



Factors Affecting the Increase in Crime Index in West Sumatra With Path Analysis Method

Enita Dewi Tarigan^{1*} , Ahmad Thoriq¹ , Yan Batara Putra Siringoringo¹ , Citra Dewi Hasibuan¹

^{1*}Statistics Study Program, Universitas Sumatera Utara

* Corresponding Author: enitadewi@usu.ac.id

ARTICLE INFO

Article history:

Received: 05 July 2022

Revised: 06 August 2022

Accepted: 29 September 2022

Available online: 30 September 2022

E-ISSN: 2656-1514

P-ISSN: -

How to cite:

Tarigan, E.D., Thoriq, A., Siringoringo, Y.B.P., Hasibuan, C.D., "Factors Affecting the Increase in Crime Index in West Sumatra With Path Analysis Method", Journal of Research in Mathematics Trends and Technology, vol.4, no2., Sep., doi:10.32734/jormtt.v4i2.16071

ABSTRACT

Crime or criminality in Indonesia is rampant in both print and television media. We can see news about crime almost every day. Basically, every individual will be influenced by several factors, both internal and internal, external causes of a person committing a crime, including population, education, morality, poverty and unemployment. In this case, a statistical analysis will be studied that can detect the magnitude of these factors, both directly and indirectly, on the crime rate. One of the statistical analyzes that can be used to analyze causal relationships between variables is path analysis, which is a direct development of the multiple regression form with the aim of providing estimates of the level of importance (magnitude) and significance (significance) in a variable set of causal relationships. hypothetical consequences. From the research results for West Sumatra Province, it was concluded that there was no large influence of variable X on Y.

Keyword: Path Analysis, Poverty, Crime, Education, Unemployment



This work is licensed under a Creative Commons Attribution-ShareAlike 4.0 International.

<http://doi.org/10.32734/jormtt.v4i2.16071>

1. Introduction

Based on the official website (Kompas.com), West Sumatra province is one of the provinces with the highest crime rate in Indonesia, namely in 10th place with a crime rate of 7,992 in 2022 and 1st place goes to North Sumatra Province. Crime is an action that violates written law and existing laws and norms, this crime also harms people or threatens the safety of the environment in society. Economic factors and the increasing unemployment rate can cause the crime index to increase and make people whose basic daily needs such as clothing, food and shelter cannot be met with an income that is considered mediocre or insufficient. Meanwhile, family needs are increasing day by day, and the number of family dependents is not small. Therefore, the only way to increase the economy is that they are willing to commit criminal acts such as robbery. Robbery and committing acts of theft/breaking into the house [1], [2]. Education is very important for everyone, because education is a very strong provision for everyone to get a decent life and everyone avoids various social problems that occur in society. However, judging from the facts, currently there are many social problems occurring in society, some of which are poverty, crime, and so on. These problems are still

unresolved, especially regarding crime. We often hear about various criminal cases that occur in various regions in Indonesia. This causes anxiety for the wider community, because if crimes occur, the welfare of the community will be threatened. The cause of criminal acts in society is due to the lack or low level of education obtained by the perpetrators of criminal acts themselves. [3]

2. Research Methods

2.1 Correlation Analysis

Correlation analysis is an analytical technique used to measure the strength and weakness of the relationship between two variables. This variable consists of independent and dependent variables. The magnitude of the relationship ranges between 0 - 1. If it is close to 1, it means the relationship between the two variables is getting stronger, and vice versa, if it is close to 0, it means the relationship between the two variables is getting weaker. [4]

To draw conclusions about the relationship between two variables, it is necessary to fulfil the following criteria, if:

Table 1. Coefficient Interval

Coefficient Interval	Relationship Level
0,00 – 0,199	Very low
0,20 – 0,399	Low
0,40 – 0,599	Currently
0,60 – 0,799	Strong
0,80 – 1,000	Very Strong

