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Research Article

The Impact of Sustainable Business Strategies on Achieving a Green Economy in Indonesia

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Abstract: *Amidst global changes, extreme challenges shake the global industry, including worrying climate change, prolonged depletion of natural resources, pollution, and growing economic imbalances. Unsustainable exploitation of natural resources has a significant impact on the environmental crisis and global economic stability. A theory of the Environmental Kuznets Curve (EKC) explains that economic growth initially increases emissions due to industrial and infrastructure expansion. In developing countries such as Indonesia, this theory is very relevant. However, implementing sustainable business strategies can help turn this trend towards a green economy. This study focuses on how sustainable business strategies can be the solution to achieving a green economy in Indonesia. Through quantitative methods and data analysis from 2003-2023, this study aims to identify factors that influence the success of sustainable business strategies in achieving a more balanced and sustainable green economy in Indonesia.*

Keywords: *Economic growth, Environmental impacts, Green economy, Indonesia, Sustainable business strategies*.

I. INTRODUCTION

The issues of climate change and global warming have become urgent concerns in our era, carrying extensive impacts on the environment, societies, and economies across the globe. The long-term modification of Earth's normal weather, encompassing variations in temperature, precipitation, and various other environmental variables, is referred to as changing the climate (Rayhan, Kinzler, & Rayhan, 2023). Climate change is not only an environmental problem but also a serious threat to the global economy. More extreme weather has the potential to weaken economic growth through damage, one of which capital stock, labor supply, and labor productivity tend to be weaker as the world adjusts to higher temperatures (Afiya, 2024).

A theory of the Environmental Kuznets Curve (EKC) by Grossman and Krueger (1991) explains that economic growth initially increased emissions due to industrial and infrastructure expansion. In a country like Indonesia, which is still developing economically, the impact of climate change can be even more vital since the economic sectors are still heavily dependent on natural resources, such as agriculture, forestry, and fishery. According to the Global Carbon Atlas (2017), Indonesia ranks 12th as the world's largest carbon producer, 5th in Asia, and 1st in Southeast Asia. Therefore, Indonesia, as one of the world's largest carbon emitters, and as a country which is still developing, supports this theory. According to the EKC theory, when economies grow and per capita income increases, environmental degradation first gets worse as societies become wealthier and place a higher priority on environmental protection; finding a balance between economic development and environmental sustainability is still a major problem, especially for countries like Indonesia where economic growth is still strongly linked to industrialization.

As a developing country pursuing progress, Indonesia faces complex challenges that require massive transformations in various sectors, including the economy, industry, and infrastructure. With the massive transformation, in order to improve social and economic well-being, Indonesia must also consider the negative environmental impacts resulting from such major developments. There are also opportunities for sustainable and environmentally conscious growth, one of which is by adopting green technologies, promoting renewable energy, and implementing environmentally friendly policies. Therefore, sustainable business strategies must be the main focus in every step towards progress, ensuring that economic growth not only brings short-term benefits but also protects and preserves natural resources as valuable assets for future generations to realize the vision of a green economy.

II. LITERATURE REVIEW

A) Sustainable Business

In today's modern business world, sustainable business practices are becoming more crucial. A strong foundation for businesses seeking to combine financial success with a positive influence on society and the environment, sustainable business is becoming more important in an era where environmental, economic, and social challenges are receiving more attention.

Given the current social and environmental changes, sustainable business practices are essential. According to a study by Kraus et al. (2020), businesses can reap long-term benefits from sustainable business, which incorporates environmental initiatives and strong social responsibility practices. This includes long-term planning that acknowledges the significance of protecting the environment, considering the well-being of workers and communities, and creating business models that can adapt to changing circumstances. It has also been demonstrated that an organizational culture that upholds sustainable principles improves corporate performance, highlighting the significance of sustainable business in the contemporary business environment (Abad-Segura et al., 2019).

For businesses, sustainable business practices could bring positive impacts, one of which is reducing the company's operational risks and expenses. According to Groenewald and Powell (2016), sustainable practices can directly and indirectly bring various benefits connected to risk reduction, such as energy and resource efficiency. Companies that implement them typically have lower risk levels and are better at managing risks. Another research by Aspergis et al. (2022) also mentioned that businesses that prioritize sustainability also pay less for debt. These results suggest that sustainable enterprises might lower financial risk and increase their resilience to economic change.

