Analysis Of The Factors Influencing The Provincial Environmental Quality Index In Java Island, 2017-2021

Isna Ayu Wulandari[1] Sitti Retno Faridatussalam[2]
Email: isnaayuwulandari@gmail.com [1] Sittiretnofaridatussalam@gmail.com [2]
Muhammadiyah University of Surakarta

| Keywords:	Abstract
Environmental Quality Index, Total Population, HDI, Industrial Sector GRDP, and Poverty Level	The Environmental Quality Index serves as an indicator for assessing the efficacy of environmental management and protection. It functions as a reference point for various stakeholders involved in evaluating the performance of environmental preservation efforts. The index's measurement is based on three key indicators: the Water Quality Index, Air Quality Index, and Land Cover Quality Index. This study is conducted with the primary goal of investigating the influence of Population, Human Development Index, Industrial Sector GRDP, and Poverty Level on the Provincial Environmental Quality Index across Java Island during the period of 2017 to 2021. Secondary data is employed for this research , utilizing panel data analysis techniques. The outcomes of this study reveal that the Human Development Index and Poverty Rate significantly impact the Environmental Quality Index. conversely, the Total Population and Industrial Sector GRDP exhibit no significant influence on the Provincial Environmental Quality Index within Java Island for the years 2017 to 2021.

1. INTRODUCTION

The environment is a spatial unit with all objects, power, conditions, and living things, including humans and their behavior, which affect nature itself, the continuity of life, and the welfare of humans and other living things, according to Law Number 32 of 2009 Article (1) concerning Environmental Protection and Management.

Indonesia is a country that has abundant natural resources. The use of natural resources will increase as a result of Indonesia's economic growth. If not controlled properly, this economic growth can deplete natural resources and cause poor environmental quality, including air and water pollution and a decrease in the quantity and quality of land cover. If this environmental damage is not immediately addressed, it will result in a decrease in environmental quality which can cause losses. (Hidayati & Zakianis, 2022). Environmental quality is defined as the

condition of the environment that is capable of optimally supporting human survival in an area. A good living environment can enable humans to develop optimally.

The Environmental Quality Index is used by the Ministry of Environment and Forestry (KLHK) to measure the success of environmental development. Nationally, the Environmental Quality Index is an indicator of the performance of environmental management and protection which is used as an excuse by all parties in measuring the performance of environmental management and protection. The Environmental Quality Index is the result of a combined analysis of three environmental component indicators, namely the Water Quality Index (IKA), Air Quality Index (IKU), and Land Cover Quality Index (IKTL) (Indeks Kualitas Lingkungan Hidup Indonesia , 2017).

Graph 1. Java Island Environmental Quality Index (IKLH) 2017-2021
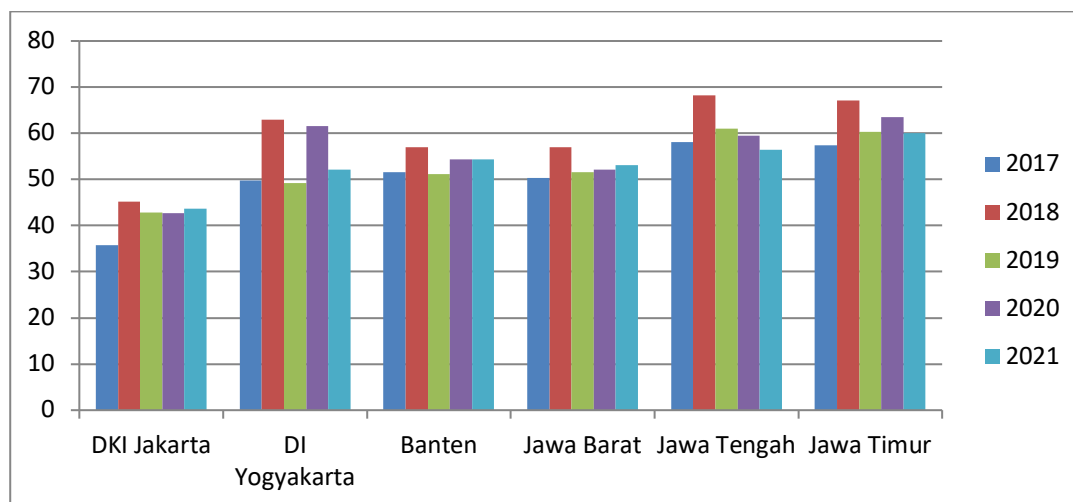
Based on report IKLH year 2010, IKLH according to Island Indonesia, Island Java ranks final from 6 island which exists in Indonesia. IKLH Island Java ie 59.82, increased from the previous year 54.41. That matter show air quality in Island Java is the worst among the islands Which other. Matter This caused Because Island Java is island with amount densest population as well as center government, where is development transportation as well as the industry is growing very rapidly.

