JEKOP
Kemakmuran Hijau: Jurnal Ekonomi Pembangunan
JEKOP 3(1): 53–66
ISSN 3062-8547

Institute for Advanced Science, Social and Sustainable Future
MORALITY BEFORE KNOWLEDGE

Analysis of the influence of social and economic dimensions on sustainable development through environmental performance as a mediating variable: A structural equation modeling-partial least squares approach

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Received Date: November 29, 2025 Revised Date: January 2, 2026 Accepted Date: February 28, 2026

ABSTRACT

Background: Sustainable development demands a balance between social, economic, and environmental dimensions. This study aims to analyze the influence of social and economic dimensions on sustainable development with environmental performance as a mediating variable using the Structural Equation Modeling-Partial Least Squares (SEM-PLS) approach. **Methods:** This study uses secondary data from the Indonesian Sustainable Development Indicators (SDGs) report Volume 8 for 2023. The research variables consist of economic, social, environmental, and sustainable development dimensions which are analyzed using SmartPLS 4.0 software to assess validity, reliability, and relationships between constructs. **Findings:** The results show that economic variables have a significant negative effect on sustainable development ($\beta = -0.930$; $p = 0.000$), while social variables have a positive effect ($\beta = 0.188$; $p = 0.093$). Social variables significantly influence environmental performance ($\beta = 0.516$; $p = 0.008$), whereas economic and environmental variables do not significantly affect sustainability. The model shows strong explanatory power for sustainable development ($R^2 = 0.848$) but weak for environmental performance ($R^2 = 0.265$). **Conclusion:** The results show that the economic dimension has a significant negative effect on sustainable development, while the social dimension has a positive but insignificant effect. Environmental performance does not mediate the relationship between social and economic factors on sustainable development. However, the high R^2 value indicates that the model has strong explanatory power. Sustainable development in Indonesia is still dominated by economic factors, while social and environmental aspects have not provided optimal contributions. **Novelty/Originality of this article:** This research's novelty lies in the use of Indonesia's 2023 SDGs indicator data using the SEM-PLS approach to test the role of environmental performance as a mediating variable. The results provide a new empirical perspective on the imbalance of sustainable development pillars in developing countries.

KEYWORDS: economic dimension; environmental performance; SEM-PLS; social dimension; sustainable development.

1. Introduction

Sustainable development has become a global issue that demands a balance between economic progress, social welfare, and environmental sustainability. Since the publication of Our Common Future by the World Commission on Environment and Development (WCED, 1987), sustainable development has been defined as development that meets the

Cite This Article:
Khaerunisa, A. C. (2026). Analysis of the influence of social and economic dimensions on sustainable development through environmental performance as a mediating variable: A structural equation modeling-partial least squares approach. *Kemakmuran Hijau: Jurnal Ekonomi Pembangunan*, 3(1), 53-66. https://doi.org/10.61511/jekop.v3i1.2026.3109

needs of the present generation without compromising the ability of future generations to meet their own needs. This framework gave birth to the Triple Bottom Line (TBL) concept by Elkington (1998), which emphasizes that sustainability can only be achieved if there is synergy between the three main pillars of people, prosperity, and planet. This framework was later strengthened in the 2030 Sustainable Development Goals (SDGs) agenda, which emphasizes a balance between social, economic, and environmental dimensions as the main foundation of sustainable development (Singh et al., 2022; UN DESA, 2023). Indonesia is also committed to sustainable development, implemented through the Sustainable Development Goals (SDGs), as stipulated in Presidential Regulation Number 59 of 2017 concerning the Implementation of the Achievement of Sustainable Development Goals. Despite progress in several sectors, social disparities, economic inequality, and environmental degradation remain major challenges in achieving the 2030 SDGs targets. These include the sub-universal proportion of adequate housing, suboptimal levels of productive employment, and unequal access to clean water (BPS, 2024).

Sustainable development is inseparable from the interplay of social, economic, and environmental dimensions. The economic dimension emphasizes inclusive and efficient growth in creating social well-being (Barbier & Markandya, 2013; Koirala & Pradhan, 2020), while the social dimension emphasizes improving the quality of life, education, and health (Misztal et al., 2020; Singh et al., 2020). Meanwhile, the environmental dimension emphasizes sustainable natural resource management and mitigating the negative impacts of human activities (Baydoun & Aga, 2021). These three dimensions cannot stand alone; environmental performance often serves as a bridge connecting social and economic dynamics towards achieving sustainable development (Singh & Kumar, 2022). Economic dimensions, such as Gross Domestic Product (GDP) per capita, unemployment rate, and the Gini ratio, are considered important because they reflect national production capacity, employment opportunities, and income distribution (Barbier & Markandya, 2013; Dorofeev, 2022). However, rapid economic growth, if not accompanied by equity, can lead to inequality, weakening the benefits of development and negatively impacting the environment. Unemployment and poverty are also associated with increases in GDP per capita, while the influence of the Gini ratio is far more complex.