2.2 Path Coefficient Testing

2.2.1 T Test

The t test is used to determine the significance of the influence of independent variables partially or individually on the dependent variable.[5]–[7]

$$t_{count} = r \frac{\sqrt{n-2}}{\sqrt{1-r^2}} \quad (1)$$

Information:

t_{count} = Correlation Test Statistics

n = Number of Samples

r = Partial correlation value

2.2.2 F Test

Hypothesis testing using a simultaneous test with the F-test aims to determine the joint influence of the independent variables on the dependent variable. [5]–[7]

$$F = \frac{\frac{r^2}{k}}{\frac{1-r^2}{n-k-1}} \quad (2)$$

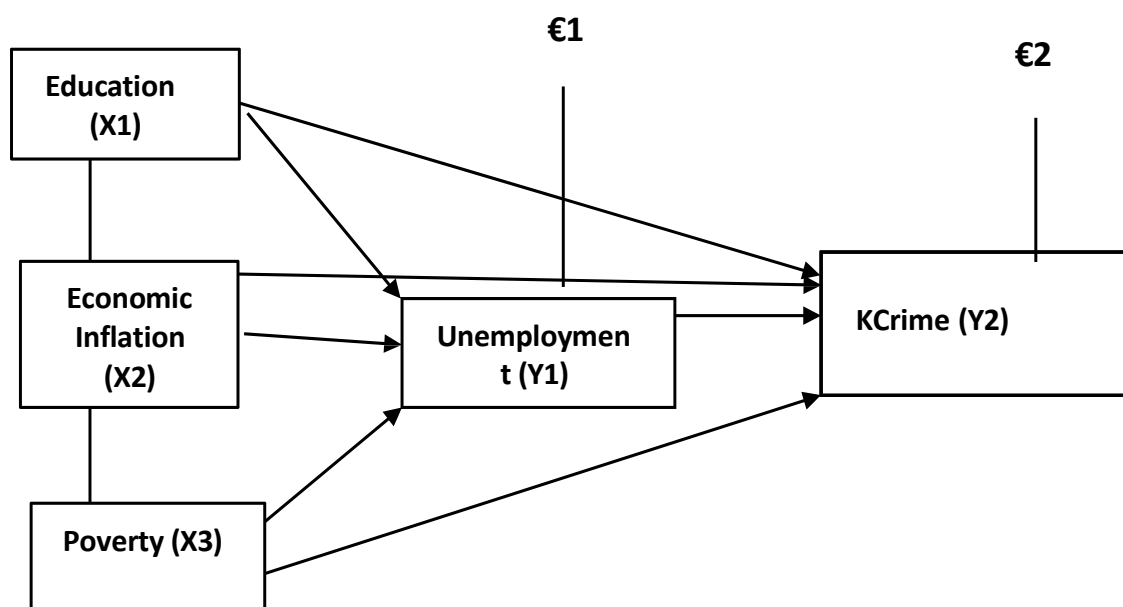
Information:

r^2 = Multiple correlation coefficient

k = Number of independent variables (independent) N = Number of sample members

F = Fcount which is then compared with F_{table}

2.3 Path Analysis Diagram



The path diagram in the figure above consists of three structural equations, where X_1 , X_2 , and X_3 are

Figure 1. Path Analysis Diagram

exogenous variables, while Y_1 and Y_2 are endogenous variables. Therefore, the structural equation is: [4]

$$Y_1 = P_{Y_1X_1}X_1 + P_{Y_1X_2}X_2 + P_{Y_1X_3}X_3 + \epsilon_1 \text{ (as substructure equation 1)}$$

$$Y_2 = P_{Y_2X_1}X_1 + P_{Y_2X_2}X_2 + P_{Y_2X_3}X_3 + P_{Y_2Y_1}Y_1 + \epsilon_2 \text{ (as substructure equation 2)}$$

3. Results and Discussion

The data taken is secondary data obtained through the official websites www.bps.go.id, www.Sumbarprov.go.id and www.sumbar.polri.go.id valid data with primary data obtained through direct field observation. Next, data collection is carried out in accordance with predetermined criteria, namely data from various factors based on the years 2004 – 2022.

3.1 Descriptive Analysis Results

1. Crime

Table 2. Descriptive Value of Crime

	Descriptive Statistics				
	N	Minimum	Maximum	Mean	Std. Deviation
Crime	19	5387	16277	11027.58	3204.538
Valid N (listwise)	19				

Based on the table above, it is known that the value of the crime rate ranges between 5387 - 16277 with an average value of 11027.58 and a Std.Deviation figure of 3204.538. It can be concluded that the figure is still high for the province of West Sumatra, especially in the city of Padang, which has a higher value than other districts.

