INFLUENCE OF ENVIRONMENTAL QUALITY FOR SUSTAINABLE DEVELOPMENT IN INDONESIA

Heffi Christya Rahayu
Pasir Pengaraian University
Corresponding Author: e-mail: heffichristyarahayu@gmail.com

Handri
Bandung Islamic University
e-mail: handrif2@gmail.com

ABSTRACT

Global warming and environmental damage are important issues today. Sustainable development must pay attention to the impact of social and economic actions on the environment. To find out the quality of the environment is influenced by what factors in Indonesia. It is necessary to conduct research using model regression analysis of panel data with variables of GRDP, poverty, energy consumption, and HDI against IKLH there are 33 provinces in Indonesia. The results of the model selected and will be used in this study is the Fixed Effect Model. From the results of the partial analysis, it is known that poverty and HDI have a significant influence on environmental quality, where both variables have a positive effect on IKLH. Meanwhile, GRDP and Energy Consumption do not have a significant influence on IKLH. Simultaneously, the four independent variables affect IKLH as a dependent variable. The magnitude of the influence of the four independent variables (HDI, Poverty, GRDP, and Energy Consumption) on IKLH is 80.95%, and the remaining 19.05% is a variable that is not used in the study

Keywords: IKLH; GRDP; Indonesia; Panel Data

ABSTRAK

Pemanasan global dan kerusakan lingkungan menjadi isu penting saat ini. Pembangunan berkelanjutan harus memperhatikan dampak tindakan sosial dan ekonomi terhadap lingkungan. Untuk mengetahui faktor apa saja yang mempengaruhi kualitas lingkungan di Indonesia. Perlu dilakukan penelitian dengan menggunakan model analisis regresi data panel dengan variabel PDRB, kemiskinan, konsumsi energi, dan IPM terhadap IKLH terdapat 33 provinsi di Indonesia. Hasil pemilihan model yang digunakan adalah Fixed Effect Model. Dari analisis kemiskinan dan IPM, secara parsial berpengaruh signifikan terhadap kualitas lingkungan, dimana kedua variabel tersebut berpengaruh positif terhadap IKLH. Sedangkan PDRB dan Konsumsi Energi tidak berpengaruh signifikan terhadap IKLH. Secara simultan keempat variabel independen tersebut mempengaruhi IKLH sebagai variabel dependen. Besarnya pengaruh keempat variabel bebas (IPM, Kemiskinan, PDRB, dan Konsumsi Energi) terhadap IKLH adalah sebesar 80,95%, dan

sisanya sebesar 19,05% merupakan variabel yang tidak digunakan dalam penelitian.

Kata Kunci: IKLH; GRDP; Indonesia; Regresi Data Panel

INTRODUCTION

National development is still very necessary to advance all aspects in order to achieve the welfare of the nation. One of the benchmarks of national development is to look at the economic growth of a country. But various demands for achieving high economic growth, often mislead developing countries (Wafiq & Suryanto, 2021). When state revenues are still low, they will focus on increasing their income by ignoring environmental quality issues (Ahmed et al., 2019; Batmunkh et al., 2022). From several previous studies, it is stated that environmental quality is negatively affected by economic growth, increasing economic growth will have an impact on decreasing environmental quality. (Ahmed et al., 2019; Wafiq & Suryanto, 2021; Wang et al., 2020; Yameogo et al., 2021). The faster the economy grows; the more natural resources need to produce goods. While the concept of sustainable development does not have a greedy nature, it must not only be self-interested but also attach importance to the next generation.

In a region area, economic progress in Gross Regional Domestic Product, is a reflection of the income in the region. The island of Java is the largest distributor of GDP and is a benchmark for the national economy. However, the high value of GRDP, on the other hand, the lowest average IKLH value is also on the island of Java, precisely DKI Jakarta, which is 52.98% in 2020. Meanwhile, the highest IKLH was on the island of Papua, which was 79.75% in 2020 with the lowest GRDP. The shift in the structure of the economy in Indonesia from agriculture to the industry helps to increase economic growth in Indonesia (Ahmed et al., 2019). However, the process of industrialization with the exploitation of resources that trigger economic growth results in decreased natural resource availability and damage to the environment. According to Oktavilia et al. (2018), if in line with the Environmental Kuznets Curve, Indonesia is in a formulation stage where economic activities will cause environmental damage by exploring natural resources excessively and unsustainable industrialization.

