

Income Inequality and Inclusive Development in Environmental Sustainability Context

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General Background: Development and environmental sustainability are interdependent components of national progress. **Specific Background:** Environmentally inclusive development emphasizes the wise, planned, and sustainable use of resources to enhance quality of life. **Knowledge Gap:** However, the interplay between income inequality, inclusive economic development, and environmental quality remains underexplored in the Indonesian context. **Aim:** This study investigates the dynamic relationship between income inequality, inclusive development, and environmental quality across Indonesia's 34 provinces. **Results:** The findings reveal a bidirectional negative relationship: inclusive economic development significantly reduces income inequality, while lower income inequality promotes more inclusive development. **Novelty:** This research provides empirical evidence on the reciprocal nature of inequality and inclusivity within a sustainability framework, contributing to a deeper understanding of socio-environmental policy integration in developing economies. **Implications:** The results underscore the importance of implementing inclusive and environmentally aware development strategies as a means to address inequality and enhance long-term sustainability outcomes.

Highlights:

- Highlights the reciprocal relationship between inequality and inclusive development.
- Provides empirical evidence from 34 Indonesian provinces.
- Emphasizes the role of sustainability in equitable economic growth.

Keywords: Income Inequality, Inclusive Development, Environmental Quality, Sustainable Development

Introduction

Until now, sustainable environmental issues have increasingly colored global media coverage in all countries, including Indonesia. Humans utilize existing environmental resources to achieve well-being and meet their needs. In practice, some humans have the wrong perspective on resources, which then affects their actions in relating to the environment, and sometimes human actions cause damage to the environment [1]. Increasing human awareness of the importance of the environment and its sustainability has made the environment a widely discussed issue. As economic development becomes the goal for most countries in the world, it is inversely proportional to the quality of the existing environment. Economic development that is carried out more often has a negative impact on the environment than it benefits the environment [2]. As development in the economic sector develops, the need for energy, land, and natural resources also increases, causing environmental degradation.

Another challenge to Indonesia's economic development is the problem of income inequality. According to the Asian Development Bank, although GDP is growing, its benefits have not been evenly distributed [3]. Studies such as those conducted by Yusuf have shown that the richest 20% of Indonesians control more than 45% of total income, which exacerbates social and economic disparities. Income inequality has been a persistent problem in Indonesia, with the gap between the rich and the poor widening [4]. This economic gap has critical implications for sustainable development, especially in the context of environmentally inclusive growth. Thus, environmentally inclusive economic development aims to ensure that economic growth does not degrade the environment and that communities benefit from green initiatives [5].

Inclusive economic development is a strategy to improve economic performance by expanding economic opportunities and prosperity, and providing broad access to all levels of society [6]. Inclusive economic development according to Bappenas is economic development that creates or provides broad access and opportunities for all levels of society in a fair manner, increases welfare, and reduces disparities between groups and regions [7]. However, unfortunately, the components in calculating the level of inclusiveness of economic development in Indonesia have not taken into account the aspect of environmental quality at all. Concluded that there is a negative correlation between economic activity and environmental quality in a region [8]. The Environmental Quality Index (IKLH) in Indonesia in 2022 was 72.42 with the lowest value of 54.65 for DKI Jakarta and the highest of 84.22 in West Papua Province [9]. There is a tendency that provinces with high economic activity tend to have worse environmental quality than provinces with relatively low economic activity.

Despite the extensive literature on income inequality and sustainable development, the causality between income inequality and environmentally inclusive development remains under-explored, particularly in the Indonesian context. Previous studies have mainly focused on economic inequality [10] or environmental sustainability [11] but rarely on the interrelationship between the two. Adebayo highlight that environmental degradation often exacerbates income inequality [2], but the reverse relationship—how income inequality affects environmentally inclusive development—requires further empirical investigation.

Literature Review

Every country aims to realize a development that can provide sustainable benefits to society while at the same time maintaining the quality of the environment [12]. Environmental sustainability refers to practices that ensure the long-term health of ecological systems. Climate change, air pollution, and deforestation are significant challenges to sustainable development [13], so government policies are needed to combat these problems including environmentally friendly policies by encouraging renewable energy and reducing carbon emissions [9]. Empirical studies have shown varying results regarding the impact of income inequality on environmentally inclusive development. For example, a study by Jorgenson & Schor found that higher income inequality was associated with lower environmental performance in developing

countries [14]. However, other studies, such as those by Knight and Schor, argue that with the right governance and policy framework, it is possible to achieve economic justice and environmental sustainability. An effective policy framework is essential to promoting environmentally inclusive development. Policies should aim to reduce income inequality and ensure environmental sustainability [15].

Economic development that was initially oriented towards achieving high growth must be oriented towards inclusiveness and pay attention to environmental aspects. This is intended so that existing development can guarantee aspects of sustainability [16]. The emerging conceptual framework links economic growth with poverty reduction and income inequality. Growth with poverty and inequality has a two-way relationship [17]. Any effort to reduce income inequality will have an impact on increasing inclusiveness [6].

Method

The research data covers 34 provinces in Indonesia, for the period 2017-2022. The estimation stage begins with the selection of the best panel model through the Chow test and the Hausman test. This research model is:

$$GINI_{it} = a_0 + a_1 PEI_{it} + a_2 IKLH_{it} + \varepsilon_{1it} \quad (1)$$

$$PEI_{it} = a_3 + a_4 GINI_{it} + a_5 IKLH_{it} + \varepsilon_{2it} \quad (2)$$

$$IKLH_{it} = a_6 + a_7 GINI_{it} + a_8 PEI_{it} + \varepsilon_{3it} \quad (3)$$

The Gini Index (GINI) measures the level of relative income distribution gap among residents of a region or the degree of population distribution inequality. The Inclusive Economic Development Index (PEI) contains three main pillars: high economic growth, income equality and poverty reduction, and expanding access and opportunities. The Environmental Quality Index (IKLH) shows the quality of the environment in a region, which is a composite value of the water quality index, air quality index, land quality index, and sea water quality index. The water quality index reflects the general quality of water. The air quality index is a measure used to assess air pollution. The land quality index is a measuring tool that measures the level of land cover quality in a region.

