THE IMPACT OF THE PROVINCIAL MINIMUM WAGE ON ENVIRONMENTAL QUALITY IN INDONESIA

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Abstract

This research aims to study the relationship between the per capita Gross Regional Domestic Product (GRDP per capita), percentage of poor population, the open unemployment rate, the provincial minimum wage, and percentage of households with proper sanitation to the environmental quality index (EQI). This research also aims to demonstrate if the Environmental Kuznet Curve (EKC) hypothesis is applicable in Indonesia. This research utilizes secondary data collected from 33 provinces in Indonesia between 2012 and 2021 and analyzed using panel data regression. The results demonstrated that the EKC hypothesis holds true in Indonesia, as illustrated by the significance of the negative results of GRDP per capita on the EQI followed by the substantial positive results of GRDP per capita squared. The minimum wage in the province has a strong beneficial influence on EQI. In the meanwhile, this research was unable to give significant data about the influence of the percentage of poor population, the open unemployment rate, and percentage of households with proper sanitation on Indonesia's environmental quality index.

Keywords: Environmental Quality Index, Environmental Kuznet Curve Hypothesis, Economic Development, Economic Growth

JEL Classification: O44, Q56

Introduction

Indonesia is one of the fastest-growing economies in Southeast Asia in the first quarter of 2019 (Azwardi *et al*, 2022). This suggests that Indonesia's economy is doing well, which will lead to faster economic development. The good results of economic progress, however, really have a bad effect on the state of the environment. According to Sumarni (2019), as a result of the unrestrained use of natural resources, Indonesia's rapid economic expansion may cause a decline in environmental quality. In line with this, according to Bella, Hapsari, and Suryanto (2021), as a result of economic activity, environmental quality suffers as a result of economic expansion. Therefore, Chen *et al* (2021), according to his research, improving the quality of life through economic expansion while also protecting the environment is a major challenge. According Rifa and Dewi (2018) even while economic expansion and the associated impact on the environment expand simultaneously, there is a trade-off between the two.

In addition to human activities, a nation's development activities can contribute to a decline in environmental quality (Noormalitasari & Setyadharma 2021). According to Zhu, Bashir, and Marie (2022), development is the enhancement of a community's quality of life and well-being via the provision of access to resources to which it is entitled. One of the indications of economic development is economic growth accompanied by improvements in economic and social structure. Not just strong economic growth, but also income disparity, equitable investment, enough employment opportunities, and low poverty rates are necessary for a nation's economic development to be successful (Nuraini & Hariyani, 2019). Development is seen successful if it emphasizes indicators of sustainable development, notably by paying close attention to social and environmental factors (Kartiasih & Pribadi, 2020). According to Bella *et al* (2021), if development just seeks to improve social welfare and is improperly carried out, it will have a detrimental effect on the biological systems of all organisms.

Some developing countries frequently encounter a variety of significant environmental concerns, such as climate change and risks to natural and biological resources (Masron & Subramaniam, 2019). This issue also exists in the growing nation of Indonesia. According to KLHK (2020), Indonesia had a decline in the amount of wooded land from 95.7 Ha in 2014 to 94.1 Ha in 2019 throughout the course of that time period. This is because different sections of Indonesia's forests have been damaged as a result of changing land use. Jambeck *et al* (2015), according to his findings, Indonesia really contributes the second-highest amount of plastic debris to the ocean behind China. The marine biodiversity of Indonesia may be threatened and harmed by the pollution of the sea by plastic garbage. In addition, environmental quality in various provinces of Indonesia is unequal. Several provinces in western Indonesia have a high alert level and poor environmental quality, whereas regions in eastern Indonesia have excellent environmental quality (Sumargo & Haida, 2020). Even Jakarta, Indonesia's capital and economic center, was requested to be the city with the worst environmental pollution (Azwardi *et al*, 2022).

The Environmental Quality Index (EQI) released by the Ministry of Environment and Forestry of the Republic of Indonesia is used to quantify environmental quality in Indonesia. The EQI is an indicator that describes the status of the national environmental management outcomes from all provinces in Indonesia. It is comprised of the Water Quality Index, Air Quality Index, and Land Cover Quality Index (Kementerian Lingkungan Hidup dan Kehutanan, 2019).