In improving national welfare, in addition to increasing economic growth, namely how the state can reduce the level of poverty (Ratnawati and Sc). The level of poverty directly has a negative influence on the quality of the environment (Masron & Subramaniam, 2020; Octavilia et al., 2018; Sumargo & Haida, 2020). According to Oguonu (2005), poverty hinders sustainable development, the poor trying to get out of the poverty line contribute to degradation or environmental damage. Although high consumption comes from a more prosperous and well-off society, to survive the poor tend to do various things without paying attention to environmental sustainability (Candidate, 2012). This shows that poverty occurs through the exploitation of resources that are not environmentally friendly so that it has a direct impact on environmental quality.

Examples such as felling trees, dumping waste from economic activity, living in slum areas, and the lack of facilities make them dump waste into

sewers and rivers. But according to Masron & Subramaniam (2020), we should see poverty as a solution rather than part of the problem. By reducing the level of poverty as a contributor to environmental damage, good environmental quality will be achieved.

In everyday life, all human beings need energy, both electrical energy, light, chemistry, and others. However, energy consumption causes CO2 emissions to be higher (Ho & Ho, 2021; Kubatko et al., 2018; Rehman, 2020; Robbi et al., 2020; Sultana et al., 2022; Wang et al., 2020). According to Ho & Ho (2021), industrial revival will increase energy consumption which causes high pollution, when compared to when development was still low, industrial revival has an impact on the amount of energy consumption which will produce more waste. In addition, changes in human living standards and better incomes lead to higher energy consumption. The more energy consumption, the more natural resources will be depleted. It is feared that this will cause the country to be unable to continue sustainable development. Due to environmental problems, factors such as energy consumption, economic growth, and poverty that could contribute to environmental damage are hard to research for determining good policy (Rahman et al., 2022).

To overcome the problem of environmental damage, an improvement in human quality is needed (Oktavilia et al., 2018). According to him, human development has a positive impact on environmental quality. Human quality development can reduce environmental degradation; besides that, it can have a positive impact on sustainable development. Human development is measured by an increase in life expectancy, education, health, standard of living, and others. Indicators that measure the success of the quality of human development are expressed in the human development index (HDI). If there is an improvement in the quality of human beings, especially in terms of environmental education, it will increase concern and management of the environment independently. According to Li & Xu (2021), the key to improving the quality of the environment is to accelerate human development. The dilemma between economic growth, resource depletion and environmental degradation and investment in human development is a very important problem to solve. The development of human quality not only pursues a higher level of education and material wealth, but they also need a better living environment. So that human development can create a good quality of the country and environment.

The research gap in this study is that some studies show that economic growth has a negative influence on the quality of the environment, but some studies also show that growing the economy can have a positive effect on the quality of the environment. The results of research by Yahaya et al. (2020) and Kubatko et al. (2018) show that economic growth can have a positive effect on the quality of the environment. According to Kubatko et al. (2018), a higher level of GDP per capita stimulates activities related to improving the quality of health such as sanitation, vaccination, health care systems, sewage treatment, and others.

This paper aims to examine the effect of poverty, Gross Regional Domestic Product, Energy Consumption, and Human Development Index on the environmental quality of all provinces in Indonesia using panel data

analysis model. Where the quality of the environment can be shown by the environmental quality index in Indonesia.

RESEARCH METHODS

The data used will be processed in the form of numbers using statistical analysis methods, this approach is called a quantitative descriptive approach. The strategy carried out is a case study of several factors that can affect the Quality of the Environment in all provinces in Indonesia. Where in order to understand the flow of this research, namely by studying previous research and by testing and interpreting the data that has been collected. The selection and formation of variables are based on IKLH data from 33 provinces taken from 2017 to 2020.

The tool used to test the panel data is E-Views 9. This study uses the panel data regression method because it is useful to see the inseparable economic impact between each individual in several periods that cannot be obtained from time series data or cross section data. The advantage of using panel data is that it is able to provide more data so that it will produce a greater degree of freedom, besides that combining data can overcome problems arising from the elimination of variables (Widarjono, 2007). Panel data test stages:

1. Regression Model Estimation

    Panel data regression model estimates are used as predictions and regression model parameters, seen from the constant or intercept (α) and the regression coefficient through the slope (β). According to Widarjono (2007:251), the techniques used to estimate the panel data parameters are:

    a. The General Effects Model is the simplest model, namely by combining cross section and time series data regardless of time or individual differences. The approach used is the Ordinary Least Square (OLS) method, so this model is often called pooled OLS or Common OLS Model.

    b. Fixed Effect Model FEM is an estimation of panel data using dummy variables, the presence of dummy variables, namely, to capture intercept differences. In this model the approach used is the Least Square Dummy Variable (LSDV) method or the covariance model.

    c. The Random Effects Model is an approach in which the residuals are interrelated over time and between individuals. The approach in this model is the Generalized Least Square (GLS) approach.

