factor analysis, to test hypotheses by factor analysis. Here factorloadingwe will hypothesize. Then a CFA is performed to test the fitloadingwhat happens to the existing matrix. From the results, we will see how far the fit between the factorsloading from our data with those generated by the model.

To be able to perform CFA, we need complex analytical tools such as Structural Equation Modeling (SEM). For practical needs related to SEM, we need software like AMOS.

In its visual output, AMOS provides facilities for quantitative calculations from the analysis to be included in the image, so that with its capabilities AMOS can also provide several analyzes at once.

Confirmatory Factor Analysis (CFA) is one of the factor analysis methods used when researchers already have knowledge about 54 structure of a latent factor. The structure is obtained based on theoretical studies, research results regarding the relationship between observed variables and latent variables. CFA is divided into two, namely:First Order CFA and Second– Order CFA (Hair, 1998).

a. First-Order Confirmatory Factor Analysis (CFA)

On First Order CFA is a latent variable that is measured based on several indicators that can be measured directly. The model of this equation is

$$X = \Lambda_x \xi + \delta \quad (1)$$

b. Second-Order Confirmatory Factor Analysis (CFA)

Relationship between First Order CFA and Second Order CFA is shown in the following equation.

$$\eta = B\eta + \Gamma\xi + \zeta \quad (2)$$

$$x = \Lambda_x \eta + \varepsilon \quad (3)$$

2. Research Analysis

To carry out the CFA analysis in this study, it is required to take the following steps:

a. Describe the characteristics of poor households per village/kelurahan in North Sumatra Province.
b. Standardize Data.
c. Characteristics of poor households in North Sumatra Province.
d. Analyze the data using the Confirmatory Factor Analysis (CFA) method with the help of the SPSS program to obtain indicators that significantly shape the latent variables of Health Quality and Economic Quality. The steps to run the SPSS programming application using the Confirmatory Factor Analysis (CFA) method are as follows:
   - Finding KMO and Bartlett`s Test values
   - Total Variance Explainet
   - Matrix Components
   - Rotated Component Matrix
   - Component Score Coefficient Matrix
e. Conclusion

3. Research Procedure

The research procedures applied in this study to achieve research are:Data Sources and Research are:

a. Collect references on poverty indicators andConfirmatory Factor Analysis (CFA).
b. Collecting data at the Central Bureau of Statistics of North Sumatra.
c. Conduct a description of the poverty level data.
d. Determine the indicators that have been formed significantly by the method Confirmatory Factor Analysis (CFA).

3. RESULT AND ANALYSIS

This data was taken from the Central Statistics Agency (BPS) of North Sumatra in 2018 regarding poverty indicators based on the dimensions of health quality and economic quality, which has 33 regencies/cities where the total population in 2018 reached 14.42 million people. The data taken regarding the Poverty Indicators based on the dimensions of Health Quality and Economic Quality.

1. Application of Health and Economics CFA Using SPSS

a. Data Processing on Health in North Sumatra Province 2018

The assumption that underlies whether or not factor analysis can be used is that the matrix data must have sufficient correlation (Sufficient Correlation). TestBartlett of Sphericity is a statistical test to determine whether there is a correlation between variables. Researchers must understand that a larger sample causesBartlett Test the more sensitive it is to detect correlations between variables.

KMO and Bartlett's Test

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.603
Bartlett's Test of Sphericity	Approx. Chi-Square	227.355
	df	45
	Sig.	.000

Another test tool used to measure the level of intercorrelation to measure the level of intercorrelation between variables and whether or not factor analysis can be carried out is the Kaiser-Meyer-Olkin Measure Of Sampling Adequacy (KMO MSA). KMO values vary from 0 to 1. The desired value must be > to be able to do Factor Analysis.

The results of the SPSS output display show that the KMO value is - 0.603 so that factor analysis can be carried out. Likewise with the value Bartlett Testwith Chi-Squares - 227,355 and significant at 0.000, it can be concluded that the Factor Analysis test can be continued.

Component Matrix[a]

	Component			
	1	2	3	4
Zscore(X1)	.803	-.316	-.068	.461
Zscore(X2)	.847	-.255	.022	-.351
Zscore(X3)	-.064	-.251	.778	-.223
Zscore(X4)	.754	-.141	.333	-.326
Zscore(X5)	.798	-.317	-.067	.469
Zscore(X6)	.242	.717	-.255	.144
Zscore(X7)	.440	.601	-.249	-.338
Zscore(X8)	-.624	.162	.537	.338
Zscore(X9)	.397	.511	.426	.345
Zscore(X10)	.514	.532	.438	-.054

Extraction Method: Principal Component Analysis.