The social dimension encompasses aspects such as poverty alleviation, access to higher education, and basic health services, as important indicators for measuring a society's adaptive capacity (Misztal & Kowalska, 2020; Singh & Kumar, 2022). Singh et al. (2022) found that social and economic variables jointly influence sustainable development. In the same context, the quality of maternal health services and higher education participation rates have been identified as key variables in strengthening communities' capacity to address development challenges (Jena et al., 2022). Environmental aspects in sustainable development studies are often measured through indicators such as access to adequate sanitation, electrification, and waste management. Access to adequate sanitation and effective waste management systems can support public health and economic productivity (Jimenez et al., 2017). A study by Manulusi et al. (2025) in ASEAN countries showed that intensive economic activity without the support of good environmental governance can increase the ecological footprint and hinder the achievement of sustainable development.

Environmental performance can then be positioned as a mediator between economic and social dimensions. Improvements in social and economic conditions (poverty reduction, increased education, and reduced unemployment) can have a more positive impact on sustainable development if accompanied by improvements in environmental performance (access to sanitation, electrification, and waste management). Several studies have found that environmental performance mediates the relationship between social responsibility and sustainability. Gazi et al. (2024) also emphasized that environmental mediating and moderating factors are important in social and economic relationships. The Structural Equation Modeling - Partial Least Squares (SEM-PLS) approach is one of the most suitable methods for analyzing latent relationships between social, economic, and environmental dimensions on sustainable development (Hair et al., 2020; Zulfikar et al., 2023). SEM-PLS is now widely used to test complex structural models, including relevant

mediating and moderating relationships in sustainable development studies (Hair et al., 2020). SEM-PLS allows researchers to evaluate direct and indirect influences, including the mediating effect of environmental performance, on the relationship between social, economic, and sustainable development dimensions (Singh & Kumar, 2022).

This research focuses on how the interrelationships between social, economic, and environmental dimensions influence sustainable development in Indonesia. Although several previous studies have examined the relationship between social, economic, and environmental dimensions on sustainable development, most of these studies are partial, examining only one or two dimensions without integrating all three simultaneously into a comprehensive structural model. They also fail to examine the mediating mechanisms that explain how social and economic influences can operate through environmental mediation on sustainable development (Gazi et al., 2024; Kraus et al., 2020; Misztal & Kowalska, 2020; Terra dos Santos et al., 2023). Furthermore, the use of recent data from the Indonesian Sustainable Development Indicators (SDGs) Volume 8, published in 2024, is still rare for related research (BPS, 2024).

The problem formulation in this study is how the social dimension measured through poverty indicators, higher education participation, and childbirth rates and the economic dimension measured through GDP per capita indicators, open unemployment rate, and Gini ratio can affect environmental performance measured through access to sanitation, electrification, and waste management and ultimately contribute to the achievement of sustainable development measured through indicators of access to clean water, decent housing, and productive employment by utilizing secondary data of the Indonesian SDGs and the Structural Equation Modeling-Partial Least Squares (SEM-PLS) analysis approach. Thus the question in this study is, how do the social and economic dimensions influence sustainable development? and how do the social and economic dimensions influence sustainable development through environmental performance mediation? This research question also serves as the basis for determining the research objectives, namely to analyze the influence of the social and economic dimensions on sustainable development both directly and indirectly through environmental performance, by utilizing secondary data of the Indonesian SDGs and the Structural Equation Modeling-Partial Least Squares (SEM-PLS) analysis approach.

2. Methods

2.1 Research data

This study uses secondary data from the Indonesian Sustainable Development Indicators (SDGs) report, Volume 8, published in 2024 by the Central Statistics Agency (BPS, 2024). This data covers social, economic, environmental, and sustainable development achievement indicators at the provincial level in Indonesia. After a thorough review and data search, the data used in the report was taken from 2023. This is because the latest data available, from 2024, is not yet fully complete. The units of analysis in this study are the provinces listed in the Indonesian Sustainable Development Indicators (SDGs) report, Volume 8, published in 2024 by the Central Statistics Agency. Each province has its own achievement score for social, economic, environmental, and sustainable development indicators (BPS, 2024).