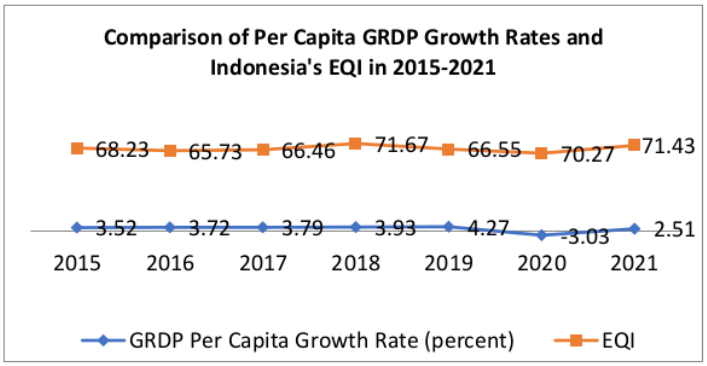

Figure 1. Comparison between GRDP Per Capita Growth Rates at Constant Prices (ADHK) in 2010 and Indonesia's EQI in 2015-2021.

Source : Central Bureau of Statistics and Ministry of Environment and Forestry, 2022

The figure showed that both the 2010 constant price GRDP per capita growth rate and Indonesia's EQI for the period 2015 to 2021 have an upward tendency, despite the varying movements of EQI. Even though it should Padhan *et al* (2019), increased economic activity will result in environmental issues owing to the buildup of emission levels caused by a high demand for energy. This assertion is backed up by Yameogo, Omojolaibi, and Dauda (2021), according to their findings, the link between economic expansion and the environment is bad. The research undertaken by Saud, Chen, and Haseeb (2018), it was also said that economic expansion led to a reduction in environmental quality in 26 nations, causing it to become a global problem. Besides that, research Nasreen *et al* (2020) moreover, this demonstrates that Asia's environmental quality is harmed by economic expansion.

Environmental Kuznet Curve (EKC) is a theory that describes the relationship between economic growth and environmental quality (ul Hasan *et al*, 2021). According to the EKC hypothesis, an increase in environmental degradation would occur at the onset of economic growth, followed by a decrease

in environmental degradation as economic growth continues (Özokcu & Özdemir, 2017). This is due to the fact that during the early stages of development environmental concerns were ignored and environmentally friendly energy sources were not readily available. As a result of economic growth, an understanding of environmental quality maintenance became crucial during the subsequent stages of development advancing science and engineering (Nuansa & Widodo, 2018). Therefore, an inverted U-curve exists between economic expansion and environmental deterioration according to the EKC theory. Research Darwanto *et al* (2019) argued that the EKC hypothesis demonstrated a process of structural transformation concurrent with economic growth.

The relationship between poverty and other areas of life includes the environment. According to Susanti Tasri *et al* (2022), poverty, as one of the economic variables, impacts the quality of the environment. Research conducted by Baloch *et al* (2020), in Sub-Saharan African nations, rising poverty has an effect on rising CO2 emissions. Efforts to reduce poverty are therefore declared a development priority in both developing and rich nations, even as the first Sustainable Development Goal. According to Mansi *et al* (2020), due to the vast quantity of natural resources required to satisfy human needs, the exodus of poor people can be detrimental to the environment. This statement contradicts the findings of research by Heger, Zens, and Bangalore (2018) who discovered that when the quality of the environment improves, the buildup of trash accelerates and becomes more significant.

In tandem with a rise in economic growth, employment possibilities are rising and the rate of violence is falling, which has a detrimental effect on the environment (Zulfikar *et al,* 2021). Unemployment is a development issue that is also tied to environmental quality. Unemployment happens when the number of available jobs does not match the size of the work force. One-third of jobs in G20 nations are impacted by environmental sustainability and good management, therefore the world of work is intrinsically tied to the natural environment (ILO 2018). The open unemployment rate reveals the level of unemployment in Indonesia, as it represents the proportion of jobless to the work force (Badan Pusat Statistik 2020).

Additionally, economic activity influences the degradation in environmental quality (Setyadharma *et al*, 2021). Consumption is one of the economic activity that impedes the development of environmental quality. According to Salo *et al* (2021), in order to reduce the effects of climate change, household spending habits must be taken into account. Ivanova *et al* (2016) more than 60% of greenhouse gas emissions are a result of home use, hence special consideration must be given to the environmental effects created. Wage income is one of the necessary prerequisites for consumption. The magnitude of a person's earnings affects his or her consuming behavior. Therefore, a research must be conducted to assess how the provincial minimum wage affects environmental quality.