So that in 2017-2021 the Java Island Environmental Quality Index (IKLH) tends to fluctuate where the lowest percentage of environmental quality occurs in the DKI Jakarta area, this percentage can be seen in graph 1. DKI Jakarta has a larger population compared to other regions other areas, so that this can lead to reduced land and a large number of people making the number of public and private transportation also increase which causes air pollution in this region to also increase. The number of DKI Jakarta's industrial sector is 1,628 units, this can lead to lower environmental quality such as decreased water quality due to water pollution due to residual disposal of the industrial sector's waste.

The Environmental Quality Index (IKLH) can be influenced by several factors, one of which is the population. A place with a very high population density will have many needs, including the need for residential land , access to clean water and clean air (Dewi & Fitria, 2022).

The Human Development Index (IPM) combines a number of indicators to assess the main aspects of achieving the fundamental capacities of the population, which include: long and healthy lives, knowledge and skills, and the attainment of the resources necessary to achieve the goals of living standards (Fauzi & Oktavianus, 2014). According to the Central Bureau of Statistics (BPS) a region with an HDI value of more than 70% can be said to be high, this shows that the area has good environmental quality for the community (Badan Pusat statistik, 2022). With the increasing human development index, this can affect the pattern of government administration by increasing the level of community performance to maintain environmental quality so that it does not get lower. (Mukherjee & Chakraborty, 2010).

The Industrial Sector Gross Regional Domestic Product (GRDP) is the total added value generated by all business units in an area or the total value of final goods and services produced by all economic units in a region (Pratiwi, 2021). The economic activity of a region increases in proportion to its economic growth rate. The amount of goods and services produced to meet people's needs increases as

the economy develops. GRDP of the Industrial Sector is one of the factors that influence the Environmental Quality Index. Therefore, through external pressures from production and consumption processes, economic growth consumes natural resources and damages the environment.

In addition to these three factors, there are other factors that can affect the Environmental Quality Index (IKLH), namely the poverty rate. Poverty is a description of the condition of a person who has limitations in meeting his needs, such as limitations in land resource ownership, skills/expertise and powerlessness in obtaining and owning economic resources to meet his life needs (Zairin, 2017). Poverty is one of the main causes of environmental damage where when people live in areas with high levels of poverty it makes people's mindsets unable to develop and progress, for example by throwing garbage into rivers and burning garbage which causes air pollution.

Febriana et al., (2019) the Granger Causality method was adopted in this study to examine the relationship between economic development and environmental quality in East Java Province using the Vector Error Correction Models (VECM) analysis model. Based on research findings using the Granger Causality analysis method , the Environmental Quality Index and the variable growth rate of the industrial sector have a causal relationship or a two-way relationship with a value of 0.047 at a significant level of 5%. The Environmental Quality Index and the transportation industry have a causal relationship with a respective value of 0.0000 and a significance level of 5%. With a significance level of 5%, agriculture has a causal relationship with the Environmental Quality Index with a value of 0.0000. Meanwhile, the U-inverse Environmental Slope in East Java provides evidence supporting the Kuznets Curve hypothesis.

Setiawan & Primandhana, (2022) analyzed the influence of several GRDP sectors on the environmental quality index in Indonesia using panel data regression analysis with the selected Fixed Effect Model (FEM) model, revealing that the Gross Regional Domestic Product (GDP) of the agricultural and processing industry sectors is significant on the Environmental Quality Index, while the GRDP of the transportation and warehousing sector has no significant effect.

Dewi & Fitria, (2022) conducted research on the Environmental Quality Index (IKLH) in DKI Jakarta in 2019-2021 using the time trend ecological study design method , where in the period 2019-2021 DKI Jakarta showed an increase in the Index (IKA), Seawater Quality Index (IKAL), Land Cover Quality Index (IKTL) accompanied by improvements in sanitation and human development index (IPM) and decreased Air Quality Index (IKU) accompanied by an increase in the amount of transportation.