2. Regression Model Selection

    To choose a regression model, there are three tests that must be carried out, namely:

    a. The Chow test is a test conducted to choose which model is the most appropriate to use, whether the common effect or fixed effect model.

    b. Hausman test is a test conducted on the fixed effect or random effect model to determine the most appropriate one to use.

    c. Lagrange Multiplier (LM) test was conducted to determine the model to be used, whether random effect or common effect (OLS).

3. Test of Classical Assumptions

Panel data regression model which is a regression model that meets the requirements if it meets the Best, Linear, Unbiased, and Estimator (BLUE) criteria. In-order for the equation to be categorized as meeting the BLUE rules, the data used must meet the assumptions commonly known as classical assumption tests. In the classical assumption test, there are three tests used. Here is the explanation:

    a. Normality Test, which is a test of the normality of data distribution. The methods used are residual histogram, kalmogrov smirnov, kurtosis skewness, and jarque-fallow.

    b. Heterokedasticity Test, to see whether the residual formed has a constant variance or not. Methods for detecting heteroskedasticity include graphing methods, park, glesjer, spearman correlation, goldfeld-quandt, breusch-pagan and white.

    c. Multicolleniaritas Test, to determine the existence of relationships in free variables. Methods for detecting multicholinearity include variance influence factors and paired correlations.

RESULTS AND DISCUSSION

A. Regression Model Estimation

Before estimating, a test is conducted to select a model using the Chow test, Hausman test and LM (Lagrange Multiplier) test to determine whether the chosen model is Common Effect, Fixed Effect or Random Effect.

Table 1 Probability Values of Test Results

Test	Chi-Sq. Statistic	Probability
Chow	160.7957	0.0000
Hausman	40.9081	0.0000
LM	-	-

Source: Data Processing Results, E-Views 9

In the Chow test, the probability value of Chi-Square is 0.0000 or the significance value is less than 0.05, thus rejecting H0 or the selected model is Fixed Effect. Furthermore, if the Hausman Test the selected model is also Fixed Effect, because the Chi-Square Probability value is 0.0000 or less than the significance value of 0.05. So, the decision taken is to reject H0 or the Fixed Effect model as the chosen model because it is better than the Random Effect model. So based on the two test results, it is not necessary to continue with the LM (Lagrange Multiplier) test.

B. Test of Classical Assumptions

Before further analysis, we must ensure that the data is free from problems of data normality, multicolleniaritas and heterochedasticity in order to meet the BLUE criteria. Here are the results of each test that must be carried out:
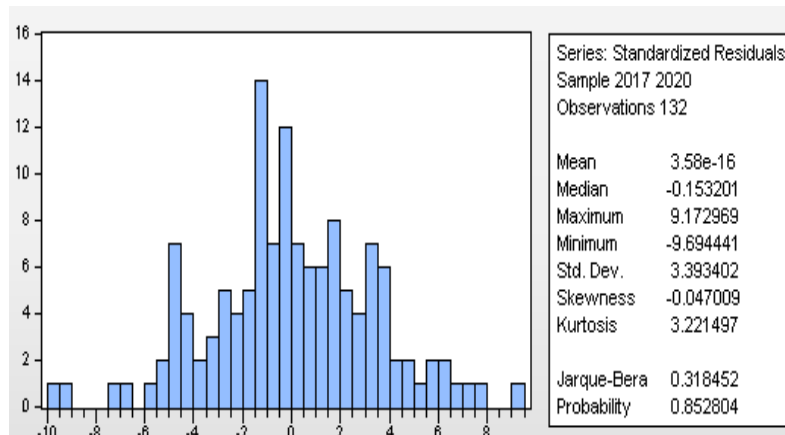

Figure 1. Normality Test Results
Source: Data processing results, E-Views

Figure 1 shows the probability value on The Jarque-Fallow is 0.8528 or more than 0.05, so H_0 is accepted. So, it can be said that all data in this study are normally distributed

Table 2. Multicolleniaritas Test Results

Correlation	Energy Consumption	HDI	Poverty	GRDP
Energy Consumption	1.000	0.1160	0.5283	0.5414
HDI	0.1160	1.000	-0.0129	0.4075
Poverty	0.5283	-0.0129	1.0000	0.7104
GRDP	0.5415	0.4075	0.7104	1.0000

Source: Data processing results, E-Views 9

Based on the results of the correlation test shown in table 2, it shows that all values between independent variables are less than 0.8, so it can be concluded that the data used are free from multicolleniaritas problems.

