Suharto, Rahcmad Budi; Rochaida, Eny; Roy, Juliansyah et al.

Article

Analysis of inclusive economic development of environmental quality in Indonesia by examining environmental Kuznets Curve

International Journal of Energy Economics and Policy

Provided in Cooperation with:
International Journal of Energy Economics and Policy (IJEEP)

Reference: Suharto, Rahcmad Budi/Rochaida, Eny et. al. (2021). Analysis of inclusive economic development of environmental quality in Indonesia by examining environmental Kuznets Curve. In: International Journal of Energy Economics and Policy 11 (4), S. 225 - 229. https://www.econjournals.com/index.php/ijeep/article/download/11114/5914. doi:10.32479/ijeep.11114.

This Version is available at:
http://hdl.handle.net/11159/7771

International Journal of Energy Economics and Policy

ISSN: 2146-4553

available at http: www.econjournals.com

International Journal of Energy Economics and Policy, 2021, 11(4), 225-229.

Analysis of Inclusive Economic Development of Environmental Quality in Indonesia by Examining Environmental Kuznets Curve

Rahcmad Budi Suharto*, Eny Rochaida, Juliansyah Roy, Meiki Permana

Universitas Mulawarman, Kalimantan Timur 75119, Indonesia. *Email: rbsuharto.unmul@gmail.com

Received: 25 January 2021 **Accepted:** 28 April 2021 **DOI:** https://doi.org/10.32479/ijeep.11114

ABSTRACT

This study analyzes the relationship of inclusive economic development to the quality of the environment in Indonesia. Secondary data used was derived from Bappenas, Ministry of Environment and Forestry of the Republic of Indonesia, period from 2013 to 2017. The results showed that inclusive economic development still resulted in environmental degradation. The inclusive economic development index, which is one of the sustainable development goals that represent the achievement of economic dimensions and social dimensions, leads to degradation of the environmental extent. The Environmental Kuznets Curve did not occur in the year of observation of this study. The recommendation for stakeholders is to prioritize environmental sustainability in every policy taken. For future researchers may consider research to determine indicators of sustainable development, which are composite indicators consisting of all dimensions (economic, social, environmental).

Keywords: Inclusive Economic Development, Sustainable Environmental Quality, Sustainable Development
JEL Classifications: O10, Q56

1. INTRODUCTION

Inclusive economic development is an economic development that creates complete access and opportunity for all walks of life in a fairway, improves welfare, and reduces inequality between groups and regions (Kostetska et al., 2020; van Niekerk, 2020). Sustainable development is an enormous challenge for all countries in the world, especially for developing countries like Indonesia. Sustainable development departs from one noble goal, namely to achieve a better quality of life for all, for now, tomorrow. For future generations, conditions occur if we can improve the quality of economic, social, and environmental life in a balanced manner. By considering these three aspects, the benefits of development will be felt by the whole community in an inclusive way, of course, followed by more efficient use of natural resources.

Development in the field of economics and social aims to prosper society and is expected to be sustainable without damaging the environment. Some research in modern and developed countries showed that sustainable economic development, and social development do not cause environmental degradation (Despotovic et al., 2016; Ioan et al., 2020; Conrad and Cassar, 2014). However, from research in developing countries, there is a phenomenon to the contrary (Adams, 2003). The ecological damage occurred so massively as a result of the construction carried out (Tamazian et al., 2009; Singh, 1998; Sasana, 2017). Environmental damage, as a result of development, threatening the sustainability of civilization, had become a significant concern and a shared concern of the world community. At the end of 2015, sustainable development goals (SDGs) came into effect. At the United Nations general assembly, on December 4, 2014, which agreed to the platform of the world development plan, based on

the results of the Open Working Group on SDGs. The deal will target world development goals from 2016 to 2030. Development often results in damage to the environment; Air pollution, water pollution, or damage to forests. Hence, this study aims to analyze the relationship of inclusive economic development to the quality of the environment in Indonesia by examining secondary data used which is derived from Bappenas, Ministry of Environment and Forestry of the Republic of Indonesia between 2013 and 2017. The objective was to show the relationship between inclusive economic development and environmental degradation by examining Environmental Kuznets Curve (EKC).