The Sustainable Development Goals also evaluate the environmental consequences of economic disparity (ul Hasan *et al*, 2021). Access to proper sanitation in the community reveals income disparity. If the percentage of homes with proper sanitation remains low, this implies that there is still a great deal of inequality in society. This is because access to proper sanitation is not uniformly spread throughout the population. Sanitation issues have an effect on environmental and health conditions, thus in addition to simple access to sanitation, suitable infrastructure to support family sanitation practices are also required. According to research performed by Noormalitasari & Setyadharma (2021), if the number of homes with proper sanitation increases, the quality of the environment would improve.

This study aims to determine the impact of GRDP per capita, percentage of poor population, the open unemployment rate, the percentage of households with proper sanitation, and the provincial

minimum wage on Indonesia's environmental quality in order to determine whether the EKC hypothesis holds true there. It is crucial to conduct this research since environmental concerns are not given sufficient consideration in developing nations (Masron & Subramaniam, 2019). Therefore, it is vital to do more research to determine how economic activities influence environmental quality. This research has the merit that, to the best of our knowledge, no research has ever been completed to examine the influence of the provincial minimum wage on environmental quality in Indonesia, therefore it may be utilized as supplementary literature.

Research Method

This research provided use of secondary data in the form of panel data, specifically a combination of time series and cross section data from 33 provinces in Indonesia (excluding North Kalimantan) from 2012 to 2021, obtained from the Central Bureau of Statistics and the Ministry of Environment and Forestry of the Republic of Indonesia in 2022. The Environmental Quality Index is the dependent variable, whereas the GRDP per capita, percentage of poor people, the open unemployment rate, the percentage of households with proper sanitation, and the provincial minimum wage are the independent variables. The following table provides an explanation for each variable employed.

Table 1. Variable Identity

Variable	definition	Source
Environmental Quality Index	A generalization of Indonesia's environmental circumstances using the water quality index, air quality index, and land cover quality index	Ministry of Environment and Forestry (2022)
GRDP per capita	The ratio of the value of GRDP to the total population of an area over a specific time period is known as GRDP per capita at constant prices (thousands of rupiah)	Central Bureau of Statistics (2022)
Percentage of Poor Population	Percentage of people living in poverty (thousands)	Central Bureau of Statistics (2022)
Open Unemployment Rate	Unemployment rate as a proportion of the total work force (percent)	Central Bureau of Statistics (2022)
Provincial Minimum Wage	The amount of the minimum wage applicable in all Indonesian provinces (rupiah)	Central Bureau of Statistics (2022)
Percentage of households with proper sanitation	Percentage of homes with access to sanitary services relative to total households (percent)	Central Bureau of Statistics (2022)

The method of panel data regression was selected as the analytical tool, thus it is required to choose the optimal model. To assess the relationship between economic growth and environmental deterioration, the econometric model derived from the EKC hypothesis employs a quadratic form (Setyadharma *et al*, 2020). The trade-off that arises between environmental quality and economic growth is described by quadratic regression modeling (Sari, 2022). This is the econometric model that was used:

$$\mathrm{LOG(EQI)}_{it} = \propto_0 + \propto_1 \mathrm{LOG(GRDPpercapita)}_{it} + \propto_2 \mathrm{LOG(GRDPpercapita)}^2_{it} + \propto_3 \mathrm{LOG(POV)}_{it} + + \propto_4 (\mathrm{UNEMP})_{it} + \propto_5 \mathrm{LOG(WAGE)}_{it} + \propto_6 (\mathrm{SAN})_{it} + e_{it}$$

Information : The quadratic regression modeling describes the trade off that occurs between economic growth and environmental quality

EQI	= Environmental Quality Index
GRDPpercapita	= Gross Regional Domestic Product per capita
$GRDPpercapita^2$	= The squared form of per capita Gross Regional Domestic Product
POV	= Percentage of poor population
UNEMP	= Open unemployment rate
WAGE	= Provincial minimum wage
SAN	= The percentage of households with proper sanitation
Log	= Logarithm function
e	= error
$\propto_0$	= Constant
$\propto_1$- $\propto_6$	= Coefficient
i	= Province
t	= Observation time series (2015-2021)

Result and Disscussion

The aims of this research, which employs a quantitative strategy in the form of panel data regression, is to demonstrate the validity of the EKC hypothesis in Indonesia and to ascertain the impact of various variables on the EQI in Indonesia, including GRDP per capita, the percentage of poor population, the open unemployment rate, the percentage of households with proper sanitation, and the provincial minimum wage. The data utilized is secondary data from 33 provinces in Indonesia from 2012 to 2021 obtained from the Ministry of Environment and Forestry of the Republic of Indonesia for 2022 and the Central Statistics Agency (BPS). The descriptive statistic for each of the utilized variables is as follows.

