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EFFECT OF ENVIRONMENTAL POLLUTION ON ENVIRONMENTAL QUALITY IN INDONESIA IN 2018

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Abstract

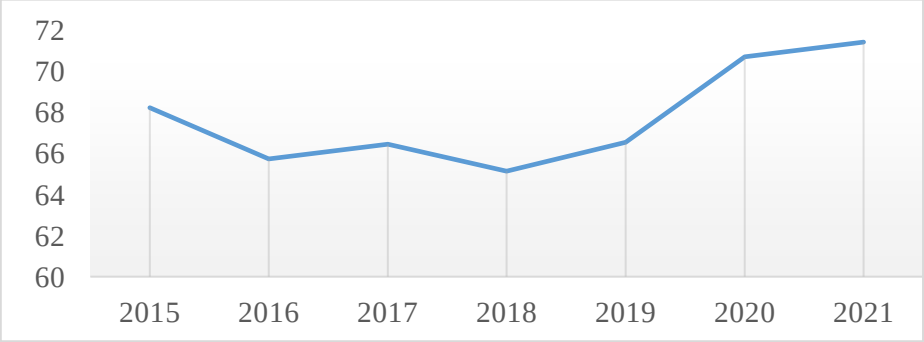
The decline in environmental quality can be influenced by many things, one of which is economic growth. In 2016 Indonesia was in position 57 out of 61 countries with an environmental quality index value of 66.55. The purpose of this research is to determine the effect of Water Pollution Index (X1), Soil Pollution Index (X2), and Air Pollution Index (X3) on Environmental Quality (Y). This type of research is quantitative with an Ordinary Least Square (OLS) approach. The population in this study were 34 provinces in Indonesia with secondary data obtained from the Ministry of Environment and Forestry (KLHK) and the Central Statistics Agency (BPS) in 2018. The results of this study show that the Water Quality Index variable has an insignificant negative effect, the Soil Quality Index no significant positive effect, and the Air Quality Index variable has a significant negative effect on environmental quality. The conclusion of this study is that the government needs to implement policies in dealing with cases of water, soil, and air pollution because this is very dangerous for living things and the environment.

Keywords: *Environmental Quality, Economic Growth, Pollution*

1. INTRODUCTION

The decline in environmental quality, also known as environmental degradation, is a consequence of multiple factors that have an effect on the quality decline of natural resources. In economics, environmental degradation is the result of externality problems, i.e., problems originating from human activities. Environmental issues are a global concern, as demonstrated by the 1972 United Nations Conference in Stockholm, which addressed environmental issues on a global scale. Pakistan has the lowest environmental quality in the world, with over 310 thousand pollution-related deaths per year. While Denmark is the country with the best environmental quality, this nation has the most comprehensive policies, particularly in reducing greenhouse gas emissions and preventing climate change.

In order to minimize the occurrence of natural disasters that result in a large number of fatalities, Indonesia's environmental quality must be improved. Indonesia ranked 57 out of 61 countries surveyed in 2016 regarding environmental quality, with an environmental quality index value of 66.55. This demonstrates Indonesia's environmental consciousness. The following is the environmental quality index for Indonesia from 2015 to 2021.



Source: Ministry of Environment and Forestry, data processed

Figure 1 Indonesia's environmental quality level in 2015-2021 (Percent)

The figure above demonstrates that the value of the Indonesian Environmental Quality Index has increased quite well, despite a decline in 2016 and 2018, and an increase of 3.72 percent from 2019 to 2020, which demonstrates good progress.

Indonesians feel the effects of deteriorating environmental quality caused by an increase in environmental pollution. Environmental pollution is the cause of many diseases (Manisalidis et al., 2020). In Indonesian marine waters, the Directorate General for Pollution and Environmental Damage Control (PPKL) discovered plastic waste (42%), wood (24%), and rubber (13%). In addition, the conversion of land functions results in forest fires that degrade air quality. Due to massive land clearing, Sumatra frequently experiences land fires; in 2018, approximately 79.967,68 hectares of land burned, and in 2019, this number increased to 84.834,00 hectares.