2. LITERATURE REVIEW

The conception of three pillars of sustainability (social, economic, environmental), usually represented by three circles that intersect with overall sustainability at the center of the slice of the three rings, is an attempt to reconcile economic growth as a solution to social and ecological problems (Purvis et al., 2019). The sustainable environmental quality represented by the environmental quality index (EQI) consists of; air quality index, water quality index, land cover quality index. The inclusive economic development, measured using the inclusive economic development index (IEDI). Inclusive economic development index, which is a tool to measure and monitor the extent of Indonesia's development inclusivity. Both at the national, provincial, and district and city levels (The index figures consist of 3 Pillars and 8 Sub-pillars as well as 21 indicators of the shaper of the inclusive economic development index).

The three pillars are economic development and growth; equalization of income and reduction of advertising; and, expansion of access employment opportunities. Moreover, eight sub pillars consist of economic growth; employment opportunities; economic infrastructure; inequality; poverty; human capabilities; basic infrastructure; and, inclusive finance. Lastly, there are more detail 21 indicators, including real GDP/GDP growth per capita; percentage of the manufacturing sector to overall GDP; Bank credit ratio to GDP; employment opportunity rate; percentage of fully working population; percentage of workforce with secondary and upper education level; percentage of households using electricity; percentage of the population owned mobile phones; percentage of roads with good and moderate condition; Gini ratio; women's income donation; average ratio of village and city households expenditure; percentage of the poor; average protein consumption per capita per day; old school expectations figures; percentage of toddlers who get complete basic immunizations; percentage of the population who have health insurance; percentage of households with decent drinking water source; percentage of households with own urination facilities; the ratio of deposit account amount to productive age population; and, bank small and medium-sized enterprises credit ratio.

Development of economics, social, and its impact on the environment; in many studies, there are still differences in the results of research (research gaps). EKC hypothesis is proven to occur. GDP per capita affects carbon emissions (Dong et al., 2018; Sarkodie and Ozturk, 2020). Economic indicators include the gross domestic product (GDP) per capita, urbanization rate, industrial structure, net exports, and indirect foreign investment. In contrast, social indicators include employment, health and disease, social security, and consumer protection, negative and significant effects on the environment (Sutthichaimethee and Dockthaisong, 2018). GDP per capita and Exports increase CO2 emissions per capita (Cheng et al., 2019). Per capita income and population have an increasing impact on combined emissions (Rüstemoğlu, 2019). Different results submitted by (Terrell, 2020), Land use data, and land cover changes, for 14 countries revealed an N-shaped EKC in some countries, while others showed very different relationships. The results show that sustainable economic growth can help reduce the concentration of environmental (Hao et al., 2018). The relationship between inclusive economic development and sustainable environmental quality is the single hypothesis in this study. Thus, the hypothesis of this study is: there is a significant link between inclusive economic development and sustainable environmental quality.

3. METHODOLOGY

This research uses multivariate statistical methods, with structural equation Modeling (SEM), and using WarpPLS software. Research involving multivariable analyses is worth doing multivariate analysis if the variables are observed unison or simultaneously conducted the study. Data analysis is done simultaneously on research in which variables interconnecting, both theoretically and empirically. In the process of multivariate analysis, the relationship between variables included in the calculation process. Interpretation of the analysis results made comprehensively, and this is in harmony with the nature that in multivariate analysis already considers the relationship between variables.

To analyze the relationship between variables in this study empirically, using WarpPLS, with user interface and graphics. Using variance-based and factor-based structural equation models (SEM), using the least-squares and factor-based methods (Kock, 2015). Another critical feature of WarpPLS is its ability to identify and model non-linearity among the variables in the path model, measuring whether these variables as latent variables or not, resulting in parameters that take into account the appropriate underlying heterogeneity (Gountas and Gountas, 2016) (Guo et al., 2011). There is ten model fit and quality index (Kock, 2010) with the indicators of Average Path Coefficient (APC); Average R-squared (ARS); Average Adjusted R-squared (AARS); Average block Variance Inflation Factor (AVIF); Average Full Collinearity VIF (AFVIF); Tenenhaus GoF (GoF); Simpson's paradox ratio (SPR); R-squared contribution ratio (RSCR); Statistical suppression ratio (SSR); and Nonlinear- bivariate causality- direction ratio (NLBCDR) (Table 1).