Although in the Sustainable Development Indicators (SDGs) Indonesia report Volume 8 published in 2024 by the Central Bureau of Statistics has a total of 38 provinces, but in this study the provinces taken are 34 provinces, because some provinces such as Southwest Papua, South Papua, Central Papua and Papua Mountains do not have complete data. So the provincial data taken includes Aceh, North Sumatra, West Sumatra, Riau, Jambi, South Sumatra, Bengkulu, Lampung, Bangka Belitung Islands, Riau Islands, DKI Jakarta, West Java, Central Java, DI Yogyakarta, East Java, Banten, Bali, West Nusa Tenggara, East Nusa Tenggara, West Kalimantan, Central Kalimantan, South Kalimantan, East Kalimantan, North

Kalimantan, North Sulawesi, Central Sulawesi, South Sulawesi, Southeast Sulawesi, Gorontalo, West Sulawesi, Maluku, North Maluku, West Papua and Papua.

2.2 Research variables and indicators

In this study, economic variables were measured using GDP per capita, the open unemployment rate, and the Gini ratio. Social variables were measured using poverty indicators, higher education participation, and the birth rate. Environmental variables were measured using access to sanitation, electrification, and waste management. Sustainable development variables were measured using access to clean water, adequate housing, and productive employment (Table 1).

Table 1. Operational definitions of research variables and indicators

Variables	Operational definition	Code	Indicator
Economic	Describes the level of economic performance of a region, including growth, employment opportunities, and income distribution.	ECO1 ECO2 ECO3	1. GDP per capita (SDG 8.1.1) 2. Open unemployment rate (SDG 8.5.2) 3. Gini ratio (SDG 10.1.1)
Social	Measuring the social welfare of the community, as reflected in education, health, and poverty.	SOC1 SOC2 SOC3	1. Percentage of the population living below the poverty line (SDG 1.2.1) 2. Higher education participation rate (SDG 4.3.1) 3. Rate of births attended by a health worker (SDG 3.1.2)
Environmental	Describes the extent to which a region is able to manage the environment sustainably.	ENV1 ENV2 ENV3	1. Access to adequate sanitation (SDG 6.2.1) 2. Electrification ratio (SDG 7.1.1) 3. Waste management (SDG 11.6.1)
Sustainable Development	Describes the achievement of sustainable development that considers social, economic, and environmental balance.	SUS1 SUS2 SUS3	1. Access to clean water (SDG 6.1.1) 2. Proportion of households in adequate housing (SDG 11.1.1) 3. Level of productive employment (SDG 8.5.1)

(Barbier & Markandya, 2013; Kraus et al., 2020; Manulusi et al., 2025; Misztal & Kowalska, 2020; Parikh et al., 2021; Singh & Kumar, 2022; UN DESA, 2023; Zulfikar et al., 2023)

This research model examines the relationship between economic and social dimensions (exogenous variables) and sustainable development (endogenous variables) through environmental performance (mediating variables). The selection of variables and indicators in this study is based on the conceptual framework of sustainable development that emphasizes the balance between social, economic, and environmental dimensions as outlined by the World Commission on Environment and Development (WCED, 1987) and the Triple Bottom Line concept (Elkington, 1998). In this context, each development dimension is represented by indicators that refer to the global guidelines of the Sustainable Development Goals (SDGs) and official secondary data from the Indonesian Sustainable Development Indicators (SDGs) report Volume 8 published by the Central Bureau of Statistics. The selection of indicators was carried out by considering the principles of conceptual validity and empirical measurability, as suggested by Hair et al. (2020), namely that each latent construct must be measured by several relevant and reliable indicators to comprehensively describe the phenomenon under study. The latent variables and

indicators used in this study are depicted in the conceptual framework as follows (Figure 1).

