THE DETERMINANTS OF ENVIRONMENTAL QUALITY IN INDONESIA

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Abstract

Purpose
This research analyzes the determinants of environmental quality in 32 Indonesian provinces in the period between 2013-2019.

Design/methodology/approach
This research method used an ordinal logistic regression analysis approach where the dependent variable consists of cumulative predicate categories based on the EQI assessment interval as determined by the Ministry of Environment and Forestry.

Findings
This study finds that the per capita GDRP and poverty have positive and significant effects on the Environmental Quality Index. However, The Human Development Index and expenditures in environmental and forestry functions have negative and significant effects.

Research limitations/implications
Based on the findings, the local and central government, through the Ministry of Environment and Forestry in cooperation with business people required to conduct the Environmental Impact Analyses, should participate in PROPER.

Originality/value
This study will show how the inter-components of economic development, social development, income and expenditure on environmental and forestry functions affect each category of the Environmental Quality Index (EQI) predicate.

Keywords: Environmental Index, PROPER, Environmental Damage, Environmental Degradation, Indonesia

1. INTRODUCTION

The impact of environmental degradation has led to an increase in natural disasters over the last three years from 2017 to 2019. During 2018 and 2019, there were 1,417 flood disasters, 1,836 tornadoes, 1,164 landslides, and 707 forest and land fires recorded in Indonesia (BPS, 2019). All these disasters are caused by various conditions, one of which is the impact of development implementation that does not pay attention to environmental sustainability (Wiyekti, 2021). Increasing income through economic growth is very important to improve people's welfare, but on the other hand, increasing economic growth in Indonesia can contribute to increasing social and environmental problems (GGGI, 2015). Uneconomic growth can have an impact on the exploitation of natural resources (PLPPNS, 2017).

Studies show that there is a trade-off between economic and social development and the environment (Sittisak and Ekasingh, 2015; Dang & Serajuddin, 2020; Roe and Elliott, 2004). The trade-off between economic growth and the environment is often associated with the Environmental Kuznets Curve (EKC) growth hypothesis. Several research have proven the EKC growth hypothesis by testing the relationship between economic growth and the environment such as stated by (RashidKhan et al., 2019; Purcel, 2020; Sen, 2020). Previous studies have shown different results., Some studies claim that there is a negative effect from economic growth on the environment (Ilham, 2018; Munir & Ameer, 2020a), and others argue that there is a positive relationship (Sineviciene, 2018; Li & Xu, 2021). Using the Gross Domestic Product (GDP) as an indicator, studies such as (Tang, 2016; Alvarado et al., 2018; Mesagan and Nwachukwu, 2018; Kurniawan, 2019a) found that the GDP was negative and had a significant effect on environmental quality, especially if measured by emissions of CO2. Specifically in Indonesia, the per capita Gross Regional Domestic Product is also found to have a negative effect on environmental quality as measured by the Environmental Quality Index (EQI) (Wiyekti, 2021).

The theory of endogenous growth emphasizes that one of the ways to increase economic growth is by improving human quality and developing research (Juhro and Trisnanto, 28AD). Therefore, the high quality of society will increase the activities and productivity. It also increases the utilization of natural resources, and increases pollution from the use of energy produced and will ultimately reduce the environmental quality (Vliert and Vlek, 2015; Gatti, 2016; Li and Xu, 2021; Wiyekti, 2021). However, improving the quality of society will increase education and income so as people have a mindset that is more concerned with the environment. Hence, they can maintain the quality of the environment (Kijima, Nishide and Ohyama, 2010; Jun, Zhong-kui and Peng-fei, 2011).