For APC, ARS, and AARS, this P-value computing through a process that involves estimating resampling plus a correction to counteract the common error compression effect associated with adding a random variable, in a way analogous to Bonferroni corrections. It is ideally that AVIF and AFVIF be equal to or lower than 3.3, measuring especially in models where most

variables through two or more indicators. A looser (acceptable) criterion is that both indexes are equal to or lower than 5, especially in models where most variables are single indicator variables (and thus not latent variables "true"). GoF. Similar to ARS, the GoF index, referring to the Tenenhaus GoF in honor of Michel Tenenhaus, is a measure of the model's explanatory power (Kock, 2015d). (Tenenhaus et al., 2005) defined GoF as the square root of the intermediate product to which they refer to the mean commonality index and the ARS. The SPR index is a measure of the extent to which the model does not depend on the example of Simpson's paradox (Kock, 2015). An example of the Simpson paradox occurs when the path coefficients and correlations associated with a pair of related variables have different signs. Ideally, the SPR should be equal to 1, which means that there are no examples of Simpson's paradox in the model; an acceptable SPR value is equal to or greater than 0.7, which means that at least 70% of the paths in the model is free of the Simpson paradox.

RSCR index is a measure to analyze the extent the model is free from negative R-squared contributions, which occurs together with the example of Simpson's paradox. When the predictor's latent variable makes a negative contribution to the R-squared of the criterion latent variable (note: the predictor points to the measure), it means that the predictor reduces the percentage of variance described in the standard. Such a deduction takes into account the contributions of all predictors plus the remainder. This index is similar to SPR. Ideally, the RSCR should be equal to 1, meaning that there is no negative R-squared contribution in the model. The acceptable value of the RSCR is equal to or greater than 0.9, which means that the sum of the positive R-squared contributions in the model makes up at least 90% of the total sum of the absolute R-squared contributions in the model.

Table 1: Model fit and quality index

Model fit and quality index	Criteria fit
Average path coefficient (APC)	$p < 0.001$
Average R-squared (ARS)	$p < 0.001$
Average adjusted r-squared (AARS)	$p < 0.001$
Average block variance inflation factor (AVIF)	Acceptable if ≤5 Ideally ≤3.3
Average full collinearity VIF (AFVIF)	Acceptable if ≤5 Ideally ≤3.3
Tenenhaus GoF (GoF)	Small ≥0.1 Medium ≥0.25 Large ≥0.36
Simpson's paradox ratio (SPR)	Acceptable if ≥0.7 Ideally =1
R-squared contribution ratio (RSCR)	Acceptable if ≥0.9 Ideally =1
Statistical suppression ratio (SSR)	Acceptable if ≥0.7
Nonlinear -bivariate causality- direction ratio (NLBCDR)	Acceptable if ≥0.7

*Source: (Kock, 2015) and (Tenenhaus et al., 2005)

The SSR index is a measure of the extent to which a model is independent of statistical emphasis examples. An example of statistical emphasis occurs when the path coefficient is more significant in absolute terms than the associated correlation concerning a pair of related variables. Like the Simpson paradox example, an example of statistical emphasis is a possible indication of a causality problem, suggesting that the hypothesized pathway may be unreasonable or reversed. The acceptable SSR value is equal to or greater than 0.7, which means that at least 70% of the paths in the model is free from statistical suppression.

NLBCDR. One of the exciting properties of nonlinear algorithms is that the coefficient of nonlinear bivariate association varies depending on the direction of the hypothesized causality. That is, they tend to be stronger in one order than the other, meaning that the residuals (or errors) are larger when the direction of hypothesizing causality in one way or another. It can be used, along with other coefficients, as partial evidence supporting or against a hypothesized causal relationship. The acceptable value of the NLBCDR is equal to or greater than 0.7, which means that in at least 70% of the path-related examples in the model, support for the hypothesized reverse causality direction is weak or less.