Table 2. Descriptive statistics

	LogEQI	LogGRDPper capita	POV	UNEMP	WAGE	SAN
Means	67.59327	38483.58	827.1425	5.326818	1957360	66.83703
Median	69.22500	29617.78	371.4850	4.930000	1892554	68.83500
Maximum	91.50000	174963.0	4960540	10.95000	4416186	97.12000
Minimum	35.66000	10030.98	66.62000	1.400000	745000.0	16.12000
std. Dev	9.757518	30047.36	1165,795	1.982110	683060.4	16.04637
Skewness	-0.668872	2.653689	2.483268	0.696390	0.468742	-0.507325
kurtosis	3.568285	10.01011	8.007428	2.954109	2.989956	2.904303
Jarque-Bera	29.04699	1063011	683.9363	26.70173	12.08596	14.28174
probability	0.000000	0.000000	0.000000	0.000002	0.002374	0.000792

sum	22305.78	12699582	272957.0	1757,850	6.46E+08	22056.22
Sum Sq. Dev	31323.81	2.97E+11	4.47E+08	1292562	1.54E+14	84712.85
Observations	330	330	330	330	330	330

Source: Data processed, 2022

Table 2 shows that the observations in this study totaled 330. The average EQI is 67.59 with a maximum value of 91.50 and a minimum value of 35.66. The average value of GRDP per capita is 38483.58, while the maximum and minimum values are 174963.0 and 10030.98, respectively. Percentage of poor population has an average of 827.1425, a maximum value of 4960.54, and a minimum value of 66.62. The open unemployment rate value ranges from 1.40 to 10.95, with an average value of 5.32. With an average value of 1957360, a maximum value of 4416186, and a minimum value of 745000.0, these numbers represent the provincial minimum wage. The greatest and minimum values of percentage households with proper sanitation are 97.12 and 16.12, respectively, while the average is 66.83.

There are three tests that must be passed to get the best model between the Common Effect Model (CEM), Fixed Effect Model (FEM), and Random Effect Model (REM), i.e., Chow test, Haussman test, and Lagrange Multiplier test. The acquisition of the best model between the Common Effect Model (CEM) and the Fixed Effect Model (FEM) was carried out through a Chow test. In the Chow test, H0 predicts that if the probability value is > 5%, the CEM model will be the best model, while H1 predicts that if the probability value is < 5%, the FEM model would be the best model. Table 2 reveals that the probability is 0.0000, or < 5% significance, indicating that H1 is accepted and H0 is rejected. As a result of the Chow test, we can infer that the Fixed Effect Model (FEM) is the best model.

Table 3. Chow Test Results and Haussman Test

***Chow* test**		
Effect Test	Statistics c	Prob.
Cross-section F	28.035402	0.0000
***Haussman* test**		
Test Summary	Chi-Sq. Statistics	Prob.
Random cross-sections	26.925555	0.0000

Source: Data processed, 2022

The Haussman test was then performed to determine the best model between FEM and REM. H0 indicates that REM is the best model if the resultant probability is > 5%, whereas H1 states that FEM is the best model if the probability is < 5%. The findings presented in the table above indicate that the probability value is 0.0000, or <5%. Therefore, H0 is rejected and H1 is accepted, so the optimal model is the Fixed Effect Model (FEM). Based on the findings of the Chow test and the Haussman test, it can be stated that the Fixed Effect Model is the most appropriate model for this research (FEM). Panel data has the benefit of not being obliged to do conventional assumption testing. According to A'yun and Khasanah (2022), on panel data, a traditional assumption test is not required. The traditional assumption test on panel data is thus optional. Here is the estimation outcome Fixed Effect Model (FEM).

Table 4. Estimation Results Fixed Effect Model (FEM)

Variable	Coefficient	Std. error	t-Statistics	Prob.
C	16. 46994	4.373141	3.766157	0.0002
LOG(GRDPpercapita)	-2.788990	0.849789	-3.281978	0.0012
LOG(GRDPpercapita)^2	0.134415	0.040727	3.300386	0.0011
POV	4.57E-05	2.74E-05	1.669632	0.0961
UNEMP	0.003832	0.003199	1.197565	0.2321
LOG(WAGE)	0.149325	0.019610	7.614649	0.0000
SAN	-0.000791	0.000432	-1.831133	0.0681
R- squared	0.835756	F-statistics c	38.96730	
Adjusted R-squared	0.814309	Prob(F-statistic)	0.000000	