Increasing economic growth in developing countries does not mean it willlower poverty levels (Nugroho, 2014). According to (Baloch et al., 2020; Daw et al., 2016) there are complex problems between poverty and the environment. The poor are often considered the cause of environmental degradation (Eni and Ubong, 2008). Increased poverty will cause environmental degradation due to the exploitation of natural resources that are used for livelihoods (Masron and Subramaniam, 2018; Dhrifi, Jaziri and Alnahdi, 2020; Pribadi and Kartiasih, 2020a; Sumargo and Haida, 2020). The poverty level cannot be controlled, it will cause worse environmental quality (Kocak et al., 2019). In reducing environmental degradation, the government seeks to protect the denvironment by issuing various environmental regulations (Liu et al., 2019). It turns out that environmental protection regulations are actually considered to result in an increase in the number of

poor people due to limited access to the use of natural resources for their livelihood (Chaigneau et al., 2018; Wang et al., 2020; Setyadharma et al., 2020).

The problem of low budget and inappropriate planning of environmental management is one of the factors inhibiting environmental management (Bappenas, 2018; BPS, 2020c). The high income distribution inequality experienced by local governments between natural resource-rich areas and areas where there are few natural resources leads to low fiscal capacity of the region, so that when there are environmental problems, they cannot be immediately overcome (Halimatussadiah et al., 2021). In addition, environmental problems cannot be handled properly because local governments that have large balance funds actually budget low environmental and forestry function spending (Saputra and Haryanto, 2021).

The issuance of PP No. 46 (2017) can provide encouragement to local governments in using their regional environmental management planning and funding policies. The Ministry of Finance has provided alternative environmental funding instruments that can be used by local governments derived from fiscal transfers such as the Natural Resources Revenue Sharing Fund (DBH SDA) (Kemenkeu, 2019). The DBH SDA has a principle based on the producing area (by origin) and its distribution based on the realization of regional revenues. It turns out that this condition can cause inequality between the abundant producing regions of the natural resources and areas where there are few natural resources (Manurung, 2019).

Therefore, this study contributes to complement the research of Wiyekti, 2021 by adding the poverty variable and the Natural Resources Revenue Sharing Fund (DBHSDA) fiscal transfer variable as a funding instrument for environmental management in terms of income. In contrast to previous studies which focused more on proving the Environmental Kuznets Curve (EKC) growth hypothesis, this study will show how the inter-components of economic development, social development, income and expenditure on environmental and forestry functions affect each category of the Environmental Quality Index (EQI) predicate.

2. LITERATURE REVIEW

Previous research on the link between economic development indicators and social development indicators on environmental quality has been carried out in various countries, including Indonesia. In general, the linkage between economic development indicators as measured by economic growth and social development indicators as measured by the poverty rate and HDI has a negative impact on environmental quality. However, there are still differences in the impact of development indicators on environmental quality in several countries.

In Indonesia, the negative relationship between economic growth as measured with the Gross Domestic Product per capita and environmental quality has been studied by (Orchidea et al., 2016b; Oktavilia et al., 2018; Pribadi & Kartiasih, 2020a; Sumargo & Haida, 2020; Wiyekti, 2021). However, this is different from research by Hadi et al., (2018) which examined the relationship between economic growth (measured using the GDP per capita) and environmental quality (measured by CO2 emissions) in Indonesia in 1990-2015. The research findings show that an increase in the GDP per capita can improve environmental quality, which is indicated by a decrease in CO2 emissions. They concluded that when the GDP per capita increases, it will have an impact on people's income which will ultimately have an impact on reducing CO2 emissions. This research is in line with research by Sineviciene, (2018) carried out in 15 developing countries in 2000-2010. The results of the study concluded that there is a positive and significant relationship between economic growth and environmental quality. Sineviene's research is supported by research

by Li & Xu, (2021) which concludes that in general increasing economic growth in China can improve the quality of the environment in regional China and environmental damage can reduce economic growth.

Several studies have found a trade-off between poverty, the Human Development Index and environmental quality. Research (Setyadharma et al., 2020) carried out in 33 provinces in Indonesia in 2012-2017 found a trade-off between poverty and environmental degradation. The results of the study concluded that there is a unique relationship between poverty and environmental quality. Limited government budgets cannot jointly reduce poverty and improve environmental quality at the same time. Strict government regulations related to environmental protection will actually lead to an increase in the number of poor people due to limited access to natural resources. The research results of Setyadharma et al., (2020) are in line with research by AK. Duraiappah, (1998) which concluded that initially the poor were not the direct cause of environmental damage. However, institutional failures and market failures that lead to poor communities have a direct impact on environmental quality.