Ramadhantie et al., (2021) The Human Development Index (IPM) is estimated to have a significant influence on the Environmental Quality Index by using a panel data analysis approach and the model chosen is the Fixed Effect Model (FEM). The Environmental Quality Index (IKLH) will be low when the Human Development Index (IPM) is high and vice versa.

Davis et al., (2022) conducted a study using the Can-EQI method , in which the calculation was based on a population census in the Canadian region by adding up the ranking of the results of each variable based on the hypothesized relationship with health outcomes. Using this method yields the result that most of the larger urban centers in Canada have higher levels of water quality than rural areas in Canada.

Based on the background that has been discussed, the authors are interested in conducting research on the effect of population, Human Development Index (IPM), Industrial Sector Gross Regional Domestic Product (GRDP), and poverty levels on the Environmental Quality Index in Java Island between 2017-2021.

2. METHODE RESEARCH

This study will analyze the effect of Population, Human Development Index (IPM), Industrial Sector Gross Regional Domestic Product (GRDP), and Poverty Level on the Environmental Quality Index (IKLH) in Java Island in 2017-2021 using a panel data analysis tool . The dependent variable in this study is the Environmental Quality Index (IKLH). The independent variables in this study are Population, Human Development Index (IPM), Industrial Sector Gross Regional Domestic Product (GRDP), and Poverty Level. The type of data used in this study is secondary data obtained through official reports from the Central Bureau of Statistics and the Ministry of Environment and Forestry.

The econometric model used in this study is a modification of (Ramadhantie, Ramadhan, & Hasibuan, 2021). This observation focuses on the role of government and society in participating in improving the environmental quality index on the island of Java. The econometric model used in this observation is as follows.

$$IKLH_{it} = \beta_0 + \beta_1 POP_{it} + \beta_2 IPM_{it} + \beta_3 IND_{it} + \beta_4 KMS_{it} + \varepsilon_t$$

Information:

IKLH	: Environmental Quality Index (Percent)
POP	: Population/Number of Population (Thousands)
HDI	: Human Development Index (Percent)
IND	: Industrial Sector Gross Regional Domestic Product (Million Rupiah)
KMS	: Poverty Rate (Percent)
β_0	: Constant
$\beta_1, \ldots \beta_4$	: Regression Coefficient
ε	: Error term (Error Factor)
i	cross section data on Java Island
t	Time series data for 2017-2021

3. RESULTS AND DISCUSSION

The estimation results of panel data regression using the Common Effect Model (CEM), Fixed Effect Model (FEM), and Random Effect Model (REM) approaches can be seen in Table 1 .

Table 1. Results Panel Data Regression

Variable	Regression Coefficient		
	CEM	FEM	BRAKE
C	150.2206	736.1054	150.2206
POPs	-1.369053	-62.8508	-1.369053
IPM	-1.127789	1.288218	-1.127789
ENG	-0.458838	-8.027118	-0.458838
KMS	1.109982	-2.109485	1.109982
R^2	0.698064	0.781496	0.698064
Adjusted R^2	0.649754	0.683169	0.649754
F statistics	14.44975	7.94795	14.44975
Prob. F statistics	0.000003	0.000063	0.000003

source: processed panel data using E-views 10

a. Test Panel Data Model Selection

1) Chow test

the best estimated model between the Common Effect Model (CEM) or the Fixed Effect Model (FEM). The results of the Chow test can be seen from Table 2

Table 2. Results Chow test

Redundant Fixed Effects Tests
Equation: Untitled
Test cross-section fixed effects

Effect Test	Statistics	df	Prob.
Cross-section F	1.527334	(5,20)	0.2261
Chi-square cross-sections	9.702337	5	0.0841

Based on the results of the chow test above, it was found that it H_0 was rejected with a probability value of 0.0841 < (0.1).

Thus it can be concluded that the selected model is the Fixed Effect Model (FEM).

2) Test Hausman

The Hausman test is used to determine the best estimated model among the Fixed Effect Models (FEM) and the Random Effect Model (REM). The results of the Hausman test can be seen from Table 3.

Table 3. Results Test Hausman

Correlated Random Effects - Hausman Test
Equation: Untitled
Test cross-section random effects

Test Summary	Chi-Sq. Statistics	Chi-Sq. df	Prob.
Random cross-sections	6.857740	4	0.1436

Based on the Hausman test above, it was found that it H_0 was accepted with a probability value of 0.1436 > (0.10). Thus it can be concluded that the Random Effect Model (REM) model is the best model that can be used in this study.

