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Relationship of the GRDP Sectors with Environmental Quality Index in Indonesia 2012-2017

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Article Info	Abstract
	The purpose of this research are to find out and analyze the relationship between the agricultural sector, the mining sector, the manufacturing sector, the construction and transportation sectors with the environmental quality index in Indonesia.This study used a quantitative method derived from secondary data in the form of publication data of the GRDP sectors on constant prices and environmental quality indices in 33 provinces on an annual basis in 2012-2017. The population in this study are the GRDP in Indonesia and statistics on environmental quality indexes in Indonesia. Data analysis used panel data regression analysis with fixed effect regression models used eviews 9 tools. The results shows partially agriculture and transportation sector variables have a positive and significant relationship with the environmental quality index (EQI), while the mining and construction sector variables have a negative and significant relationship, while manufacturing industries variables have a negative and insignificant relationship. Variables in the agriculture sector, the mining sector, the manufacturing sector, the construction sector, and the transportation sector together have a positive and significant relationship with the environmental quality index (EQI).

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INTRODUCTION

Economic conditions are one indicator of the economic progress of a region, the higher the economy of a region, the better economy of a region. economic growth explains the factors that determine economic growth and its processes in the long run, an explanation of how these factors can affect other factors that cause the growth process. Economic growth is important in the context of a country's economy because it can be one measure of the growth or achievement of the nation's economy. National development strives to achieve quite high economic growth, which in turn allows the realization of an increase in the standard of living and welfare of all people (Syahputra, 2017:183).

One important indicator to know the condition of economic growth in a region in real terms, can be seen through the gross regional domestic product (GRDP) (Suryani, 2010:2). For Indonesia, which is one of the developing countries, economic growth is one of the goals that must be achieved in the implementation of development. The achievement of the Indonesian economy are strongly influenced by the existence of supporting sectors as part of an increase in the regional output of a province which has remained constant or sustained for several periods which will ultimately accelerate economic growth.

Rapid economic growth is generally followed by environmental damage. Economic growth requires an increase in the production of goods or services so that people's needs can be met and can reach the needs of the wider community. But in reality, economic growth has an impact on environmental damage in the long run (Pujiati, et al, 2015:27). Economic growth causes the depletion of natural resources and causes environmental damage caused by externalities from the production and consumption processes. The carrying capacity of nature decreases, making the economic growth of the society disturbed by its stability (Damayanti and Chamid, 2016:7). Given these problems, it is necessary to study environmental management policies with existing natural resource management systems. The study in this case includes an institutional system with environmental development planners with more effective and efficient policy orientation.

In Law number 32 of 2009 concerning Environmental Protection and Management it is said that "Environmental protection and management is a systematic and integrated effort undertaken to preserve environmental functions and prevent environmental pollution and/or damage which includes planning, utilization, control, maintenance, supervision and law enforcement". That factor Influencing the potential quality of the environment is "the textile, rubber, food and beverage industry, wood and rattan processing, cigarettes, paper, tannery plantations, settlements, mining, agriculture, animal husbandry, industry, tourism, number of vehicles, solid waste, transportation facilities, burden of liquid waste and B3 waste from lodging facilities and hospitals, limited defecation facilities, landfills (EQI, 2017).

In a quantitative assessment of the quality of the environment in Indonesia, it is based on a report from the Ministry of Environment and Forestry in the form of an environmental quality index (EQI) published annually. According to the Ministry of Environment and Forestry (2017) "the environmental quality index (EQI) is used to assess the performance of environmental quality improvement programs. Enviromental quality index can also be used as information material in supporting the process of policy making related to environmental protection and management".

One approach to assessing the problem of economic growth with environmental quality is the theory of Environmental Kuznets Curve (EKC). This theory explains the long-term relationship of how the economy is able to restore the environmental damage caused by economic activity. Their research proves that the form of the relationship between the level of environmental damage and per capita income follows the inverse U shape pattern as the pattern of the relationship between income inequality with per capita income in the Kuznets curve (Astuti, 2014: 50).

Research related to the relationship between the GRDP sectors and the environmental quality index. Kuswantoro's research (2009) states that the variable of agricultural productivity has an opposite (negative) effect on environmental deforestation. The results of the study are different from Fachrudin (2018) saying that there is a relationship between the level of economic growth

and environmental degradation. Gupito, et al (2013) stated that there is a positive and significant relationship between the transportation sector and CO2 emissions. Similarly Rajagukguk's research (2015) states that the number of vehicles has a positive impact on CO2 emissions. The results of these studies differ from Prasurya (2016) stating that the GRDP of the transportation and warehousing sector on the island of Sumatra obtained negative results after a two-way test of the provincial EQI on the island of Sumatra. Was'an (2012), in his research stated that there was a significant relationship that formed the Environmental Kuznets Curve (EKC) model between CO2 and CH4 emissions with economic growth in the industrial sector. The results of the study are different from Gupito et al (2013) stating that the industrial sector has a negative or not significant effect on CO2.