Harsa (2019) concluded that there was a correlation between water pollution and the occurrence of diarrhea outbreaks in the new village of Ngagelrejo Wonokromo in Surabaya, where 53.3% of the population experienced diarrhea. According to Wirosoedarmo et al. (2015), residential areas led to a decrease in water quality, which increased the Pollution Index (IP) in the Brantas watershed by 0.87. According to research (Hindriani et al., 2013), the pollution of the Ciujung River at the discharge of ecological maintenance has a 95% chance of being 9.12 m3/second and originates from a centralized or decentralized water pollution load of 80% each. Meanwhile, Pratama (2020) discover that the dummy variable has a significant effect in the short term but not in the long term. Indonesia is not obligated to participate in the reduction of CO2 emissions but has an interest in doing so due to the MDGs and SDGs agreements. Moreover, both population growth and energy per capita have a substantial positive impact.

We can conclude from the preceding explanation that there are numerous factors that contribute to the decline of environmental quality and its effects on society and the environment, all of which must be addressed immediately. Based on the results of preliminary research, scientists are interested in conducting experiments to determine how much environmental pollution affects the high or low quality of the environment in Indonesia. In this study, what distinguishes it from prior research is the type of data and variables that will be examined.

2. LITERATURE REVIEW

To support Indonesia's economic growth, the government conducts the development process with great intensity in the present day. Numerous developments, such as the construction of toll roads, manufacturing industries, mining, and infrastructure, have a significant impact on the environment. As stated in the Environmental Kuznets Curve (EKC) theory, which states that technological advancements can cause environmental damage, this situation occurs frequently in developing nations. Meanwhile, technological advancements can promote environmental sustainability in developed nations. The Environmental Kuznets Curve (EKC) theory is the first to establish a connection between economic growth and environmental degradation. This EKC theory explains that when a country's economy is weak, the country's focus is on production and investment, which is expected to lead to an increase in income while environmental issues are ignored (Febriana, Selly., Diartho, H. C., Istiyani, 2019).

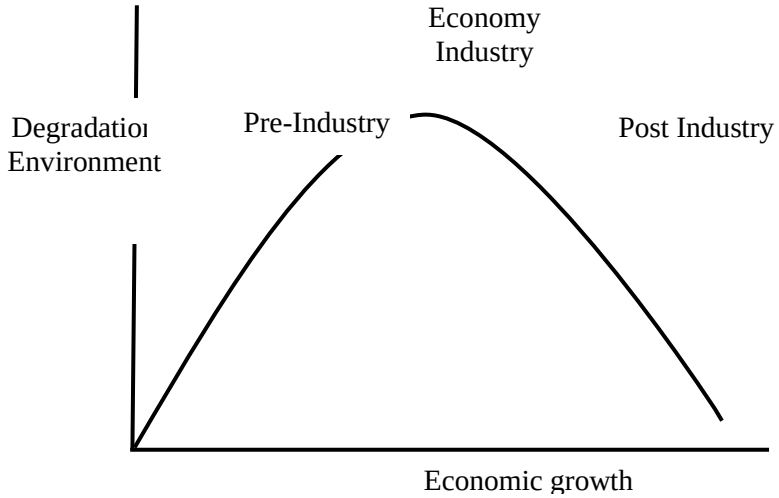


Figure 2 Kuznets Environmental Curve

Grossman & Krueger (1995) highlight the relationship between economic growth and various environmental indicators reveals that initial economic growth will have a negative impact on the environment, but it will eventually reach a tipping point where environmental conservation and sustainable development will occur (Andrée et al., 2019; Fodha & Zaghdoud, 2010).