2. Education

Table 3. Descriptive Value of Education

Descriptive Statistics					
	N	Minimum	Maximum	Mean	Std. Deviation
EDUCATION	19	7.94	9.18	8.5311	.35978
Valid N (listwise)	19				

Based on the table above, it is known that the value of the level of education in the province of West Sumatra is around 7.94% - 9.18% with an average value of 8.53% and a Std Deviation of 0.36%. This figure includes half of the population aged 15 and over who are also not in school.

3. Population

Table 4. Descriptive Value of Population

Descriptive Statistics					
	N	Minimum	Maximum	Mean	Std. Deviation
POPULATION	19	4523815	5640629	5080751.16	344679.596
Valid N (listwise)	19				

Based on the table above, it is known that the value of the population in West Sumatra ranges from 4523815 people - 5640629 people with an average value of 5080751.16 people and Std. difficult to compete for jobs.

4. Poverty

Table 5. Descriptive Value of Poverty

Descriptive Statistics					
	N	Minimum	Maximum	Mean	Std. Deviation
POVERTY	19	3796	37155	17626.68	15755.668
Valid N (listwise)	19				

Based on the table above, it is known that the poverty value in West Sumatra is around 3796 people - 37155 people with an average value of 17626.68 and a Std Deviation of 15755.668. This figure is considered safe, but if the percentage increases over time, the weaker the province will be if poverty is high.

5. Unemployment

Table 6. Descriptive Value of Unemployment

Descriptive Statistics					
		Minimum	Maximum	Mean	Std. Deviation
Unemployment (%)	19	5.09	12.74	7.4747	2.04466
Valid N (listwise)	19				

Based on the table above, it is known that the unemployment rate in West Sumatra province is around 5.09% - 12.74% with an average figure of 7.47% and a Std.Deviation of 2.04%. This figure is included in the unsafe category because the unemployment rate is increasing due to fewer job opportunities and also There are widespread termination of employment contracts or mass layoffs

carried out by companies.