Table 2. Heterochemedasticity Test

Variable	Prob.
C	0.5622
LNENERGI	0.6861
LN IMPOVERISHMENT	0.5700
LNPDRB	0.4838
HDI	0.3911

Source: Data processing results, E-Views 9

Based on the results of table 3 above, it is known that all variable probability values are greater than the significance value of 0.05, so the variables of poverty, GRDP, population density and HDI do not have heterochemisticity problems. From the three panel data assumption tests, it can be concluded that the data used meet the BLUE criteria (Best, Linear, Unbiased, Estimator).

C. Fixed Effect Model Results

Here are the results of the FEM Test with the IKLH variable as the dependent variable:

Table 3FEM Test Results

Variable	Coefficient	Std.Error	t-Stat	Prob.	Information
C	-693.5575	151.4198	-4.5804	0.0000	Significant
LN-energy	-0.8428	1.6004	-0.5266	0.5997	Insignificant
LN Impoverishment	39.5344	9.2913	4.2550	0.0000	Significant
LNPDRB	2.0328	1.2527	1.6227	0.1080	Insignificant
HDI	2.2753	0.6555	3.4712	0.0008	Significant
R_Squared	0.8619				
Adjusted R_Squared	0.8095				
F-Statistics	16.4668				
Prob(F-Statistics)	0.0000				

Source: Data processing results, E-Views 9

If the probability value is greater than the significance value of 0.05, it can be stated that the independent variable has no significant effect on the dependent variable. But on the contrary, the probability value is smaller than the significance value of 0.05 then the free variable has a significant effect on the bound variable. In Table 5, it can be concluded that partially there are 2 variables that have a significant effect on IKLH, namely the Poverty and HDI variables. Meanwhile, the other 2 variables (GRDP and Energy Consumption) did not have a significant effect on IKLH. Then simultaneously all independent variables affect the IKLH, it can be seen from the probability

value of F-Statistics (0.0000) smaller than the level of significance (0.05). From the R-Square value of 0.80953, it means that the four independent variables can explain the quality of the environment in Indonesia by 80.95% while the remaining 19.05% is explained by other variables beyond the model under study.

The regression equation obtained from the *Fixed Effect* Model is:

IKLH = -693.5575 - 0.8428 LNENERGY + 39.5344 NIMPOVERISHMENT + 2.0328 LNPDRB + 2.2753 IPM

The Energy Consumption variable negatively affects the IKLH variable, then the other 3 variables have a positive influence on the IKLH.

D. Discussion

Based on the results of the study, the first hypothesis that states that poverty has a negative effect on IKLH was not proven in this study. The poverty variable has a significant influence on the quality of the environment in a positive direction, meaning that a decrease in poverty leads to a decrease in the quality of the environment. This is in line with Science research (2020) The extent to which poverty alleviation efforts are the cause of environmental damage can be expressed by the relationship between a reduction in the poverty rate and an increase in the environmental quality index. The Kuznet curve illustrates the extent to which an increase in per capita income at a certain point will cause environmental damage. While poverty reduction is described by an increase in the income per capita of the poor. In other words, it can be said that if there is a decrease in the poverty rate, it indicates an increase in the income of the poor, so that environmental damage can be shown by the Kuznet curve at the initial level.

In the second hypothesis of this study, GRDP has a negative impact on IKLH, but the results of the data processing are different from the hypothesis. The results of this study show that GRDP has a positive effect on IKLH, in line with the research of Kubatko et al. (2018) and Yahaya et al. (2020). According to Kubatko et al. (2018) the higher level of GDP per capita stimulates activities related to improving the quality of health such as sanitation, vaccination, health care systems, sewage treatment and others. For example, in west Java province to support environmental sustainability programs, the Governor of West Java and his deputies held a Green Leadership program to accelerate the growth and equitable distribution of environmental-based development and sustainable spatial planning. In addition, there are digital innovations such as the Plantation Land Allotment Map Information System to find out the function of the land to be used. Other programs held in each province such as waste management programs, environmental conservation programs, community development programs, and others have also helped improve the quality of the environment. Based on data obtained from the 2019 National Waste Management Information Systen (SIPN), of the 33 million tons of waste managed, 51.67% are managed every year. If the program can be held continuously and the number of participants increases, it can improve the quality of the environment. This is also likely due to the fact that the

contribution of GDP sources in 2017-2020 in Indonesia is dominated by the service sector which continues to increase, while income in the agricultural, mining, and manufacturing sectors has decreased.