The difference in research results (research gap) about the relationship between the GRDP sectors and the environmental quality index (EQI) that explains on the one hand the GRDP sector has a positive effect on environmental quality and on the other hand environmental quality has a negative effect on GRDP needs further research. Although there has been a lot of research on the GRDP sector, but research in this field is still rare research that examines the occurrence of environmental damage due to the GRDP sectors, especially in the agricultural sector, mining sector, manufacturing industry sector, and transportation sector in Indonesia.

METHODS

The research used is quantitative research. This study used secondary data obtained from Badan Pusat Statistik Indonesia and Kementrian Lingkungan Hidup dan Kehutanan. The sample in this study constitutes 5 GRDP sectors and the environmental quality index used 33 provinces in Indonesia, the annual data collection method in 2012-2017 with a total sample of 198 data taken.

This study used two variables: the dependent variable and the independent variable. The dependent variable is the environmental quality index (EQI), while the independent variables are the agriculture sector, the mining sector, the manufacturing sector, the construction

sector and the transportation sector. Data collection techniques and instruments used documentation techniques, documentation techniques are used to obtain publicity data from GRDP sectors on constant prices and environmental quality indices in 33 provinces for the period 2012-2017 and data sourced from publications on an annual basis.

Data analysis techniques used: 1) descriptive analysis, which is a statistical method used to analyze data by describing or describing data that has been collected as it is without intending to make conclusions that apply to the public or generalizations. 2) the classic assumption test is used to analyze the research meeting the classic assumptions so that the model can be used as a good predictor that has the BLUE (Best Linear Unlimited Estimation) criteria. Some of the conditions that must be met are data from each variable normally distributed, between independent variables there is no multicollinearity problem, no heterokedasticity problem occurs, and no autocorrelation occurs. 3) panel data regression, is a combination of time series and cross-section data. By accommodating information both related to cross-section variables and time series, panel data can substantially reduce the problem of omitted-variables, a model that ignores relevant variables (Ajija, et al 2011). Panel data regression modeling used in this study are:

$$LnY_t = \beta_0 + \beta_1 LnX_{1t} + \beta_2 LnX_{2t} + \beta_3 LnX_{3t} + \beta_4 Ln_{X4t} + \beta_5 LnX_{5t} + \varepsilon_t$$

Description,

Y : Enviromental quality index
β_0 : Constant
β_1-β_5 : Regression coefficient
Ln : Natural logaritm
X_1 : Agriculture sector
X_2 : Mining sector
X_3 : Manufacturing sector
X_4 : Contruction sector
X_5 : Transportatin sector
t : year
ε_t : *Standart error*

RESULTS AND DISCUSSION

The analysis this research used panel data regression analysis. In knowing the appropriate model in the research, the model testing is done by determining the chow test with the common effect or fixed effect model. When the results state that it is better to use fixed effects, the second step is carried out with the thirst test. Hausman test is done to test between fixed effects or random effect.

Tabel 1. The Chow Test

Effects Test	Statistic	Prob.
Cross-section F	20.091727	0.0000
Cross-section Chi-square	319.393857	0.0000

Source: Research data processed 2019

The chow test results obtained the cross-section chi-square probability value of 0,000 which is smaller than the significant value of 0,05 indicating that the model used is fixed effect. Furthermore, a fixed effect or random effect test is performed using the Hausman test.

Tabel 2. The Hausman Test

Summary Test	Chi-Sq. Statistic	Prob.
Cross-section random	32.949891	0.0000

Source: Research data processed 2019

The results of the Hausman test obtained a random cross-section probability value of 0,000 which is smaller than the significant value of 0,05 so that the model used is fixed effect. So it can be concluded that the panel data regression model in this study uses fixed effects.

Tabel 3. Panel Data Regression Test

Variable	Coefficient	Std. Error	t-test	Probability
C	-117.3918	79.70964	-1.472743	0.1428
LnX_1?	20.38851	8.959546	2.275619	0.0242
LnX_2?	-5.571392	2.404497	-2.317072	0.0218
LnX_3?	-5.937343	3.117733	-1.904378	0.0587
LnX_4?	-18.11305	7.484949	-2.419929	0.0166
LnX_5?	20.78066	6.898477	3.012354	0.0030
R-squared	0.898455			
F-statistic	38.26087			
Prob(F-statistic)	0.000000			

Source: Research data processed 2019

Based on the results of panel data regression using the pooled least squares method it can be seen as follows:

$$Y = -117{,}391 + 20{,}388LnX_1 - 5{,}571LnX_2 - 5{,}937LnX_3 - 18{,}113LnX_4 + 20{,}780LnX_5$$

The Relationship between Agriculture Sector and Environmental Quality Index

The t-count value of the agricultural sector variable are 2,275 which is greater than the t-table value of 1,972 with a probability value of 0,024 which is smaller than the significant value of 0,05 it can be concluded that the agricultural sector has a positive and significant relationship with the environmental quality index (EQI). The positive relationship occurs because the agricultural sector currently promotes sustainable agriculture, sustainable agriculture systems prioritize organic agriculture used to reduce the use of chemical fertilizers in agricultural business activities that can damage the quality of the environment so that agriculture implemented can have a value of effectiveness, efficiency and land resources area that can be used as a supporting means to increase agricultural production (Thohir, 2013:115). So as to cause an increase in the agricultural sector, it can raise the environmental quality index.