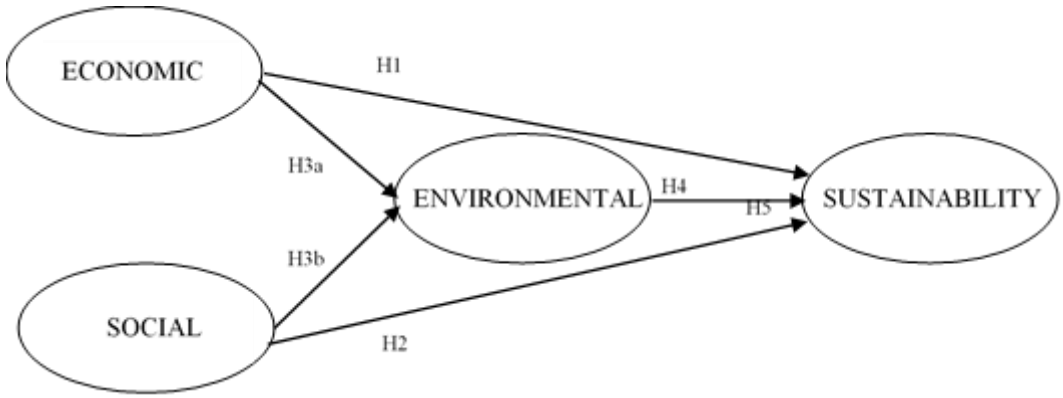

Fig 1. Research conceptual framework and hypotheses

The economic dimension includes economic growth, employment opportunities, and income equality. Indicators such as GDP per capita, the open unemployment rate, and the Gini ratio are frequently used (Singh & Kumar, 2022; Zulfikar et al., 2023). The theories of Inclusive Growth (Kanbur & Rauniyar, 2010) and Endogenous Growth (Romer, 1990) explain that inclusive and productive economic growth strengthens a society's capacity to achieve sustainable development. Pacifico (2023) shows that social and environmental variables also impact economic development within a cross-country panel framework. A study in Kazakhstan showed that economic growth has a strong correlation with education indicators but a weak correlation with environmental performance (Kenzhegulova, 2024). This suggests that economic growth alone is insufficient to ensure sustainability without environmental considerations.

H1: Economic variables influence sustainable development variables. The social dimension includes poverty alleviation, higher education, and health services, all of which support human capacity building and social inclusion (Kalfaoglu, 2023; Misztal & Kowalska, 2020). According to Human Development Theory (Sen, 1999) and the Social Sustainability Model (Colantonio, 2011), prosperous and educated societies have the capacity to promote sustainable development. Improved social quality increases awareness of the importance of sustainability. (Singh & Kumar, 2022) found that higher education participation and poverty reduction contribute positively to sustainable development indicators. Because improved human capacity enables communities to be more active in the development process and manage resources sustainably, social indicators are crucial.

H2: Social variables influence sustainable development variables. According to Ecological Modernization Theory (Mol & Spaargaren, 2000), economic growth can be a positive force for environmental improvement when accompanied by investment in clean technologies and good governance. Zhao et al. (2022) found that economic growth positively impacts environmental quality when coupled with green policies. In Indonesia, provinces with strong economies (e.g., Jakarta and West Java) demonstrate greater improvement in environmental management than low-income provinces. Based on the Social Sustainability Framework (Colantonio, 2011) and Human Development Theory (Sen, 1999), improvements in social quality, such as education, health, and public awareness, will strengthen environmental behavior. Communities with higher levels of education and better welfare tend to be more aware of the importance of natural resource management and environmental conservation. Zhao et al. (2022) show that the social dimension significantly influences environmental performance in East Asia through increased ecological awareness.

H3a: Economic variables influence environmental variables and H3b: Social variables influence environmental variables. Based on Sustainable Development Theory (WCED, 1987) and the Triple Bottom Line (Elkington, 1998), sustainability can only be achieved if

the environment is optimally maintained. Good environmental performance creates ecosystem carrying capacity for economic and social activities. Environmental quality has been shown to significantly influence the sustainable development index in East Asia (Zhao et al., 2022). Environmental protection through increased energy efficiency and reduced carbon emissions has also been found to improve the sustainability index in Chinese provinces (Zhao et al., 2022).

H4: Environmental variables influence Sustainable Development variables: Environmental performance refers to how a country or region manages aspects such as sanitation, electrification, and waste management. This indicator indicates environmental governance capabilities and ecosystem quality (Manulusi et al., 2025; Parikh et al., 2021). A study by Kraus et al. (2020) showed that in a corporate context, environmental performance mediates the relationship between social responsibility and sustainability policy outcomes. Gazi et al. (2024) strengthened this finding in a broader institutional context. Therefore, within this research framework, environmental performance is assumed to mediate between the social, economic, and sustainability dimensions of development. H5: Environmental variables mediate the influence of social and economic variables on the Sustainable Economy variable.