B) Green Economy

A green economy, as defined by the United Nations, is one that lowers social inequality and improves human well-being while lowering environmental hazards and resource shortages (United Nations Environment Programme, 2011). A green economy, on the other hand, is an economic model in which economic growth is integrated with environmental policies that focus on reducing environmental impacts, resource efficiency, and ecosystem protection (European Environment Agency, 2019). According to Bina (2013), the goal of the green economy is to promote equitable, ecologically friendly, and sustainable economic growth. The idea has grown in significance in response to global concerns like environmental degradation, climate change, and the sustainability of natural resources.

In the framework of the green economy introduced by the European Environment Agency (2012), the economy and ecosystem are two interrelated factors, and both undoubtedly play a significant part in attaining a nation's sustainable development. The ecosystem component of the green economy, on the one hand, is concerned with preserving and reestablishing natural ecosystems that preserve environmental sustainability. The economic aspect of the green economy, on the other hand, focuses on initiatives to accomplish inclusive, ecologically conscious, and sustainable economic growth. However, in addition to these two aspects, EEA (2012) notes that this concept also needs to take human well-being into account since the idea of a green economy must also guarantee that people's basic needs can be satisfied in a way that does not damage natural resources.

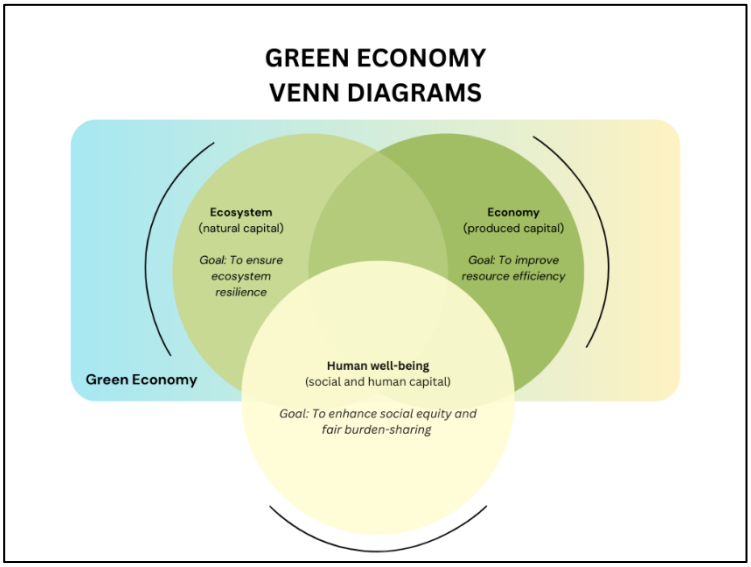

Fig. 1 Green Economy Concept (EEA, 2012)

C) Previous Studies

The primary focus of this study, the green economy concept, is derived from a number of theories from earlier studies. One of them comes from a study conducted by Kasztelan (2017), which addresses the ideas of sustainable development, green economy, and green growth, as well as the connections between the three. It is revealed further in this study that the goal of

sustainable development is to steer the economy towards environmental protection in order to achieve green growth and a green economy.

Meanwhile, Breaban, Banica, and Sandu (2013) used the Environmental Performance Index (EPI) as the primary variable in another study that assessed regional resilience in Romania. This research aims to determine the most important environmental policy indicators across five categories and evaluate how well these indicators perform across various regions in Romania. The methodology employed in this study includes the investigation of important variables like energy policy, water quality, and air quality, as well as the use of EPI as an assessment framework. The findings demonstrate that the total EPI score emphasizes that in order to boost regional resilience, a number of areas need to be improved, and districts that practice sustainable development typically score higher on evaluations. Based on these findings, this study will use EPI as a reference representative of green economy, to see how sustainable business strategies factors would impact the achievement of green economy concept in Indonesia.

D) Methodology

A quantitative approach will be used in this study as the methodology of the research. As mentioned in the previous chapter, in accordance with the EEA concept of the green economy, this study will analyze three different models: the ecosystem factors model, the economic factors model, and the human well-being factors model. Secondary data from the Indonesian government's data will be collected, and their effects on achieving a green economy, as represented by Indonesia's EPI score, will be examined. Utilizing annual data from the years 2003 to 2023 will also help to understand better how things have changed over time, which can serve as the foundation for developing suggestions.