In summary, several structural equations for the outer model and inner model are used in this study.

Outer model:

$$\text{Sustainable environmental quality (EQI)} = \lambda_1 \text{EQI} + \delta_1 \quad (1)$$

$$\text{Inclusive economic development (IEDI)} = \lambda_2 \text{IEDI} + \delta_2 \quad (2)$$

Inner Model:

$$\text{Sustainable environmental quality (EQI)} = \gamma 1 + \gamma 2 \text{IEDI} + + \delta_3 \quad (3)$$

Description: λ: indicator weight; γ: coefficient of influence of exogenous variables on endogenous variables; δ: measurement error.

4. RESULTS AND DISCUSSION

The analysis was conducted to investigate the relationship between variables in this study empirically by using WarpPLS, with user interface and graphics. There is ten model fit and quality index used as a basis of analysis with the indicators of Average Path Coefficient (APC); Average R-squared (ARS); Average Adjusted R-squared (AARS); Average block Variance Inflation Factor (AVIF); Average Full Collinearity VIF (AFVIF); Tenenhaus GoF

Figure 1: Hypothesis test results

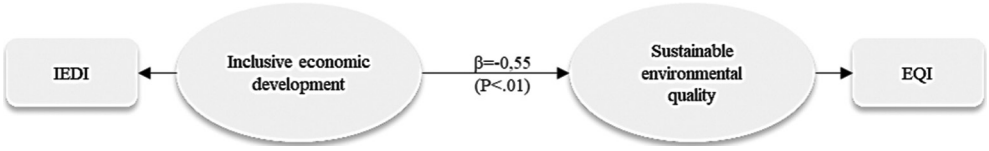


Table 2: Analysis results model fit and quality index

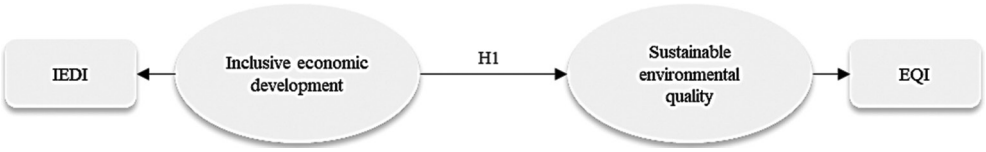
Model fit and quality index	Criteria Fit	Analysis results	Remarks
Average path coefficient (APC)	P<0.001	0.550 P<0.001	Good Significant
Average R-squared (ARS)	P<0.001	0.303 P<0.001	Good Significant
Average adjusted R-squared (AARS)	P<0.001	0.298 P<0.001	Good Significant
Average block variance inflation factor (AVIF)	Acceptable if ≤5 Ideally ≤3.3	N/A	N/A
Average full collinearity VIF (AFVIF)	Acceptable if ≤5 Ideally ≤3.3	1.389	Ideal
Tenenhaus GoF (GoF)	Small ≥0.1 Medium ≥0.25 Large ≥0.36	0.550	Large
Simpson's paradox ratio (SPR)	Acceptable if ≥0.7 Ideally = 1	1	Ideal
R-squared contribution ratio (RSCR)	Acceptable if ≥0.9 Ideally = 1	1	Ideal
Statistical suppression ratio (SSR)	Acceptable if ≥0.7	1	Acceptable
Nonlinear-bivariate causality-direction ratio (NLBCDR)	Acceptable if ≥0.7	1	Acceptable

(GoF); Simpson's paradox ratio (SPR); R-squared contribution ratio (RSCR); Statistical suppression ratio (SSR); and Nonlinear-bivariate causality- direction ratio (NLBCDR) (Table 1). The results of model fit analysis and quality index were shown in Table 2.

The hypothesis testing showed that inclusive economic development led to the degradation of sustainable environmental quality. Economic development and social development still cause environmental sustainability damage. This is shown in hypothesis test results (Figure 1).