Pollution is closely related to the current development process because every human activity produces externalities (Apdillah et al., 2022). Pollution is the introduction of chemical compounds into an ecosystem in such a way that they harm the environment and endanger living things. According to Ainuddin (2017), pollution or environmental pollution is a condition that has worsened the original situation. Pollution results from human activities, including economic and infrastructure development. This pollution has the potential to affect all aspects of life, including humans, animals, and environmental quality.

FAO (1997) defines environmental degradation as the deterioration of environmental quality or carrying capacity due to human activities or natural causes. Environmental degradation can occur as a result of environmental exploitation, such as forest encroachment, land conversion, peatland drainage, and excessive use of fossil fuels, among other processes. Both Todaro & Smith (2011) Land conversion in developing nations now contributes to global concentrations of greenhouse gases or greenhouse gases and is estimated to account for the top 20% of carbon dioxide (CO2) emissions worldwide.

Meanwhile, Megalina (2015) reveal the presence of the Amplas Terminal in Medan City has an effect on air pollution, including not only the smoke generated by vehicles but also the presence of cigarette smoke and garbage. Made et al. (2021) demonstrated that careless disposal of household waste can lead to environmental degradation, such as a decline in water quality, as a result of household activities. Moreover, Ramadhan (2018) Describe the contamination of soil, water, air, and other elements by pesticides that negatively affect the environment and stratospheric ozone layer.

The variables of water pollution (X1), soil pollution (X2), and air pollution (X3) have a negative impact on environmental quality, according to the hypothesis derived from theoretical studies and previous empirical research. Based on the researcher's preliminary research and the outcomes of previous studies, this test will confirm the initial hypothesis. This research differs from previous studies in terms of variables, the data examined, and the methodologies employed.

3. RESEARCH METHOD

This research is quantitative research. Quantitative research is a systematic scientific study of phenomena and their parts and relationships. The data obtained comes from the Central Statistics Agency and the Indonesian Ministry of the Environment. This study uses cross-sectional data from 34 provinces in Indonesia in 2018. The dependent variable used is the Environmental Quality variable (Y) which is an environmental condition that can provide optimal comfort and carrying capacity for living things that occupy the environment, this variable uses index data. Environmental Quality in 34 Provinces in Indonesia in 2018.

As for the independent variable, the researcher uses 3 variables, namely the Water Pollution variable (X1) which is a change in water quality as a result of human activities causing chemical compounds to be mixed into the water and causing a decrease in water quality itself, the X1 variable uses the Water Pollution Index (IPA) data. 34 Provinces in Indonesia 2018. Soil Pollution Variable (X2) is a condition where the surface or underground has been polluted by pollutants, causing a decrease in soil quality and very dangerous for living ecosystems, variable X2 uses Soil Pollution Index (IPT) data 34 Provinces in Indonesia in 2018. Air Pollution Variable (X3) is the mixing of pollutants into the air layer which causes a decrease in air quality so that it can cause various respiratory diseases in living things, the X3 variable uses the Air Pollution Index (IPU) data for 34 Provinces in Indonesia in 2018.

The method used in this study is Ordinary Least Square (OLS). The final result of this method produces a population regression function which is used to estimate the data, there are 4 basic assumptions in producing the estimation of this OLS method, namely BLUE (Best, Linear, Unbiased, and Estimator). In general, the equation is as follows:

$$Y = f(X_1, X_2, X_3)$$

The general form of the econometric model equation is as follows:

$$Y = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \cdots + e$$

Then form the equation of the econometric model with the variables used as follows:

$$Y_i = \beta_0 + \beta_1 IPA_i + \beta_2 IPT_i + \beta_3 IPU_i + e_i$$

Where:

Y_i	= Environmental Quality Index (IKLH)
β_0	= Constant Coefficient
$\beta_1\beta_2\beta_3$	= Coefficient
IPA	= Water Pollution Index
IPT	= Soil Pollution Index
IPU	= Air Pollution Index
e	= Error
i	= Cross-section data of 34 provinces in Indonesia

4. RESULT AND DISCUSSION

Good environmental quality is highly expected by all countries, including Indonesia. Currently, there are many cases of environmental damage, be it air pollution, water pollution, soil pollution, radioactive pollution, and others. The existence of various human activities causes pollutants to enter the environment so that it has a negative effect on living things in the environment.