Bano et al., (2018) conducted research related to human development and environmental quality as measured by CO2 emissions in Pakistan in 1971-2014. The results of the study concluded that the relationship between human development and CO2 emissions only has a causative relationship in the long term while not in the short term. This means that in the long run any increase in human development through education will reduce CO2 emissions. In China, research results from Jun et al., (2011) related to the relationship between human capital and environmental quality in 1996-2008 concluded that increasing human capital can improve environmental quality. Research (Sapci & Shogren, 2017) examined the relationship between environmental degradation (measured by pollution) and human development in the United States in 2007-2009. The results of the study found that a 1 percent reduction in pollution can increase human capital by 0.10 percent.

The negative relationship between human development and environmental quality has been studied. Research (Li & Xu, 2021) examined the relationship between human development and the environment as measured by waste-intensive industries and air quality in provinces in China in 2004-2017. The results of the study found a positive relationship between human development and industrial solid waste and air quality. Research (Oktavilia et al., 2018) carried out in 31 provinces in Indonesia from 2010 to 2015 concluded that increased human development had a positive effect on the environmental quality index (EQI). An increase of 1 percent in the Human Development Index (IPM) can increase EQI by 0.15 percent.

The success of environmental management is inseparable from the intervention of the government. Local government intervention through revenue policies from environmental and forestry management and spending on environmental and forestry functions can affect environmental quality. Research (Orchidea et al., 2016b) examined the effect of spending on environmental and forestry functions on the Environmental Quality Index (EQI) in 32 provinces in Indonesia in 2009-2013. The results of the study found that spending on environmental and forestry functions had a positive and significant effect on EQI. Research by Orchidea et al., (2016b) is consistent with research by He et al., (2017) looking at the effect of environmental spending on air quality in China in 2007-2015. The results of the study concluded that in general there was no significant relationship between environmental expenditure and the air quality index. However, in several sample cities, different results were found, such as in Beijing, Taiyuan, Chongqing and Lanzhou where an increase in environmental spending would lower the air quality index. However, in the cities of Shijiang, Ji'nan and Urumqi, a non-significant effect was found between spending

on environmental functions and the air quality index.

Research (Basoglu & Uzar, 2019) regarding the impact of environmental spending on environmental quality as measured by the ecological deficit in 1995-2014 in Europe found that in the long run a 1 percent increase in environmental spending can reduce the ecological deficit by 1 percent. However, it is different from Indonesia wherein research by Wiyekti, (2021) it is stated that an increase in spending on environmental functions in 32 provinces will reduce the Environmental Quality Index (EQI).

3. RESEARCH METHODS

This study used cross section data from 32 provinces in 2013 – 2019. The criteria for selecting the sample are provincial data from the combined results of district/city data, having data on the EQI, GRDP per capita (GRDP), Poverty (POV), HDI, and Expenditures on Environmental and Forestry Functions (BFLHK) as well as the Natural Resources Revenue Sharing Fund (DBHSDA). So that out of 34 provinces only 32 provinces met the sample selection criteria. The provinces that are not included in the criteria are North Kalimantan and DKI Jakarta. The province of North Kalimantan does not meet the criteria because the province of North Kalimantan was only formed in 2013 so that it does not yet have the required data according to the criteria. While the province of DKI. Jakarta does not meet the criteria because it is DKI Jakarta has no districts.