2.3 Structural equation modeling analysis – partial least squares (SEM-PLS)

This study uses a quantitative approach with the Structural Equation Modeling – Partial Least Squares (SEM-PLS) method. The SEM-PLS model was chosen because it is able to analyze causal relationships between latent variables measured by several indicators and can test direct and indirect (mediation) effects simultaneously (Garson, 2016; Hair et al., 2020; Sarstedt et al., 2017). In addition, this approach is suitable for exploratory research that focuses on predictions and relationships between constructs with relatively small sample sizes or non-normally distributed data (Hair et al., 2019). This research model examines the relationship between social and economic dimensions (exogenous variables) and sustainable development (endogenous variables) through environmental performance (mediating variables). Model evaluation in the Partial Least Squares–Structural Equation Modeling (PLS-SEM) approach consists of two main stages: evaluation of the measurement model (outer model) and evaluation of the structural model (inner model). This stage aims to ensure that the indicators used are truly capable of representing the latent constructs being studied and to assess the strength of the relationship between latent variables in the research model (Figure 2).

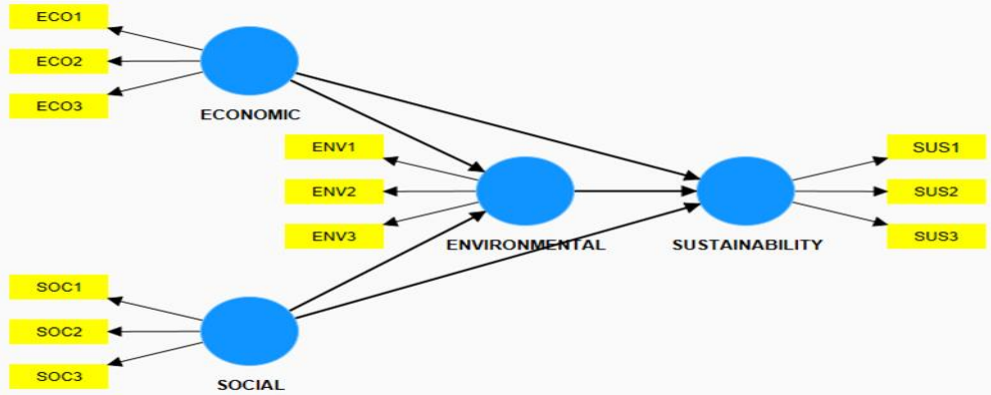

Fig 2. Research model

Evaluation of the measurement model (outer model) is conducted to test whether each reflective indicator used is truly valid in measuring the latent construct. The measurement model aims to ensure convergent validity through two main indicators: the outer loading value and the Average Variance Extracted (AVE) (Hair et al., 2020). According to Hair et al. (2019), in the PLS-SEM approach, the main focus of outer model evaluation is to ensure that

each indicator has a significant contribution to the construct it represents. Therefore, if the research objective is predictive and exploratory, the use of two main measures, outer loading and AVE, is considered adequate (Chin, 1998; Garson, 2016). Outer loading indicates how much an indicator contributes to the latent construct being measured. The outer loading value describes the strength of the correlation between the indicator variable (manifest variable) and the latent variable. An outer loading value above 0.70 indicates that the indicator has strong convergent validity (Hair et al., 2020). A value between 0.50 and 0.70 is acceptable in the initial stages of exploratory research if removing the indicator does not significantly improve the construct's reliability (Chin, 1998). Values below 0.50 should be eliminated from the model as they are considered unable to adequately explain the construct (Fornell et al., 1981).

Average Variance Extracted (AVE) is used to measure how much of an indicator's variance can be explained by the latent construct. AVE is also used to test convergent validity at the construct level (Fornell & Larcker, 1981). According to Hair et al. (2019), an AVE value of ≥ 0.50 indicates that more than 50% of the indicator's variance is explained by the latent construct, thus the construct has good convergent validity. An AVE value <0.50 indicates that the indicator does not adequately explain the construct and requires removal or modification. Thus, if all reflective indicators have outer loading values > 0.70 and AVE > 0.50, the measurement model can be declared convergently valid and meets the requirements to proceed to the structural model evaluation stage. Structural model evaluation (inner model) aims to assess the causal relationships between latent constructs that have been declared valid in the outer model stage. This evaluation is conducted using two main indicators: the coefficient of determination (R^2) and the path coefficient (Garson, 2016; Hair et al., 2019). In secondary data-based research with predictive models, the use of simple fit indicators such as R^2 and the path coefficient is considered sufficient to assess model adequacy (Hair et al., 2020). This is because PLS-SEM focuses on prediction, not absolute model fit like covariance-based SEM.