4.1. Descriptive statistics

This analysis is used to provide an overview of the variables tested in the study, such as the mean value, maximum value, minimum value, and others.

Table 1 Results of Descriptive Statistical Analysis

	IKLH	IP_AIR	IP_TANAH	IP_UDARA
Mean	73.00559	32.80471	3.030294	12.04912
Median	73.70500	25.22500	2.085000	10.90000
Maximum	91.50000	98.49000	13.66000	26.59000
Minimum	45.21000	3.780000	0.350000	0.650000
Std. Dev.	10.26425	23.55674	2.672194	6.012305
Skewness	-0.400993	1.219365	2.066153	0.314523
Kurtosis	3.031357	3.833534	8.471329	2.887172
Jarque-Bera	0.912568	9.409762	66.59947	0.578608
Probability	0.633634	0.009051	0.000000	0.748785
Sum	2482.190	1115.360	103.0300	409.6700
Sum Sq. Dev.	3476.712	18312.36	235.6405	1192.878
Observations	34	34	34	34

Source: Data processed with eviews 10, 2022

It can be seen from the table above, the distribution of variable data that will be used in this test. Based on the existing problems, this study aims to evaluate the quality of the environment in 34 provinces and with the data that has been obtained.

4.1.2. Classic Assumption

This test aims to determine whether the estimation results tested are free from symptoms of abnormal data, multicollinearity, autocorrelation, and heteros. This test is useful for producing linear estimates so that it is free from minimum bias or variance (Best Linear Unbiased).

Table 2 Classical Assumption Test Results

	Normality test	Test Multicollinearity			Autocorrelation Test	Test Heteroscedasticity
Results	*Probability*	IPA	IPT	IPU	*Prob. Chi-Square(2)*	*Prob. Chi-Square(3)*
	0,789	1,954	1,777	1,348	0,277	0,406

Source: Data processed with eviews 10, 2022

From the results of the classical assumption test, it was found that the data used in this study did not have problems with abnormal data, multicollinearity, autocorrelation, and heteroscedasticity. In the normality test using the Jarque-Bera Test the probability results are more than 0,05, which is 0,789 this indicates that the tested data is normal. Multicollinearity test on the three variables, the value of Centered VIF is not more than 10 so that there is no multicollinearity problem in the data. In the autocorrelation test the value of Prob. Chi-Square (2) more than 0,05, which is 0,277 so that it is free from autocorrelation problems. From the table above, it can also be seen that in the heteroscedasticity test the Prob value. Chi-Square (3) is not less than 0,05 so that it is free from heteros problems in this test. From the overall results of the classical assumption test, it is certain that the data in this study are free from bias.

4.1.3. Regression Analysis

Regression analysis aims to test whether or not there is an effect between the independent variable and the dependent variable. The regression results were processed using the eviews 10 program and obtained the following results:

Table 3 Results of Regression Analysis

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	86.36966	3.167779	27.26505	0.0000
IPA	-0.127456	0.082358	-1.547571	0.1322
IPT	1.005217	0.692311	1.451973	0.1569
IPU	-1.014932	0.268010	-3.786914	0.0007

R-squared	0.451468	Mean dependent var	73.00559
Adjusted R-squared	0.396615	S.D. dependent var	10.26425
S.E. of regression	7.973054	Akaike info criterion	7.100143
Sum squared resid	1907.088	Schwarz criterion	7.279715
Log likelihood	-116.7024	Hannan-Quinn criter.	7.161382
F-statistic	8.230479	Durbin-Watson stat	1.537780
Prob(F-statistic)	0.000382		

Source: Data processed with eviews 10, 2022

From the regression testing that has been carried out, the following results are obtained:

$$\hat{Y} = 86{,}36966 - 0{,}127456X1 + 1{,}005217X2 - 1{,}014932X3$$

Based on the test results above, the constant value is 86,36966, which means that if the value of water pollution, soil pollution, and air pollution is 1, the environmental quality index increases by 86,36966. The regression coefficient of the Water Pollution Index (hereinafter referred to as IPA) variable is -0.127456, which means that if there is a 1% decrease in the water pollution index, it will result in a decrease in the environmental quality index of -0,127456 in each unit, assuming the soil and air pollution variables are valued. remains the same.