This research method used the ordinal logistic regression analysis approach where the dependent variable consists of cumulative predicate categories based on the EQI assessment interval as determined by the Ministry of Environment and Forestry. This study used five categories of dependent variable predicates based on the EQI value intervals such as the following (Kehutanan, 2019):

a. Very Poor (Y1) with an interval of $40 < EQI \leq 50$
b. Poor (Y2) with an interval of $50 < EQI \leq 60$
c. Fairly Good (Y3) with an interval of $60 < EQI \leq 70$
d. Good (Y4) with an interval of $70 < EQI \leq 80$
e. Very Good (Y5) with an interval of $EQI > 80$

The ordinal logistic regression model in this study can be formulated as follows:

$$Logit\ (Y_1) = ln\left(\frac{Y_1}{1 - Y_1}\right) = \theta_1 + \beta_1 GRDP + \beta_2 POV + \beta_3 HDI + \beta_4 BFLHK + \beta_5 DBHSDA$$

$$Logit\ (Y_2) = ln\left(\frac{Y_2}{1 - Y_2}\right) = \theta_1 + \beta_1 GRDP + \beta_2 POV + \beta_3 HDI + \beta_4 BFLHK + \beta_5 DBHSDA$$

$$Logit\ (Y_3) = ln\left(\frac{Y_3}{1 - Y_3}\right) = \theta_1 + \beta_1 GRDP + \beta_2 POV + \beta_3 HDI + \beta_4 BFLHK + \beta_5 DBHSDA$$

$$Logit\ (Y_4) = ln\left(\frac{Y_4}{1 - Y_4}\right) = \theta_1 + \beta_1 GRDP + \beta_2 POV + \beta_3 HDI + \beta_4 BFLHK + \beta_5 DBHSDA$$

$$Logit\ (Y_5) = ln\left(\frac{Y_5}{1 - Y_5}\right) = \theta_1 + \beta_1 GRDP + \beta_2 POV + \beta_3 HDI + \beta_4 BFLHK + \beta_5 DBHSDA$$

4. FINDINGS

4.1 Result

From the results of ordinal logistic regression obtained from five independent variables, GRDP, POV, HDI and BFLHK variables have a significant effect on the EQI. On the other hand, the DBHSDA variable does not have a significant effect on the EQI as described in Table 1.

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Table 1. Ordinal Logistic Regression Results

No	Variables	Coefficient	p>|z|	Significant Results
1	GRDP Per Capita	2,425	0,000***	Significant
2	Poverty	0,120	0,000***	Significant
3	Human Development Index (HDI)	-0,169	0,001***	Significant
4	Expenditures on Environmental and Forestry Functions (BFLHK)	-0,978	0,000***	Significant
5	Natural Resources Revenue Sharing Fund (DBH SDA)	-0,019	0,818	Not Significant

Source: Author's Calculation, ***) significant at 1% level

To find out changes in the dependent variable due to the increase and decrease in the independent variable, we can observe the estimation results of the marginal effect (dy/dx). This can be seen in Table 2 with the assumption of other independent variables considered constant.

Table 2. Marginal Effect Estimates

Independent Variables	Environmental Quality Index (EQI)									
	Very Poor		Poor		Fairly Good		Good		Very Good	
	dy/dx	p>|z|	dy/dx	p>|z|	dy/dx	p>|z|	dy/dx	p>|z|	dy/dx	p>|z|
GRDP per capita	-0,034	0,017**	-0,263	0,000***	-0,292	0,000***	0,469	0,000***	0,121	0,000***
Poverty	-0,002	0,028**	-0,013	0,000***	-0,014	0,003**	0,023	0,000***	0,006	0,003**
HDI	0,002	0,041**	0,018	0,003**	0,020	0,006**	-0,033	0,002**	-0,008	0,009**
BFLH	0,014	0,012**	0,106	0,000***	0,118	0,000***	-0,189	0,000***	-0,049	0,001***
DBH SDA	0,0004	0,819	0,002	0,818	0,020	0,818*	0,004	0,818	0,001	0,818

Source: Author's Calculation, ***) significant at 1% level, **) significant at 5% level.