The R^2 (R-Square) value indicates the extent of variation in the endogenous construct that can be explained by the exogenous construct within the structural model. R^2 serves as a measure of the model's predictive power. The R^2 value interpretation criteria according to Chin (1998) are: if the R^2 value ≥ 0.75, the model is strong; if the R^2 value ≈ 0.50, the model is moderate; and if the R^2 value ≈ 0.25, the model is weak. A high R^2 value indicates that the exogenous construct can explain most of the variation in the endogenous construct. The path coefficient describes the strength and direction of the relationship between latent constructs in the model. Path coefficient values range from -1 to +1, where positive values indicate a unidirectional relationship (an increase in one construct increases the other construct) and negative values indicate an inverse relationship. The significance of the path coefficient is tested using bootstrapping techniques to obtain t-statistics and p-values. The hypothesis is accepted if the t-statistic> 1.96 (for a 5% significance level) and p-value < 0.05 (Hair et al., 2020). However, for secondary data with limited indicators, the significance levels used can vary, namely 1%, 5%, and 10%. The greater the absolute value of the path coefficient, the stronger the influence between the constructs.

3. Result and Discussion

3.1 Evaluation of the measurement model (outer model)

Evaluation of the measurement model was conducted to assess the validity and reliability of the indicators against the latent construct. After the initial validity test in test 1, several indicators had low outer loading and AVE values and did not meet the criteria and were then eliminated, namely: the Gini ratio (economic), higher education (social), electrification ratio (environment), and clean water (sustainable development), which were then retested in test 2 (Table 2).

Table 2. Results of the measurement model analysis

Variables	Indicator	Test 1		Test 2	
		Outer Loading	AVE	*Outer Loading*	AVE
Economic	ECO1	0.595	0.443	0.544	0.616
	ECO2	0.942		0.967	
	ECO3	0.295		-	
Social	SOC1	0.755	0.464	0.844	0.612
	SOC2	0.518		-	
	SOC3	0.745		0.729	
Environmental	ENV1	0.646	0.448	0.948	0.632
	ENV2	0.525		-	
	ENV3	0.806		0.570	
Sustainable Development	SUS1	0.229	0.528	-	0.768
	SUS2	0.825		0.811	
	SUS3	0.922		0.937	

(Data processed using Smart-PLS, 2025)

Validity is evaluated through outer loading and Average Variance Extracted (AVE) values. According to Hair et al. (2020), an indicator is considered valid if it has a loading of ≥ 0.7. However, values between 0.4–0.7 are still acceptable if the construct's AVE is > 0.5. As seen in the results of the measurement model analysis above (Table 2), after test 2, the results showed that most indicators met the validity criteria (loading > 0.7), such as ECO2 (0.967), ENV1 (0.948), SOC1 (0.844), and SUS3 (0.937). Two indicators had loadings < 0.7, namely ECO1 (0.544) and ENV3 (0.570), but were still retained because the AVE values for the corresponding constructs were above 0.5, indicating that the indicator variance still adequately explained the construct.

After test 2, all constructs had an AVE value > 0.5, thus meeting the convergent validity criteria. This indicates that the indicators used were able to explain more than 50% of the variance of each construct (Fornell & Larcker, 1981). Based on the results of the outer model test, it can be concluded that all constructs have met convergent validity and composite reliability. Indicators with loadings < 0.7 can still be retained because the construct's AVE is above 0.5 and theoretically, these indicators are important in describing the variables. These results are consistent with the research of Henseler et al. (2009) which stated that the use of secondary data in PLS-SEM often results in low internal reliability values, but the model remains valid if the composite reliability and AVE meet the criteria. Based on these results, the measurement model in this study is suitable for use in the next stage (inner model).

3.2 Evaluation of the structural model (inner model)

Structural model analysis was conducted to assess the strength of the relationship between latent variables based on the results of path coefficient estimation, specific indirect effects, and R-square. The interpretation criteria for the R^2 value according to Chin (1998) are if the R^2 value ≥ 0.75 then the model built is strong, if the R^2 value ≈ 0.50 then the model built is moderate, and if the R^2 value ≈ 0.25 then the model built is weak.

Table 3. Results of R-square analysis

Endogenous Variables	R-*square*	R-*square Adjusted*	Description
Environmental	0.265	0.214	Weak
Sustainability	0.848	0.831	Strong

(Data processed using Smart-PLS, 2025)

The R-square test in this study (Table 3) yielded an R^2 value of 0.265 for the Environmental Performance variable, indicating that exogenous variables (social and economic dimensions) only explain approximately 26.5% of the variation in environmental

performance. This means that most of the variation in environmental performance is influenced by factors outside the model, such as regional policies, environmental governance, or green infrastructure investment (Kraus et al., 2020). Meanwhile, the R^2 of 0.848 for the Sustainable Development variable indicates that 84.8% of the variation in sustainable development can be explained by social, economic, and environmental performance variables. This value is considered strong (Chin, 1998) and indicates that the research model has excellent predictive ability for sustainable development variables.