Water pollution index is a method used to measure the level of water quality by comparing the quality standards that have been set. According to the Ministry of Environment and Forestry (hereinafter referred to as KLHK) in 2020 59% of rivers in Indonesia experience severe category pollution. Due to the large number of mining activities, households, livestock, and the oil and gas industry. From the data that has been tested for the effect of the Water Pollution Index on environmental quality, the results show that the water pollution index variable has no significant negative effect on the environmental quality variable. From these results indicate that the test results are in line with H0 if the water pollution index decreases, the quality of the environment increases.

The regression coefficient of the Soil Pollution Index (hereinafter referred to as IPT) variable is 1,005217, meaning that if there is an increase in the soil pollution index by 1%, it will result in an increase in the environmental quality index of 1,005217 in each unit, assuming the variables of water pollution and air pollution remain the same. Soil pollution index is a value that describes the condition or quality of the soil in an area. Soil pollution occurs due to the presence of chemicals entering and changing the soil structure. This usually happens because industrial chemicals and liquid waste enter the soil, besides the excessive use of pesticides results in a decrease in soil quality. From the data that has been tested for

the effect of the Soil Pollution Index on environmental quality, the results show that the soil pollution index variable has no significant positive effect on the environmental quality variable. From the existing test results show that H0 is not proven in this study.

The regression coefficient of the Air Pollution Index (hereinafter referred to s IPU) variable is -1,014932, meaning that if the air pollution index decreases by 1%, it results in a decrease in the environmental quality index by -1,014932 in each unit, assuming the water and soil pollution variables remain the same. Air pollution index is a value that describes the level of quality or air condition in a certain area. In 2021, Indonesia is reported to have air pollution at the highest PM2.5 concentration in the Southeast Asia region, which is 34.3 micrograms per m^3. From the data that has been tested for the effect of the Air Pollution Index on environmental quality, the results show that the air pollution index variable has a significant negative effect on the environmental quality variable. From the existing test results indicate that H0 is accepted.

4.1.4. Statistic test

This test includes the R-Square test which is used to test how much the ability of the independent variable in influencing the dependent variable. In this test, look at the R-Square value to determine the magnitude of the influence of the independent variable on the dependent variable. From the test results that have been carried out, the R-squared value is 0,451468, which means that the Environmental Quality Index (Y) variable can be explained by the variables Water Pollution Index, Soil Pollution Index, and Air Pollution Index by 45% while the remaining 55% is explained by other variables outside the model.

5. CONCLUSION

5.1. Conclusion

In economic activity, there are many externalities that have a negative impact on the quality of the environment. In 2016 Indonesia was in position 57 out of 61 countries with an environmental quality index value of 66,55. This research is useful to determine the effect of water, soil, and air pollution on environmental quality in Indonesia. From the tests conducted, it was found that the Water Pollution Index variable has an effect of -0,127456 on the environmental quality variable, the Soil Pollution Index variable has an effect of 1,005217 on the environmental quality variable, and the Air Pollution Index variable has an effect of -1,14932 on the environmental quality variable.

5.2. Suggestion

Efforts to improve the quality of the environment must continue to be carried out by all elements, both the government and the community. One way that can be done is to conduct a study on the quality of the environment, with the results that the researcher hopes to provide input to the government to issue policies that can reduce pollution due to the impact of human economic activities. Suggestions from researchers for further research are to increase the observation period and other variables that are thought to have a strong influence on environmental quality.

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