Based on the estimation results of the marginal effect and the odds ratio, an increase in GRDP per capita when other variables are held constant, will increase the chances of the provincial EQI predicate being Good at 46.9 percent and Very Good at 12.1 percent. The increase in poverty will increase the chances of the provincial EQI

predicate being Good at 2.3 percent and Very Good at 0.6 percent. The increase in the Human Development Index (HDI) will reduce the provincial EQI predicate chance to Good at 3.3 percent and Very Good at 0.8 percent. Likewise, the increase in the Expenditure for the Environmental and Forestry Functions (BFLHK) will reduce the chances of the provincial EQI predicate being Good at 18.9 percent and Very Good at 4.9 percent.

4.2 Discussion

4.2.1 Positive Effect of per capita GRDP on the Environmental Quality Index

Our results are different with (Wiyekti, 2021) which states that an increase in per capita GRDP will reduce the Environmental Quality Index (EQI). However, this study supports Sineviciene, 2018 and Li and Xu, 2021 which conclude that an increase in per capita GRDP can improve environmental quality. With the issuance of PP No. 59 (2017) concerning the implementation of the Achieving Sustainable Development Goals that all parties including local governments are committed to participating in the achievement of sustainable development goals. Therefore, the current focus of development is environmentally friendly development and inclusive growth according to sustainable development goals (Anggraeni, 2017). Therefore, the local government through the Department of Environment and Forestry improves environmental management regulations and law enforcement for economic actors who pollute the environment. By collaborating with the central government through the Ministry of Environment and Forestry that every economic business actor who is required to carry out an Environmental Impact Management Analysis (AMDAL) must participate in the Company Performance Rating Assessment Program in PROPER (Mahmudi, no date).

4.2.2 Positive Effects of Poverty on the Environmental Quality Index

The results of this study support research by (Setyadharma et al., 2020). Provincial data in Indonesia shows that areas that have high economic growth are not followed by a decrease in poverty rates (Oktavilia et al., 2018). Observing the phenomenon that occurred in several provinces that have high incomes from the manufacturing sector, it was not followed by a decrease in the poverty rate. The role of the industrial sector is very important in expanding job opportunities, encouraging regional development and efficient use of natural resources. However, in reality this industrial sector cannot reach the local poor because most of the local workers are unskilled workers and do not meet the company's needs. The unskilled workers do not have access to industries. Thus, all they can do is work in sectors that do not require skilled labor. (Nababan et al., 2014).

4.2.3 The Negative Effect of the Human Development Index on the Environmental Quality Index

This study supports research by (Vliert and Vlek, 2015; Gatti, 2016; Li and Xu, 2021; Wiyekti, 2021) which states that an increase in the HDI will reduce environmental quality. Economic growth in the provinces in Indonesia has an impact on increasing human resources. However, the increase in this indicator was actually followed by environmental degradation (Oktavilia et al., 2018). We can see the trade-off between the HDI and environmental quality in Graph 3

where several provinces that have a high HDI actually have low environmental quality.

According to (Khattak et al., 2020), human activities have contributed to 60 percent of the consumption of natural resources. It is undeniable that when a person's education and health level increase, that person will be more active and try to increase their productivity so that they are closer to economic access to meet their needs (Kalbar et al., 2016). This process causes people to consume more energy, both from the use of electricity and the use of transportation, which in turn will increase pollution and greenhouse gas emissions.