The Relationship of the Mining Sector to the Environmental Quality Index

The t-value of the mining sector variable is -2,317 which is greater than the t-table value of 1,972 with a probability value of 0,021 which is smaller than the significant value of 0,05 it can be concluded that the mining sector has a negative relationship and significant with the environmental quality index (EQI). Negative relationships occur because the mining sector has the potential to change the ecosystem both physically, geologically and physically of an area.

Mining activities cause floods, landslides, soil erosion, decreasing water quality because mining activities exploit natural resources that are carried out continuously without carrying out conservation and protection of natural resources that cannot be carried out properly.

This phenomenon causes the increasing mining sector, then it can reduce the environmental quality index. This research is in line with Yudhistira, et al (2011) stating mining can increase foreign exchange earnings for the community but on the other hand can cause environmental damage due to many mining activities that cause erosion. Likewise Nurhayati, et al (2017) stated that the physical damage in the form of an ambles road and landslides was understood by the community as the impact of people's gold mining activities had a negative impact on the environment.

The Relationship between the Manufacturing Industry Sector and the Environmental Quality Index

The t-count value of the manufacturing sector variable is -1,904 which is smaller than the t-table value of 1,972 with a probability value of 0,058 which is greater than the significant value of 0,05 it can be concluded that the manufacturing sector has a negative relationship and not significant with the environmental quality index (EQI). The relationship between the processing industry and EQI has a negative value because the activities of the processing industry cause environmental pollution because the waste produced from the processing industry is directly discharged into the river without being processed beforehand causing the environmental quality of the area to be bad and has an impact on environmental quality caused by the entry of pollutants which is produced by soil, water, air in the form of waste materials or the results of industrial production processes in the form of solid, liquid, discharged directly into rivers without being processed first.

This phenomenon causes the increasing processing industry sector, then it can reduce the environmental quality index. This research is in line with Prasurya's (2016) explaining that industrial expansion causes rapid economic growth to have a negative influence on environmental quality. Likewise the research of Dienelly, et al (2017) explains that the industrial sector is significantly affected by forest cover.

The Relationship of the Construction Sector to the Environmental Quality Index

The t-value of the construction sector variable is -2,419 which is greater than the t-table value of 1,972 with a probability value of 0,016 which is smaller than the significant value of 0,05 it can be concluded that the construction sector has a negative relationship and significant with the environmental quality index (EQI). The relationship between construction and EQI is negative because the construction sector can cause damage to natural resources. One of the direct impacts of the construction activities is land conversion which can result in changes in the function of land as the construction of housing, buildings, factories, etc. without regard to environmental balance.

This phenomenon causes the increasing construction sector, then it can reduce the environmental quality index. This study is in line with research by Masudi, et al (2011) explaining that the type of building, design and size of the project and management are the main factors that influence the amount of construction waste so that it directly impacts on environmental quality. Likewise Huda (2009) explained that environmental externalities had a positive and significant effect on the middle and small-scale construction industry in Indonesia.

The Relationship of the Transportation Sector to the Environmental Quality Index

The t-value of the transportation sector variable is 3,012 which is greater than the t-table value of 1,972 with a probability value of 0,003 which is smaller than the significant value of 0,05 it can be concluded that the transportation sector has a positive relationship and significant with the environmental quality index (EQI). The relationship between transportation and EQI is positive because the transportation sector carries out programs to reduce pollution emitted by motor vehicles, namely, traffic engineering, control of the source (vehicle engine), and transportation energy. The implementation of the policy achieved is by changing the transportation

policy that is focused on motor vehicles to be able to become a policy in integrated transportation.

This phenomenon causes the increasing transportation sector, then it can increase the environmental quality index. The results of this study differ from the findings of Prasurya (2016) explaining that the transportation and warehousing sector has a negative and significant effect after a two-way test on EQI. Likewise, Natsir (2017) states that the rapid development of development raises environmental problems resulting in a decrease in environmental quality, namely air pollution due to the increasing number of motorized vehicles.

CONCLUSION

Based on the results of the analysis it can be concluded that partially, the agricultural and transportation sector variables have a positive and significant relationship with the environmental quality index (EQI), the mining sector and the construction sector have a negative and significant relationship with the environmental quality index (EQI), and the manufacturing sector has a negative and insignificant relationship with the environmental quality index (EQI). While simultaneously, the variables of the agricultural sector, the mining sector, the manufacturing sector, the construction sector, and the transportation sector together have a positive and significant relationship with the environmental quality index (EQI).

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