Table 4. Results Estimation Random Effect Model (REM)

$$IKLH_{it} = 150.2206 - 1.369053 \, Log(POP)_{it} - 1.127789 \, IPM_{it} - 0.458838 Log(IND)_{it}$$

$$(0.3681) \qquad (0.0029)^* \qquad (0.2172)$$

$$+1.109982 KMS_{it}$$

$$(0.0007)^*$$

$R^2 = 0.698064$; Adj $R^2 = 0.649754$; F.Stat = 14.44975; Prob F Stat = 0.000003

Description: *Significant at $\alpha = 0.01$

b. Test Selected Model Benefits

1) Test Existence of Models

Based on Table 4, the F statistical significance value is 0.000003 <0.01. Conclusion H_0 is rejected, then the model used exists. The variables of Population, Human Development Index, GRDP of the Industrial Sector and Poverty Level jointly affect the Environmental Quality Index.

2) Interpretation R^2

Coefficient determination show How many magnitude influence whole variable independent to variable dependent . Based on Table 4 is obtained mark R^2 of 0.698064 can be interpreted that 69.80% of the variation in the Environmental Quality Index can be influenced by the variables Number of population , Human Development Index , Sector GRDP Industry and Poverty Rate . While 30.2 % influenced _ by other variables outside the models.

c. Test validity Effect of Selected Models

Table 5. Test validity Influence

Variable	Prob. t	Alpha	Conclusion
Total population	0.3681	>0.10	No significant effect on α = 0.10
Human Development Index	0.0029	< 0.01	Significant effect at α = 0.01
GRDP of the Industrial Sector	0.2172	>0.10	No significant effect on α = 0.10
Poverty level	0.0007	< 0.10	Has a significant effect on α = 0.10

The Human Development Index variable has a negative effect on the regression coefficient amounted to - 1.127789. The human development index and the environmental quality index have a linear-liner relationship, meaning that if the human development index increases by 1%, the environmental quality index will decrease by 0.11%. Vice versa, if the human development index decreases by 1% then the environmental quality index will increase by 0.11%. The Poverty Level variable has a positive influence with a regression coefficient of 1.109982 . The poverty rate and the environmental quality index have a linear-linear relationship, meaning that if the poverty rate increases by 1%, the environmental quality index will increase by 0.11%. Vice versa, if the poverty rate decreases by 1% then the environmental quality index will decrease by 0.11%.

d. Interpretation Economy

The results of the analysis in this study show that the Human Development Index has a negative effect on the Environmental Quality Index. The Human Development Index and the Environmental Quality Index contribute to each other, this is because when the Environmental Quality Index is low and the Human Development Index is high, the level of progress of a region or province also increases. As a result, increased human density, poorer

air and water quality, and less green space. There is research that supports this (Ramadhantie, Ramadhan, & Hasibuan, 2021)which states that in their research HDI has a negative effect on the Environmental Quality Index (IKLH) in Indonesia.

Based on the results of the regression analysis in this study, it shows that the Poverty Level has a positive effect on the Environmental Quality Index. Poverty level has a positive influence on the Environmental Quality Index because the poor depend more on the environment, and the lack of technology around the poor can be one of the triggers. One example is when an area has a high poverty rate, the region cannot develop or advance in any sector, one of which is the industrial sector. When an area does not have many industrial or other sectors, the area has better environmental quality and reduced air and water pollution . This is supported by research (SUMITA, 2020)which states that in their research the level of poverty has a positive effect on environmental quality.

4. CLOSING

From the results of the Chow and Hausman tests, the best model has been selected to be used, namely the Random Effect Model (REM). The independent variables used in this study are Population, Human Development Index, GRDP in the Industrial Sector, and Poverty Level. Of the four variables that significantly affect the related variables, namely the Human Development Index (HDI) and Poverty Level. On the other hand, individually the Human Development Index has a negative and significant influence, while the Poverty Level has a positive and significant influence on the Environmental Quality Index as well.

With the results of this analysis, it is hoped that the government as the holder of policy and power in Indonesia will be able to explore and pay more attention to matters that can hamper the Environmental Quality Index (IKLH). In order for the Environmental Quality Index to remain high, the community and government must be concerned about the importance of maintaining cleanliness and protecting the environment (IKLH) on the island of Java.

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