6. Path Diagram Model

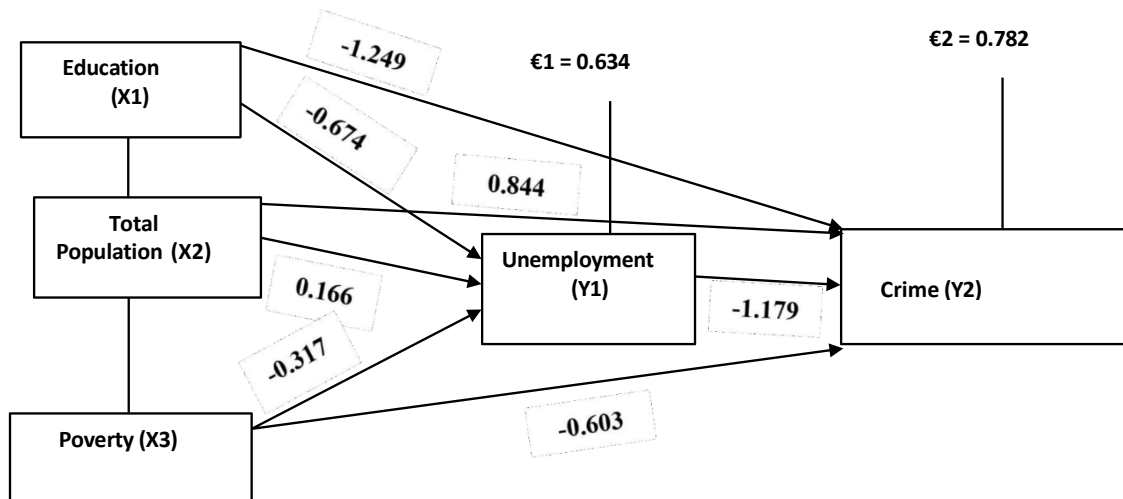


Figure 2. Path Diagram Model

3.2 Determining the Correlation Matrix

Table 7. Correlation values come from the specified variables

		Correlations				
		Education	Total Population	Poverty	Unemployment	Crime
Education	Pearson Correlation	1	.934**	.669**	-.727**	-.007
	Sig. (2-tailed)		.000	.002	.000	.978
	N	19	19	19	19	19
Total Population	Pearson Correlation	.934**	1	.822**	-.788**	.110
	Sig. (2-tailed)	.000		.000	.000	.653
	N	19	19	19	19	19
Poverty	Pearson Correlation	.669**	.822**	1	-.631**	.000
	Sig. (2-tailed)	.002	.000		.004	.999
	N	19	19	19	19	19
Unemployment	Pearson Correlation	-.727**	-.788**	-.631**	1	-.556*
	Sig. (2-tailed)	.000	.000	.004		.013
	N	19	19	19	19	19
Crime	Pearson Correlation	-.007	.110	.000	-.556*	1
	Sig. (2-tailed)	.978	.653	.999	.013	
	N	19	19	19	19	19

3.3 Path Coefficient

Based on the table above, it can be concluded that the structural equation is as. Based on the diagram above, it can be concluded that the structural equation is as following:

$$1) \text{ Substructure 1: } Y_1 = -0,674X_1 + 0,166X_2 + 0,317X_3 + 0,613$$

Table 8. Results of the Fcount Hypothesis

ANOVA ^a						
Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	46.989	3	15.663	8.313	.002 ^b
	Residual	28.262	15	1.884		
	Total	75.251	18			

Based on table 4.8 above, it can be concluded that if the sig value < 0.05 or Fcount > Ftable then there is a simultaneous influence of variable X (the influence caused by the independent variables when combined on the dependent variable) on the variable Y. in $F_{table} = F(k; n - k) = F(3; 16) = 3.24$. It is concluded that the sig value is $0.002 < 0.05$ and F count is $8.313 > 3.06$, so it can be seen that there is a simultaneous influence of variables 1,2,3 on variable 1.

Table 9. T Calculated Hypothesis Results

Coefficients ^a					
		Unstandardized Coefficients		Standardized Coefficients	
Model		B	Std. Error	Beta	t
1	(Constant)	30.341	10.423		2.911
	Education	.886	2.899	.156	.306
	Total Population	-6.034E-6	.000	-1.017	-1.526
	Poverty	1.315E-5	.000	.101	.317

Based on table 4.9, it can be concluded that if the sig value < 0.05 or t count > t table then there is an influence of It is known that the significance value for the influence of the Education variable is $0.764 > 0.05$ and the calculated t value is $0.306 < 2.131$, there is no influence of the Education variable 1 on 1, the influence of the Number of Population variable 2 is $0.148 > 0.05$ and the calculated t value is $-1.526 < 2.131$ There is no influence of 2 on variable 1, the influence poverty variable 3 $0.755 > 0.05$ and calculated t value $0.317 < 2.131$ There is no influence.

$$2) \text{ Substructure 2: } Y_2 = -1,249X_1 + 0.844X_2 - 0.603X_3 - 1,179Y_1 + 0,492$$

Table 10. Results of the Fcount Hypothesis

ANOVA ^a						
Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	139949589.947	4	34987397.487	10.911	.000 ^b
	Residual	44893518.684	14	3206679.906		
	Total	184843108.632	18			

From the table above, it can be concluded that if the sig value < 0.05 or calculated F > F table then there is a simultaneous influence of variable – k) = F (4 ; 15) = 3.06. It can be concluded that the sig value is $0.000 < 0.05$ and F count is $10.911 > 3.06$, so it can be seen that there is a simultaneous influence of variable X on variable Y.

Table 11. Results of the Tcount Hypothesis

Coefficients ^a					
Model		Unstandardized Coefficients		Standardized Coefficients	Sig.
		B	Std. Error	Beta	
1	(Constant)	82044.441	17010.684		4.823
	Education	-11126.474	3793.671	-1.249	-2.933
	Total Population	.008	.006	.844	1.415
	Poverty	-.123	.054	-.603	-2.259
	Unemployment	-1847.458	336.841	-1.179	-5.485

From the table above it can be concluded that if the significant value is < 0.05 , or $t \text{ count} > t \text{ table}$ then there is an influence of x on y . for $t \text{ table} = t (0.05/2 ; 19-4-1) = t (0.025 : 14) = 2.14479$. Known sig value. for the influence of education variable $1 \ 0.011 < 0.05$ and the calculated t value is -2.933 , there is influence 1 on variable 2, Population $20.179 > 0.05$ and the calculated t value is 1.415 , there is no influence of 2 on variable 2, the poverty variable 3 is $0.040 < 0.05$ and the calculated t value is -2.259 which means there is an influence of 3 on 2, but for the sig value of the unemployment variable 1 there is no influence of $0.000 < 0.05$ and The calculated t value is -5.485 , which means that there is an influence on variable 2 but it is negative.