Graph 1. Average Poverty and IKLH Rates in 32 Provinces in Indonesia in 2013-2019
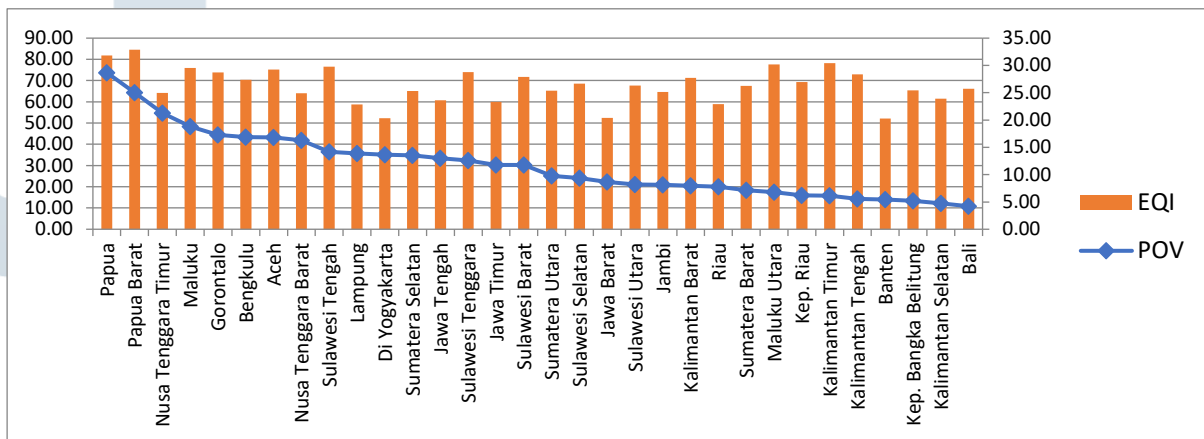
Sources: Central Bureau of Statistics of the Republic of Indonesia and Ministry of Environment and Forestry of The Republic Indonesia

4.2.4 Negative Effect of Expenditure on Environmental and Forestry Functions on Environmental Quality Index

The results of this study support research by (Wiyekti, 2021) that an increase in spending on environmental and forestry functions will reduce environmental quality. According to (Halimatussadiah et al., 2021), this condition can be caused by an imbalance in the distribution of the budget between regions that are rich in natural resources and regions that are poor in natural resources. Areas that have extensive forest cover actually have a low capacity compared to areas that have little forest cover.

According to the Deputy Chairman of the Indonesian House of Representatives, Abdul Fikri Faqih , although Law no. 32 (2009) concerning Environmental Protection and Management states that the central government and local governments must allocate a budget for environmental management, according to him the law is not clear enough to state how much the budget limit is allocated for environmental management. In addition, the environmental function expenditure budget, which is mostly used for coordination activities and meeting activities, is indicated to make environmental management inadequate because only 10 percent to 15 percent of the budget for the environment and forestry sector focuses on environmental management and conservation. Thus, when environmental problems increase, local governments cannot immediately handle them properly (Halimatussadiah et al., 2021).

4.2.5 The Negative Effect of the Natural Resources Revenue Sharing Fund (DBH SDA) on the Environmental Quality Index

The study by Manurung, (2019) also mentioned that the principle of the DBH SDA is based on the producing area and the realization of acceptance. So that the higher the permit for the utilization of natural resources, the higher the income of the local government. This policy actually provides opportunities for local governments to overexpose natural resources that ultimately increase ecosystem and environmental damage (R. Kurniawan & Managi, 2018; Kwakwa et al., 2020; Ibrahim & Ajide, 2021). The fiscal transfer policy has not fully supported environmental protection efforts (Pradiptyo et al., 2019). A clear example is that areas with extensive forest cover actually receive lower fiscal transfers compared to areas whose land cover has been completely exploited (Schröter-Schlaack et al., 2014; Mumbunan et al., 2012).

5. CONCLUSION(S)

Based on the results, the independent variabels do not always have the same effect on increasing the Environmental Quality Index in 32 provinces in Indonesia in 2013-2019. By using ordinal logistic regression, it can be concluded that the GRDP per capita and poverty have a positive and significant effect on IKLH. While the Human Development Index and Environmental and Forestry Function Expenditures have a negative and significant effect on IKLH. However, the SDA Revenue Sharing Fund does not significantly affect IKLH. To improve environmental management in the regions, local governments need to improve regulations and law enforcement for business actors who pollute the environment, increase innovation in technology for activity efficiency and community productivity. In the field of expenditure monitoring, the government must improve the quality of spending on environmental and forestry functions so that they are targeted, effective and efficient. Economic actors must participate in poverty alleviation around the business location by increasing the empowerment of the surrounding community through trainings that can improve the community's economy by taking care of the surrounding environment.

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