The econometrics model used in this study is motivated by Agustin & Suhartini (2023) which determine whether industrialization and greenhouse gas emissions in Indonesia are correlated. To do this, a time series data approach covering the years 1990 to 2019 was used, with natural greenhouse gas emissions serving as the dependent variable and other variables like trade, FDI, and economic growth serving as the independent variables. The variables used in this study are as follows:

Table 1: Definition of Operational Variables

Variable	Symbol	Definition	Expected Sign	Source
Dependent Variable				
Environmental Performance Index	*EPI*	Country performance indicator based on environmental issue categories		SEDAC, Columbia University
Independent Variables: Model 1				
Greenhouse Emission	*GREEN*	Concentrations of carbon dioxide, methane, and nitrous oxide	–	World Bank
Forest Area	*FOREST*	Land under natural or planted stands of trees in percentage of total land area	+	World Bank
Coal Consumption	*COAL*	Percentage of electricity used from coal	–	World Bank
Renewable Energy Consumption	*RENEW*	The percentage of total electricity produced that comes from renewable power plants	+	World Bank
Water Quality Index	*WATER*	Index of water bodies' quality for various beneficial uses of water, such as livestock water and drinking water supplies	+	World Bank
Agricultural Land Area	*AGRI*	Percentage share of land area that is arable compared to the total area of land	+	World Bank
Manufacture Area	*MANU*	Percentage of industries belonging to International Standard Industrial Classification (ISIC) out of total GDP	–	World Bank
Independent Variables: Model 2				
Gross Domestic Product	*GDP*	Sum of gross value added by all resident producers in the economy	–	World Bank
Foreign Direct Investment	*FDI*	Net inflows of investment in an economy other than that of the investor	–	World Bank
Inflation Rate	*INF*	Annual percentage change in the cost to the average consumer of acquiring a basket of goods and services	+	World Bank
Education	*EDUEX*	Government expenditure on education	+	World Bank

Expenditure				
Research and Development Expenditure	*RNDEX*	Government expenditure on research and development (R&D)	+	World Bank
Population Growth	*POPGROW*	The annual population growth rate from year t-1 to t	+	World Bank
Export	*EXP*	Value of all goods and other market services provided from a country to the rest of the world	+	World Bank
Independent Variables: Model 3				
Literacy Rate	*LITER*	Percentage of people ages 15 and above who can both read and write with understanding a short, simple statement	+	World Bank
Unemployment Rate	*UNEMP*	Share of the labor force that is not working but available for and seeking employment	–	World Bank
Poverty Rate	*POV*	Percentage of the population living below the national poverty line	–	World Bank
Human Development Index	*HDI*	Average accomplishments in a nation in three fundamental areas: living a long and healthy life, having access to education, and having a good standard of living	+	World Bank
Gini Index	*GINI*	A statistical measure of economic inequality in a population	–	World Bank
Clean Water Availability	*CLEANW*	Percentage of people using at least basic water services	+	World Bank
Internet Accessibility	*INTER*	Percentage of individuals who have used the internet from any location in the last three months	+	World Bank

From the variables explained in the table above, therefore the model applied in this research is as follows:

Model 1: Ecosystem Factor Model

$$EPI_t = \alpha_0 + \beta_1 GREEN_t + \beta_2 FOREST_t + \beta_3 COAL_t + \beta_4 RENEW_t + \beta_5 WATER_t + \beta_6 AGRI_t + \beta_7 MANU_t + \varepsilon_t \quad (2.1)$$

where α = intercept ; ε = error ; t = 1, 2, …, 21

Model 2: Economic Factor Model

$$EPI_t = \alpha_0 + \beta_1 GDP_t + \beta_2 FDI_t + \beta_3 INF_t + \beta_4 EDUEX_t + \beta_5 RNDEX_t + \beta_6 POPGROW_t + \beta_7 EXP_t + \varepsilon_t \quad (2.2)$$

where α = intercept ; ε = error ; t = 1, 2, …, 21

Model 3: Human Well-Being Factor Model

$$EPI_t = \alpha_0 + \beta_1 LITER_t + \beta_2 UNEMP_t + \beta_3 POV_t + \beta_4 HDI_t + \beta_5 GINI_t + \beta_6 CLEANW_t + \beta_7 INTER_t + \varepsilon_t \quad (2.3)$$

where α = intercept ; ε = error ; t = 1, 2, …, 21

Based on Uyanik and Guler (2013), regression analysis is used to find correlations between two or more variables that have cause-and-effect relationships. Time series analysis, on the other hand, is a statistical technique for examining data from repeated observations on a unit of observation at regular intervals over a large number of observations (Velicer & Fava, 2003). Since the data used in this study covers a long period from the year 2003 to 2023, therefore this study will use multiple linear regression with a time series approach to analyze how the variables on the three models affect the green economy variable, EPI.

III. RESULTS AND DISCUSSION

A) EPI Descriptive Statistics

An overview of the whole data used in this research will be given by discussing the descriptive statistics of the data in this part. The graph below shows how Indonesia's Environmental Performance Index (EPI) has changed over the past 20 years, from 2003 to 2023. The graph illustrates how Indonesia's EPI score, which was 23.9 in 2023, was the lowest it had been in the previous 20 years. However, with a score of 67.4, the highest EPI score ever recorded in Indonesia was in 2003. It is also evident that there have been notable fluctuations in Indonesia's EPI score during the last two decades; however there is also a consistent downward trend, particularly in the previous ten years.