Look that indicator $Z_{score}(X_1)$, $Z_{score}(X_2)$, $Z_{score}(X_4)$, and $Z_{score}(X_5)$ grouped on factor 1. While the indicator $Z_{score}(X_6)$, $Z_{score}(X_7)$, $Z_{score}(X_9)$ and $Z_{score}(X_{10})$ clustered on factor 2. While indicators $Z_{score}(X_3)$ and $Z_{score}(X_8)$ clustered on factor 3. This becomes difficult to interpreted, therefore it is necessary to rotate.

Rotated Component Matrix[a]

	Component			
	1	2	3	4
Zscore(X1)	.274	.933	.114	-.050
Zscore(X2)	.862	.379	.105	.089
Zscore(X3)	.076	-.139	.186	.814
Zscore(X4)	.734	.272	.326	.295
Zscore(X5)	.265	.936	.113	-.049
Zscore(X6)	-.019	-.034	.495	-.641
Zscore(X7)	.474	-.193	.421	-.539
Zscore(X8)	-.742	-.252	.218	.396
Zscore(X9)	-.092	.235	.809	-.012
Zscore(X10)	.267	.027	.818	.021

Extraction Method: Principal Component Analysis.
Rotation Method: Varimax with Kaiser Normalization.
a. Rotation converged in 7 iterations.

The result of the rotation shows that now the indicator $Z_{score}(X_2)$, $Z_{score}(X_4)$, and $Z_{score}(X_7)$ clustered on factor 1. Factor 2 clustered on indicator rotation $Z_{score}(X_1)$, and $Z_{score}(X_5)$ Factor 3 clusters on indicator rotation $Z_{score}(X_6)$, $Z_{score}(X_9)$ and $Z_{score}(X_{10})$ And indicators $Z_{score}(X_1)$ and $Z_{score}(X_1)$ clustered on a factor of 4. So it can be clearly concluded that the constructor has Unidimensionality or in other words all are valid.

Component Score Coefficient Matrix

	Component			
	1	2	3	4
Zscore(X1)	-.121	.498	-.004	-.026
Zscore(X2)	.409	-.021	-.052	.098
Zscore(X3)	.105	-.127	.143	.528
Zscore(X4)	.345	-.061	.100	.235
Zscore(X5)	-.127	.502	-.003	-.025
Zscore(X6)	-.092	-.023	.243	-.377
Zscore(X7)	.270	-.265	.154	-.290
Zscore(X8)	-.387	.047	.239	.228
Zscore(X9)	-.222	.146	.450	.028
Zscore(X10)	.059	-.089	.422	.070

Extraction Method: Principal Component Analysis.
Rotation Method: Varimax with Kaiser Normalization.

Furthermore, we can conclude that the maximum component score has 4 factors.

Factor I : X_2, X_4, and X_7

Factor II : X_1, dan X_5

Factor III : X_6, X_8, X_9, and X_{10}

Factor IV : X_3

b. Data Processing About Economy in North Sumatra Province 2018

The assumption that underlies whether or not factor analysis can be used is that the matrix data must have sufficient correlation (Sufficient Correlation). TestBartlett of Sphericity is a statistical test to determine whether there is a correlation between variables.

KMO and Bartlett's Test

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.734
Bartlett's Test of Sphericity	Approx. Chi-Square	216.201
	df	45
	Sig.	.000

The results of the SPSS output display show that the KMO value is - 0.734 so that factor analysis can be carried out. Likewise with the value Bartlett Testwith Chi-Squares - 216.201 and significant at 0.000, it can be concluded that the Factor Analysis test can be continued.

Total Variance Explained

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	4.711	47.112	47.112	4.711	47.112	47.112	4.395	43.946	43.946
2	1.688	16.885	63.997	1.688	16.885	63.997	1.925	19.246	63.192
3	1.234	12.34	76.336	1.234	12.34	76.336	1.314	13.144	76.336
4	0.944	9.444	85.781						
5	0.466	4.664	90.444						
6	0.341	3.414	93.858						
7	0.267	2.672	96.53						
8	0.173	1.734	98.264						
9	0.123	1.234	99.499						
10	0.05	0.501	100						

Extraction Method: Principal Component Analysis.

We expect that factor 1 will contain indicators $Z_{score}(X_1)$, $Z_{score}(X_3)$, $Z_{score}(X_6)$, $Z_{score}(X_7)$, $Z_{score}(X_8)$, and $Z_{score}(X_9)$ Factor 2 will contain indicators $Z_{score}(X_4)$ And Factor 3 will contain indicators $Z_{score}(X_2)$ and $Z_{score}(X_{10})$.

Component Matrix[a]

	Component		
	1	2	3
Zscore(X1)	.842	-.083	-.211
Zscore(X2)	.195	-.344	.398
Zscore(X3)	.870	.335	.025
Zscore(X4)	-.036	.888	-.126
Zscore(X5)	.946	.114	-.017
Zscore(X6)	.712	.140	.336
Zscore(X7)	.781	-.425	-.229
Zscore(X8)	.826	.437	.030
Zscore(X9)	.704	-.481	.171
Zscore(X10)	-.127	.165	.905

Extraction Method: Principal Component Analysis.

a. 3 components extracted.