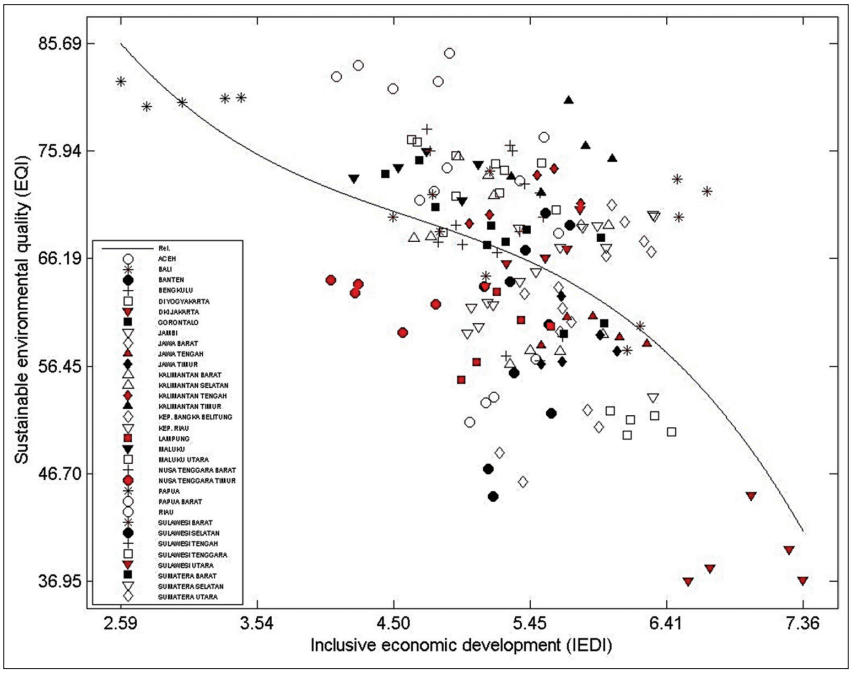
In Figures 1 and 2, it appears that; significant and negative relationships ($\beta = -0.55$, $P < 0.01$) between IEDI and EQI. It shows that inclusive economic development (IEDI) causing environmental damage. The higher the IEDI value, the lower the EQI. Growth in the field of economics and the social field, not yet on the right path, towards a sustainable development path. Not proved in Kutznet's environmental curve hypothesis in this study. Inclusive economic development (IEDI) leads to sustainable ecological degradation. As seen in Figure 3, the province of Papua has the highest environmental quality index (EQI) value but has the lowest amount of inclusive economic development index (IEDI). The opposite happened in the Capital of Indonesia, the province of DKI-Jakarta.

Figure 2: Research model pathway analysis



Sustainable environmental quality represented by the Environmental quality index (EQI); Inclusive economic development represented by the inclusive economic development index (IEDI)

Figure 3: The relationship between inclusive economic development (IEDI) on sustainable environmental quality (EQI)



Source: by the author (2020)

5. CONCLUSION

By analyzing the relationship of inclusive economic development to the quality of the environment in Indonesia. Secondary data used was derived from Bappenas, Ministry of Environment and Forestry of the Republic of Indonesia, period 2013-2017. The results showed that inclusive economic development still resulted in environmental degradation.

The main conclusion of the study is that inclusive economic development led to the degradation of sustainable environmental quality. Economic development and social development still cause environmental sustainability damage. To stakeholder, it is suggested to create and implement and prioritize more environmentally friendly development. For future research, it is expected to create models of economic development and people's prosperity without compromising the surrounding environment. The inclusive economic development index, which is one of the SDGs that represent the achievement of economic dimensions and social dimensions, leads to degradation of the environmental extent.

The EKC hypothesis did not occur in the year of observation of this study. The recommendation for stakeholders is to prioritize environmental sustainability in every policy taken. For future researchers may consider research to determine indicators of sustainable development, which are composite indicators consisting of all dimensions (economic, social, environmental).

REFERENCES

Adams, W.M. (2003), Green Development: Environment and Sustainability in the Third World. London: Routledge.

Bappenas. (2017), Tujuan Pembangunan Berkelanjutan. Jakarta: Kementerian PPN/Bappenas.