These results indicate that the success of sustainable development in Indonesia, based on the 2023 SDGs data, is more influenced by social and economic conditions than by environmental variables, which in this model act as mediators. The next step is to test the path coefficient. The path coefficient describes the strength and direction of the relationship between latent constructs in the model. The path coefficient value is seen based on the original sample value, ranging from -1 to +1. The significance of the path coefficient was tested using bootstrapping techniques to obtain t-statistics and p-values at significance levels of 1%, 5%, and 10% (Table 4).

Table 4. Results of path coefficient analysis

Path	Original Sample	T Statistics	P Values
Path Coefficient			
Economic → Sustainability	-0,930	17,669	0,000*
Social → Sustainability	0,188	1,682	0,093***
Economic → Environmental	-0,010	0,045	0,964
Social → Environmental	0,516	2,646	0,008*
Environmental → Sustainability	-0,001	0,012	0,990
Specific Indirect Effects			
Economic → Environmental → Sustainability	0,000	0,028	1,000
Social → Environmental → Sustainability	-0,001	0,058	0,991

* : Significant at the level 1%, **: Significant at the level 5%, ***: Significant at the level 10%

(Data processed using Smart-PLS, 2025)

H1: Economic Variables Influence Sustainable Development: The results (Table 4) show that the economic dimension has a significant negative effect at the 1% level on sustainable development (β = -0.930; p = 0.000), thus confirming Hypothesis 1. This negative and significant coefficient value indicates that increases in economic indicators (such as GDP per capita) are not always accompanied by improvements in sustainability and, in some cases, can even decrease the quality of environmental and social sustainability. Conceptually, this finding can be interpreted as indicating that increases in economic indicators such as GDP per capita and labor productivity tend to be accompanied by a decline in overall sustainable development outcomes. This phenomenon illustrates a trade-off between economic growth and environmental and social sustainability. This finding is consistent with the literature stating that economic growth that is not balanced with green policies and equitable distribution can lead to environmental degradation and social inequality (Manulusi et al., 2025; Rockstrom & Noone, 2009). This means that in Indonesia, economic growth remains extractive and resource-intensive, so its contribution to sustainable development is not yet positive across the board.

H2: Social Variables Influence Sustainable Development Variables: The results (Table 4) show a relationship between the social dimension and sustainable development with a value (β = 0.188; p = 0.093), indicating a positive and significant effect at the 10% level. Hypothesis 2 is therefore confirmed. These results indicate that improvements in social conditions, such as access to health facilities (childbirth) and access to adequate sanitation, tend to encourage increased development sustainability. Although the significance level is marginal, the positive direction indicates that social development plays a crucial role in maintaining the balance of sustainable development. This result can be explained by the fact that social improvements require economic and institutional support to have a significant impact on sustainable development (Misztal & Kowalska, 2020; Singh & Kumar, 2022). In

Indonesia, regional inequality and unequal education quality may contribute to the weak influence of social factors on sustainability.

H3a: Economic variables influence environmental variables: The results (Table 4) for the influence of economic variables on environmental variables, the path coefficient shows a value (β = -0.010; p = 0.964) so that Hypothesis 3a is not confirmed, which means the economic dimension has no significant effect on environmental performance. This result confirms that the increase in economic indicators (such as GDP per capita) has not been followed by an increase in environmental quality, such as access to sanitation and waste management. This condition is in line with the Environmental Kuznets Curve (EKC) theory, which states that in the early stages of economic growth, environmental quality tends to decline before increasing at a certain income level (Grossman & Krueger, 1995; Panayotou, 1995). This means that Indonesia may still be in the initial phase, where industrialization and economic expansion put pressure on environmental aspects.

H3b: Social variables influence environmental variables: The results (Table 4) for the influence of social variables on environmental variables indicate that the social dimension has a significant positive effect on environmental performance (β = 0.516; p = 0.008). Hypothesis H3b is therefore confirmed. This means that the better the social conditions of the community, the better the environmental performance achieved. Increased education, community participation, and social awareness contribute to environmentally friendly behavior and participation in hygiene, sanitation, and clean energy programs. This finding aligns with research by Parikh et al. (2021) and Zulfikar et al. (2023), which confirms that the social dimension, particularly education and social equality, is the main driver of adopting sustainable environmental behavior.