Table 12. Total influence of variable x on y

Model Summary				
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.790 ^a	.624	.549	1.37264

It is known that the R Square value is 0.388 , which means that the contribution of the unemployment variable, Population Number variable, education variable and poverty variable to crime is 62.4% . Meanwhile, the value of $e_1 = \sqrt{1 - 0.624} = 0.613$

Table 13. Total influence of $x_1.x_2.x_3$ on x_4

Model Summary				
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.870 ^a	.757	.688	1790.720

It is known that the R square value is 0.597 , which means that the contribution of the influence of the variables Education X_1 , Population X_2 , and Poverty X_3 to the Unemployment variable X_4 is 59.7% . while the value of $e_2 = \sqrt{1 - 0.624} = 0.492$

4. Conclusion

Equations and formulae should be typed in Math type, and numbered consecutively with Arabic numerals in parentheses on the right-hand side of the page (if referred to explicitly in the text). They should also be separated from the surrounding text by one space. Structural Equation of path diagrams. $Y_1 = -0,674X_1 + 0,166X_2 + 0,317X_3 + 0,613$ and $Y_2 = -1,249X_1 + 0,844X_2 - 0,603X_3 - 1,179Y_1 + 0,492$. In Structure, in the f test, calculate if the sig value < 0.05 or $F \text{ count} > F \text{ table}$. It can be concluded that the sig value is $0.002 < 0.05$ and $F \text{ count}$ is $8.313 > 3.06$, so it can be seen that there is a simultaneous influence of variables 1,2,3 on variable 1, so H_0 is rejected. It can be seen that there is a simultaneous influence of variables 1,2,3 to variable 1. And t test, it is concluded that if the sig value < 0.05 or $t \text{ calculated} > t \text{ table}$ then there is an influence of 2.13145 . It is known that the significance value for the influence of the Education variable is $0.764 > 0.05$ and the calculated t value is $0.306 < 2.131$, there is no influence of the Education variable 1 on 1, the influence of the Economic Inflation variable 2 is $0.148 > 0.05$ and the calculated t value is $-1.526 < 2.131$ There is no

influence on the variable1, the influence of the poverty variable 3 $0.755 > 0.05$ and the calculated t value $0.317 < 2.131$ There is no influence. The total influence of education variables (1) on crime (2) indirectly through poverty (3) and unemployment (1) is 1,853%. The relationship between these variables is in the opposite direction, meaning that the lower the education, the higher the crime.

References

- [1] Aliwandana M, “Analisis Pengaruh Tingkat Pendidikan dan Inflasi Terhadap Kemiskinan (Studi Kasus: Kabupaten/Kota Daerah Istimewa Yogyakarta periode 2014-2019),” Universitas Islam Negeri Syarif Hidayatul, 2020.
- [2] Badan Pusat Statistik, *Provinsi Sumatra Barat Dalam Angka 2020*. 2020.
- [3] Bagus H.K, “Analisis Pengaruh Pertumbuhan Ekonomi, Tingkat Pengangguran, Pendidikan dan Upah Minimum Kabupaten (UMK) Terhadap Kemiskinan Provinsi Jawa Tengah,” 2019.
- [4] Afif S.2, “Analisis Faktor-Faktor Yang Mempengaruhi Kriminalitas Di Kabupaten/Kota Yogyakarta,” Universitas Islam Indonesia Yogyakarta, 2022.
- [5] Heri R, “Analisis Faktor Konfirmatori dan Pemodelan Persamaan Struktural,” *J. Penelit. Fak. Mat. dan Ilmu Pengetah. Alam Univ. Negeri Yogyakarta*, 2017.
- [6] Heri Retnawati, “Analisis Jalur, Analisis Faktor Konfirmatori dan Pemodelan Persamaan Struktural,” 2017.
- [7] Suci R, “Pengaruh Tingkat Pendidikan, Pengangguran , dan Kemiskinan Terhadap Kriminalitas Di Indonesia,” Universitas Negeri Padang, 2019.