Cheng, C., Ren, X., Wang, Z., Yan, C. (2019), Heterogeneous impacts of renewable energy and environmental patents on CO_2 emission-evidence from the BRICS. Science of the Total Environment, 668, 1328-1338.

Conrad, E., Cassar, L.F. (2014), Decoupling economic growth and environmental degradation: Reviewing progress to date in the small Island state of Malta. Sustainability, 6(10), 6729-6750.

Despotovic, D., Cvetanovic, S., Nedic, V., Despotovic, M. (2016), Economic, social and environmental dimension of sustainable competitiveness of European countries. Journal of Environmental Planning and Management, 59(9), 1656-1678.

Dong, K., Sun, R., Li, H., Liao, H. (2018), Does natural gas consumption mitigate CO_2 emissions: Testing the environmental Kuznets curve hypothesis for 14 Asia-Pacific countries. Renewable and Sustainable Energy Reviews, 94, 419-429.

Gountas, S., Gountas, J. (2016), How the 'warped' relationships between nurses' emotions, attitudes, social support and perceived organizational conditions impact customer orientation. Journal of Advanced Nursing, 72(2), 283-293.

Guo, K.H., Yuan, Y., Archer, N.P., Connelly, C.E. (2011), Understanding nonmalicious security violations in the workplace: A composite behavior model. Journal of Management Information Systems, 28(2), 203-236.

Hao, Y., Peng, H., Temulun, T., Liu, L.Q., Mao, J., Lu, Z.N., Chen, H. (2018), How harmful is air pollution to economic development? New evidence from PM2. 5 concentrations of Chinese cities. Journal of Cleaner Production, 172, 743-757.

Ioan, B., Mozi, R.M., Lucian, G., Gheorghe, F., Horia, T., Ioan, B., Mircea-Iosif, R. (2020), An empirical investigation on determinants of sustainable economic growth. Lessons from Central and Eastern European Countries. Journal of Risk and Financial Management, 13(7), 146.

Kock, N. (2010), Using WarpPLS in E-collaboration studies: An overview of five main analysis steps. International Journal of E-Collaboration (IJeC), 6(4), 1-11.

Kock, N. (2015), Wheat flour versus rice consumption and vascular diseases: Evidence from the China Study II data. *Cliodynamics*, 6(2), 130–146.

Kostetska, K., Khumarova, N., Umanska, Y., Shmygol, N., Koval, V. (2020), Institutional qualities of inclusive environmental management in sustainable economic development. Management Systems in Production Engineering, 1(28), 5-22.

Purvis, B., Mao, Y., Robinson, D. (2019), Three pillars of sustainability: In search of conceptual origins. Sustainability Science, 14(3), 681-695.

Sarkodie, S.A., Ozturk, I. (2020), Investigating the environmental Kuznets curve hypothesis in Kenya: A multivariate analysis. Renewable and Sustainable Energy Reviews, 117, 109481.

Sasana, H. (2017), The impact of fossil and renewable energy consumption on the economic growth in Brazil, Russia, India, China and South Africa. International Journal of Energy Economics and Policy, 7(3), 194-200.

Singh, S.P. (1998), Chronic disturbance, a principal cause of environmental degradation in developing countries. Environmental Conservation, 25(1), 1-2.

Sutthichaimethee, P., Dockthaisong, B. (2018), A relationship of causal factors in the economic, social, and environmental aspects affecting the implementation of sustainability policy in Thailand: Enriching the path analysis based on a GMM model. Resources, 7(4), 87-94.

Tamazian, A., Chousa, J.P., Vadlamannati, K.C. (2009), Does higher economic and financial development lead to environmental degradation: Evidence from BRIC countries. Energy Policy, 37(1), 246-253.

Tenenhaus, M., Vinzi, V.E., Chatelin, Y.M., Lauro, C. (2005), PLS path modeling. Computational Statistics and Data Analysis, 48(1), 159-205.

Terrell, T.D. (2020), Carbon flux and N-and M-shaped environmental Kuznets curves: Evidence from international land use change. Journal of Environmental Economics and Policy, 9(1), 1-20.

van Niekerk, A.J. (2020), Inclusive economic sustainability: SDGs and global inequality. Sustainability, 12(13), 5427.