H4: Environmental variables influence Sustainable Development variables: The results (Table 4) obtained a path coefficient value (β = -0.001; p = 0.990), indicating that environmental performance does not significantly influence sustainable development. Hypothesis 4 is therefore not confirmed. Theoretically, this can be explained by the relatively low environmental performance in Indonesia and the uneven distribution across provinces (BPS, 2024). Although environmental management policies have been prioritized in the SDGs, these results indicate that their implementation is not yet robust enough to contribute significantly to sustainability. Parikh et al. (2021) and UN DESA (2023) also highlight the gap between policies and field practices in achieving sustainable environmental outcomes.

H5: Environmental variables mediate the influence of social and economic variables on the Sustainable Economy variable: The results in the table for specific indirect effects indicate that the indirect effects of Economic → Environmental → Sustainability (β = 0.000; p = 1.000) and Social → Environmental → Sustainability (β = -0.001; p = 0.991) are insignificant, meaning Hypothesis 5 is not confirmed. This means that environmental performance does not mediate the influence of social and economic factors on sustainable development. This is consistent with the low environmental R^2 value (0.265), indicating a weak role for the environment as an intermediary variable. Practically, this indicates that despite the implementation of social and economic policies, sustainability success has not been effectively achieved through environmental channels. This phenomenon is also explained by (Gazi et al., 2024), who state that environmental mediation is only significant when green infrastructure and governance are strong, which is still limited in many developing countries. Overall, the results of this study confirm that sustainable development in Indonesia in 2023 will be determined more directly by social and economic aspects without the mediation of environmental performance. This condition illustrates that the SDGs agenda in Indonesia is still in a transitional phase, where integration between the pillars of development (social, economic, and environmental) has not been optimal (BPS, 2024; UN DESA, 2023). The findings of this study also reinforce the view that without strengthening environmental governance, economic growth can actually exacerbate social inequality and degrade environmental quality (Kraus et al., 2020; Rockstrom & Noone, 2009).

Overall, the results of this study confirm that sustainable development in Indonesia in 2023 is determined more directly by social and economic aspects without the mediation of environmental performance. This condition illustrates that the SDGs agenda in Indonesia is still in a transitional phase, where integration between the pillars of development — social, economic, and environmental — has not been optimal (BPS, 2024; UN DESA, 2023). The findings also reinforce the view that without strengthening environmental governance, economic growth can actually exacerbate social inequality and degrade environmental quality (Kraus et al., 2020; Rockstrom & Noone, 2009). Practically, these findings provide three important insights for policy. First, economic growth needs to be directed towards a sustainable and inclusive economy through stronger fiscal policy to prevent environmental degradation from industrialization (Kraus et al., 2020). Second, equitable access to education and health services must be strengthened to increase environmental awareness and public participation in sustainable development (Parikh et al., 2021; Singh & Kumar, 2022). Third, waste management, sanitation, and clean energy need to be positioned as integrative pillars of regional development, requiring cross-sectoral synergy between social, economic, and environmental policies (UN DESA, 2023).

4. Conclusion

This study analyzed the influence of social and economic dimensions on sustainable development, both directly and indirectly through environmental performance, using Indonesia's 2023 SDGs data and a SEM-PLS approach. The results show that the economic dimension has a significant negative effect on sustainable development ($\beta = -0.930$; $p = 0.000$), indicating that economic growth in Indonesia remains extractive and has yet to contribute positively to sustainability. The social dimension shows a positive but marginally significant effect ($\beta = 0.188$; $p = 0.093$), while environmental performance neither significantly influences sustainable development nor mediates the social–economic relationship with it. The high R^2 value (0.848) confirms strong model explanatory power, yet reflects an imbalance among the three development pillars.

These findings contribute empirically to sustainable development literature in the context of developing countries, confirming that sustainability in Indonesia remains economically centered with suboptimal social and environmental integration. Future research is recommended to incorporate broader environmental indicators, apply multi-group analysis comparing regions such as Java versus non-Java, and combine quantitative SDG data with qualitative policy analysis to better capture the contextual dynamics of sustainable development implementation.

Acknowledgement

The author expresses their gratitude to the reviewers for their valuable and constructive feedback on this article.

Author Contribution

The author contributed equally to the conceptualization, methodology, analysis, and writing of this review. They collaboratively reviewed and approved the final manuscript for submission.

Funding

This research did not use external funding.

Ethical Review Board Statement

Not available.

Informed Consent Statement

Not available.

Data Availability Statement
Not available.

Conflicts of Interest
The author declare no conflict of interest.

Open Access

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