It appears that the indicators $Z_{score}(X_1)$, $Z_{score}(X_3)$, $Z_{score}(X_5)$, $Z_{score}(X_6)$, $Z_{score}(X_7)$, $Z_{score}(X_8)$, and $Z_{score}(X_9)$ grouped on factor 1. While the indicator $Z_{score}(X_4)$ grouped on factor 2. While the indicators $Z_{score}(X_2)$ and $Z_{score}(X_{10})$. clustered on a factor of 3. This becomes difficult to interpret, therefore it is necessary to rotate.

Rotated Component Matrix[a]

	Component		
	1	2	3
Zscore(X1)	.760	.272	-.330
Zscore(X2)	.094	.477	.280
Zscore(X3)	.932	-.043	-.009
Zscore(X4)	.243	-.859	.089
Zscore(X5)	.931	.171	-.111
Zscore(X6)	.735	.170	.266
Zscore(X7)	.593	.564	-.418
Zscore(X8)	.923	-.149	.025
Zscore(X9)	.521	.695	-.035
Zscore(X10)	-.024	.045	.927

Extraction Method: Principal Component Analysis.

Rotation Method: Varimax with Kaiser Normalization.

a. Rotation converged in 5 iterations.

The result of the rotation shows that now the indicators $Z_{score}(X_1)$, $Z_{score}(X_3)$, $Z_{score}(X_4)$, $Z_{score}(X_5)$, $Z_{score}(X_6)$, $Z_{score}(X_7)$, and $Z_{score}(X_8)$ clustered on factor 1. Factor 2 clustered on the rotation of indicators $Z_{score}(X_2)$ and $Z_{score}(X_9)$. And indicators $Z_{score}(X_{10})$ grouped on a factor of 3. So it can be clearly concluded that the constructor has Unidimensionality or in other words all are valid.

Component Score Coefficient Matrix

	Component		
	1	2	3
Zscore(X1)	.145	.054	-.199
Zscore(X2)	-.010	.283	.259
Zscore(X3)	.239	-.122	.042
Zscore(X4)	.156	-.512	.024
Zscore(X5)	.211	-.006	-.023
Zscore(X6)	.183	.039	.262
Zscore(X7)	.068	.233	-.258
Zscore(X8)	.250	-.180	.061
Zscore(X9)	.057	.342	.049
Zscore(X10)	.041	.092	.733

Extraction Method: Principal Component Analysis.
Rotation Method: Varimax with Kaiser Normalization.

Then we can conclude that the maximum component score has 3 factors

Factor I : X_1, X_3, X_4, X_5, and X_8

Factor II : X_2, X_7, dan X_9

Factor III : X_6 and X_{10}

4. CONCLUSIOON

Based on research on Poverty in the dimensions of Health Quality and Economic Quality in North Sumatra Province in 2018 using Convirmatory Factor Analysis (CFA) it can be concluded as follows:

1. Characteristics of Poor Households (RTM) the quality of Health by Regency/ City in North Sumatra Province which is very influential, there are 4 factors, which are Factor I, where the number of health households (Doctor) -X 2 -worth 40.9%, the number of cases of dengue disease - X 4 -worth 34.5%, and the largest number of wooden wall households -X 7 - worth 27%. Factor II, where the number of villages/kelurahan that have hospital health facilities -X1 - worth 49.8% and the number of Public Private Hospitals -X 5 - worth 50.2%. Factor III, where the number of people who have 60 health complaints and outpatient treatment during the last month -X 6 - worth 24.3%, the number of residents who have BPJS Health Contribution Assistance Recipients (PBI) -X 8 - worth 23.9%, and the number of Malnourished Babies -X 9 - worth 45% and the number of Family Welfare Income Improvement Business (UPPKS) KB in the field -X10 - 42.2%. And factor IV, where the number of people who have health complaints during the last month-X 3 - worth 52.8%. Here we can see that poverty indicators based on health quality are in the first factor.
2. Characteristics of Poor Households (RTM) Economic quality by district/city in North Sumatra Province which is very influential there are 3 factors, which is Factor I, where the floor area of the household -X1 - worth 14.5%, non-electric household lighting source -X 3 -worth 23.9%, use of shared household defecation facilities -X 4 - worth 15.6%, the main fuel is wood for household cooking -X 5 - worth 21.1% and the number of households according to the place of construction of the dirt pit -X 8 - worth 25%. Factor II, where the source of drinking water (unprotected wells) is the household -X 2 -worth 28.3%, the largest number of wooden wall households -X 7 - worth 23.3% and total food expenditure per capita in rural areas -X 9 - worth 34.2%. And factor III, where is the status of mastery development of self-owned household residence -X 6 - worth 26.2% and the actual number of recipients of food social assistance (head of household) -X10 - worth 73.3%. Here we can see that the poverty indicators based on economic quality are in the first factor.

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