Source: Data processed, 2022

The estimation results of the Fixed Effect Model (FEM) in table 4, the R-Squared value is 0.835756, which implies that in this model, the GRDP per capita, the percentage of the poor population, the open unemployment rate, the percentage of households with proper sanitation, and the provincial minimum wage can explain 83.57% of the Environmental Quality Index variable, while 16.43% is explained by other variables outside the model. The probability value of the F-Statistics test is 0.000000, which can be seen from the F-Statistics test results in table 4 above. This number is significant at $\propto = 5$ percent. Thus, the variables of GRDP per capita, the percentage of the poor population, the open unemployment rate, the percentage of households with proper sanitation, and the provincial minimum wage versus EQI. In the meanwhile, table 4's T-statistics explain that each independent variable has a probability value < 0,05 ($\propto = 5\%$). This indicates that the independent variables have a substantial influence on the dependent variable in this model.

This research confirms that GRDP per capita has a strong and negative correlation with the EQI, ceteris paribus. If GRDP per capita grows by 1%, EQI falls by 2.7889900%. These results strengthen the research Setyadharma *et al* (2020) and confirming the EKC hypothesis in the early stages of development, namely environmental quality will be poor when economic growth improves. This research also discovered a positive and statistically significant association between GRDP per capita squared and the EQI. Whereas, if GRDP per capita rises by 1%, the EQI rises by 0.134415%, ceteris paribus. This result also verifies the EKC theory in its second stage of development, namely that as economic growth grows, environmental quality improves. This research does not support study by Azwar (2019) who found that EKC did not exist in Indonesia. Nonetheless, this research strengthens the research (Sari, 2022) who determined that the EKC theory applies to nearly all islands in Indonesia. This finding is also consistent with other studies Adila, Nuryartono, and Oak (2021), Prasetyanto and Sari (2021), Bashir *et al* (2021), and Prastiyo *et al* (2020) this verifies the EKC hypothesis's presence in Indonesia. This is demonstrated by the results of the positive coefficient of per capita income and the negative square coefficient of per capita income, both of which are statistically significant. In the early phases of development, Indonesia saw a decline in environmental quality as a result of the loss of forest cover and a rise in carbon emissions; however, when economic expansion reached a turning point, tree cover began to improve and carbon emissions decreased. This research demonstrates that the EKC hypothesis is applicable in Indonesia.

The provincial minimum wage has a substantial beneficial impact on the EQI. The estimation findings indicate a value of 0.149325%, which indicates that when the provincial minimum wage increases by 1%, there is a substantial increase of 0.149325% in the EQI, ceteris paribus. According to our

knowledge, no previous research have described the influence of the provincial minimum wage on environmental quality, but a number of studies have explained the effect of income on environmental quality. The provincial minimum wage has an impact on an individual's income. Higher salaries encourage environmentally responsible purchase (Setyadharma *et al* , 2020). Through his efforts to enhance the condition of the environment, pro-environmental conduct is often possessed by those with a greater wealth (Moser & Kleinhückelkotten, 2018). This research was unable to give sufficient evidence that the open unemployment rate, the percentage of poor people, and percentage of households with proper sanitation had a substantial impact on Indonesia's environmental quality index.

Conclusion

The EKC hypothesis may be utilized to analyze the relationship between economic activity and environmental quality in a nation's development (Nuansa & Widodo, 2018). This research provides a new understanding of the existence of the EKC hypothesis in Indonesia by focusing on the EQI and incorporating additional variables, i.e., GRDP per capita, percentage of poor people, open unemployment rate, provincial minimum wage, and percentage of households with proper sanitation. This research utilized the panel data regression approach to 33 Indonesian provinces between 2012 and 2021.

The estimation results indicate that the EKC hypothesis holds true in Indonesia, as indicated by the negative and statistically significant results of GRDP per capita, followed by the positive and statistically significant results of GRDP per capita squared, which are supported by six previous studies. This research demonstrates that the provincial minimum wage has a substantial positive correlation with the environmental quality index in Indonesia from 2012 to 2021. The association between the percentage of poor people, the open unemployment rate, and the percentage of households with proper sanitation to the environmental quality index in Indonesia has not been conclusively shown by this research.

In accordance with these results, environmental quality maintenance in Indonesia has been well implemented in line with increased economic growth. Therefore, improving the quality of the environment and increasing economic growth in Indonesia must continue. The government must also be pushed to enact rules that promote the use of ecologically friendly items without negatively impacting the poor. In order to improve the quality of the environment in Indonesia, it is also recommended that the government progressively raise the provincial minimum wage. It is envisaged that future research would be able to explain the occurrence of EKC in Indonesia utilizing more approaches and the most recent year.

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