Results and Discussion

Inclusive development is not only seen from economic growth alone. Other factors related to equity, welfare, and sustainable growth are important to note [18]. One of the main goals of development is to advance general welfare. Therefore, the development of welfare indicators needs to be considered to see the quality of economic growth that occurs. Inclusive development produces economic growth with low inequality, sharing of benefits for the poor in the development process, and equal access to employment opportunities and public services such as education and health [19].

Fixed Effect Model is the best model based on Chow test and Hausman test. In Chow test, the null hypothesis of the best model common effect model is rejected, so accepting the hypothesis of the best model is fixed effect model (Table 1). In Hausman test, the null hypothesis of random effect model is rejected and accepting fixed effect model as the best model (Table 2).

Dependent Variable: GINI	Statistic	d.f.	Prob.
Cross-section F	61.5600 13	(33,168)	0.0000
Cross-section Chi-square	524.690 543	33	0.0000
Dependent Variable: PEI	Statistic	d.f.	Prob.
Cross-section F	13.2124 72	(33,168)	0.0000
Cross-section Chi-square	261.044 396	33	0.0000
Dependent Variable: IKLH	Statistic	d.f.	Prob.
Cross-section F	12.2944 63	(33,168)	0.0000
Cross-section Chi-square	250.547 237	33	0.0000

Table 1. Chow Test

Dependent Variable	Chi-Sq. Statistic	Chi-Sq. d.f.	Prob.
GINI	9.316920	2	0.0095
PEI	57.642138	2	0.0000
IKLH	44.971073	2	0.0000

Table 2. Hausman Test

Income inequality and inclusive economic development are negatively correlated and influence each other. Growth in the concept of inclusive economic development can create economic opportunities for the poor and ensure that the development process involves all marginalized groups in society [17]. Thus, inclusive economic development must be implemented sustainably by involving various parties to participate and obtain equal benefits from the development. It is hoped that inclusive economic development will be able to create quality economic growth, reduce inequality in income distribution, reduce inequality in development between regions, reduce poverty, and be able to absorb a lot of labour by focusing on expanding the scale of the economy, expanding access to economic assets, and expanding the market and creating equal opportunities in an effort to expand economic prosperity.

Dependent Variable: GINI				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.408515	0.015888	25.71273	0.0000
PEI	-0.009871	0.002211	-4.464463	0.0000
IKLH	-2.31E-06	0.000200	-0.011552	0.9908

Dependent Variable: PEI				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	7.941436	0.990193	8.020092	0.0000
GINI	-10.74384	2.406526	-4.464463	0.0000
IKLH	0.024980	0.006305	3.961986	0.0001
Dependent Variable: IKLH				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	49.40770	13.08213	3.776733	0.0002
GINI	-0.344081	29.78510	-0.011552	0.9908
PEI	3.420781	0.863400	3.961986	0.0001

Table 3. Fixed Effect Model

Income inequality and environmental quality have a negative but insignificant correlation. Income inequality can occur due to environmental damage or conversely the environment is damaged due to poverty inequality in the surrounding area. This causal relationship can continue to form an endless cycle. In such conditions, income inequality will worsen and the environment will be increasingly damaged. The longer the condition lasts, the more chronic the condition. So that income inequality causes poverty status to change non-linearly. From poor, to poorer, and finally very poor or very poor, the same tendency also occurs in environmental damage. This is characterized by human activities and lives that exceed the capacity of nature. Poor people in order to survive because they have no other choice make excessive use of natural resources beyond the carrying capacity of existing natural resources.

Inclusive economic development and environmental quality are positively correlated and influence each other. Development and the environment are two parts that support each other and cannot be separated, because there will be no development in human life if there is no environment that supports the realization of said development. In order to achieve welfare and fulfilled their needs, humans utilize existing environmental resources. In practice, some humans have the wrong perspective on resources, which then affects their actions in relating to the environment, and sometimes human actions cause damage to the environment. Humans try to carry out development by pursuing economic growth figures as much as possible which then causes environmental exploitation to be unavoidable. Environmental degradation is felt to be getting worse when humans with advances in science and technology make very drastic changes to their environment through what is called development. Development is a process of transition towards change both physically and non-physically without being separated from the potential of natural resources. Development as referred to above affects the welfare of society and the sustainability of environmental functions in the context of development for the benefit of development for all generations. Humans need to realize that the development paradigm needs to be changed so that existing resources are not exploited carelessly, but must pay attention to the carrying capacity and balance of the environment so that there is no damage or extinction and can be enjoyed by future generations. Thus, development must be sustainable.

Conclusion

This study has demonstrated the significant impact of income inequality on environmentally inclusive development in Indonesia. The analysis shows that high levels of income inequality hinder the implementation of sustainable practices and disproportionately affect marginalized communities. The findings underscore the importance of addressing income inequality to achieve environmentally inclusive development. Policymakers must adopt an integrated approach that simultaneously promotes economic

equity and environmental sustainability. In order to strengthen and accelerate inclusive economic development, it is necessary to provide the widest possible access for communities. Community empowerment is prioritized to ensure access for communities to obtain economic resources; strengthen the capacity and institutions of village communities to manage production, consumption and infrastructure systems independently; and manage renewable and non-renewable natural resources based on sustainable management principles.

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