The results of subsequent studies are in line with the hypothesis, where energy consumption has a negative impact on quality of the environment in Indonesia. Energy consumption causes carbon dioxide gas emissions to be higher (Ho & Ho, 2021; Kubatko et al., 2018; Rehman, 2020; Robbi et al., 2020; Sultana et al., 2022; Wang et al., 2020). According to Ho & Ho (2021) the rise of industry and changes in human living standards, especially now that technology is growing. This leads to an increase in electrical energy consumed. The more energy consumption, the more natural resources will be depleted. It is feared that this will cause the country to be unable to continue sustainable development.

In the last hypothesis, can be stated by that HDI has a positive effect on IKLH, this is in line with previous studies. Improving human quality will improve the quality of the environment in Indonesia (Li & Xu, 2021; Octavian et al., 2018). Vice versa, if the quality of humans decreases, the quality of the environment will also decrease. This means that humans or society fully contribute to the environment where every activity affects the quality of the environment directly. Human development is very important in reducing environmental degradation and achieve sustainable development, Li & Xu (2021) also stated in his research is the key to success in improving the quality of the environment through the acceleration of human development. Especially education in environmental management and increased concern for 42 environments, so that the community is more concerned and can manage the environment independently. So that all activities that will be carried out by the community can pay more attention to the environment and the surrounding nature.

CONCLUSION

The results of the analysis test are related to determinants that affect the quality of the environment. This research was conducted in Indonesia covering 33 provinces from 2017-2020 using the panel data method. The results of the study as stated, partially poverty and HDI are known to have a significant influence on environmental quality, where both variables have a positive effect on IKLH. Meanwhile, GRDP and Energy Consumption do not have a significant influence on IKLH. Simultaneously, the four independent variables affect IKLH as a dependent variable. The magnitude of the influence of the four independent variables (HDI, Poverty, GRDP and Energy Consumption) on IKLH was 80.95%, the remaining 19.05% was influenced by other variables not included in this research model.

From the results of panel data regression, it can be concluded that this study, the government should make efforts that can improve the quality of humans or society as a whole, these efforts can be in the form of increasing and equitable education, especially education on the environment from an early age, so that humans are more aware and concerned about environmental sustainability since childhood. In addition, it is necessary to hold intensive non-governmental activities related to the environment, especially to disseminate education about the environment, such as

socialization of the importance of preserving the environment. Community participation in preserving the environment is very meaningful for the sustainability of development in Indonesia.

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Ex Table :

Presentation of **Table 1.** The following is an example of compiling data in a table.(High Resolution Picture better from real Table or Chart)

Table 4Probability Values of Test Results

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Table 3. Heteroscedasticity Test

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LNENERGI	0.6861
LN IMPOVERISHMENT	0.5700
LNPDRB	0.4838
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Source: Data processing results, E-Views 9
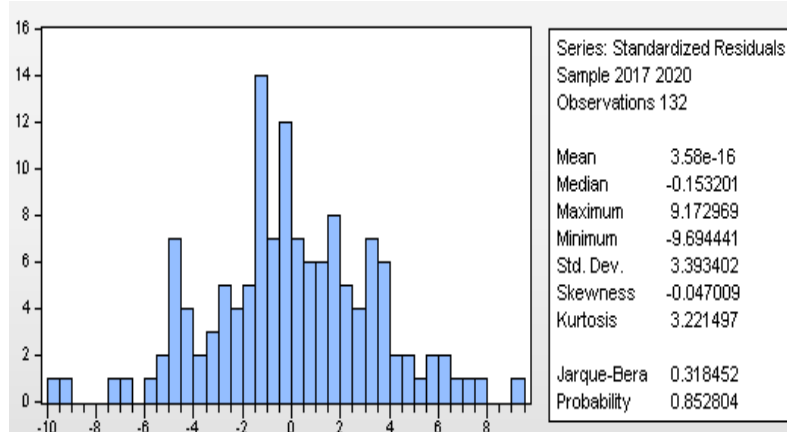
Table 5FEM Test Results

Variable	Coefficient	Std.Error	t-Stat	Prob.	Information
C	-693.5575	151.4198	-4.5804	0.0000	Significant
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HDI	2.2753	0.6555	3.4712	0.0008	Significant
R_Squared	0.8619				
Adjusted R_Squared	0.8095				
F-Statistics	16.4668				

Prob(F-Statistics)	0.0000

Source: Data processing results, E-Views 9

Ex Figure :
Figure 1. Normality Test Results

Source: Data processing results, E-Views