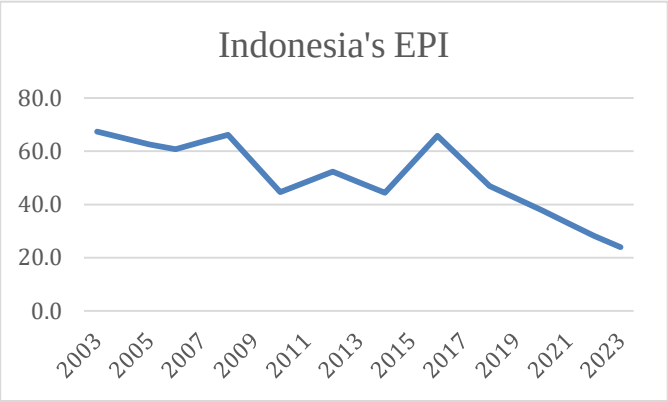

Fig. 2 Indonesia's Environmental Performance Index 2003 – 2023

B) Estimation Results

Regression analysis in this part is conducted three times through three different models, each of which focuses on a different set of variables: Model 1 examines variables related to ecosystem factors, Model 2 examines variables related to economic factors, and Model 3 examines variables related to human well-being factors. Additionally, the consideration to include a 10 percent level of significance in this study is based on the theory by Slovin (1960), which stated that since the sample size used in this study is less than 1,000, the use of the 10 percent level of significance is justified and considered to be able to produce a comprehensive result.

Table 2: Model 1 Coefficients

Variables	Standardized Coefficient		t	p-value
	$\widehat{\boldsymbol{\beta}}$	Std. Error		
GREEN	-1.401022	0.7288605	-1.92	0.077*
FOREST	5.37995	2.694152	2.00	0.067*
COAL	1.533955	0.6622691	2.32	0.038**
RENEW	1.348794	0.7182232	1.88	0.081*
WATER	2.232195	1.070296	2.09	0.052*
AGRI	3.846511	1.457223	2.64	0.018**
MANU	3.89872	1.007927	3.87	0.001***

***p<0.01, **p<0.05, *p<0.1

Source: *secondary data, processed*

Table 2 above displays Model 1 estimation results. The table shows that the dependent variable, the Environmental Performance Index (EPI), is significantly affected by each of the independent factors in Model 1. According to the estimates, for the first variable, Greenhouse Gas Emission (GREEN), every unit rise in GREEN lowers EPI by 1.40 units, significant at the 10% level, ceteris paribus. Meanwhile, for the second variable, Forest Land Area (FOREST), the estimate in the abovementioned table shows that an increase of one unit in FOREST results in a 5.38 unit rise in EPI, also significant at the 10% level, holding other variables constant.

An interesting finding on the variable Coal Consumption (COAL) which, according to the estimation, an additional unit of coal would raise the EPI by 1.53 units, with a significance level of 5 percent, ceteris paribus. Although this result may come as a shock, it could be explained by the next variable in Model 1, the Renewable Energy Consumption (RENEW), which indicates that while coal consumption in Indonesia may have increased, it might have been countered by greater usage of other renewable energy sources. Thus, even though the a high usage of coal in Indonesia, the emissions and pollution caused by coal can be compensated by a large rise in the usage of renewable energy. In addition, the estimates show that every unit rise in RENEW will also increase EPI by 1.35 units, while every unit rise in the next variable, Water Quality (WATER), will also increase EPI by 2.23 units, holding other variables constant.

As for the variable Agricultural Land Area (AGRI), with a significance level of 5 percent, it is discovered that for every unit increase in the variable AGRI, there will also be a 3.85 unit rise in the EPI, ceteris paribus. Meanwhile, the last variable in Model 1, Manufacture Area (MANU), reveals a somewhat interesting result, where it is found that adding one unit of MANU will raise EPI by 3.90 units point while holding other variables constant. This estimation unexpectedly turns out to be highly significant, specifically in the 1 percent level of significance. For this finding, Handayani, Wahyudi, and Suharnomo (2017) have previously discovered that several expanding Indonesian manufacturing industries have adopted more eco-friendly and

efficient technologies and processes, one of which is through the implementation of Corporate Social Responsibility (CSR). Thus, this finding is somewhat consistent with the previously mentioned research.

Table 3: Model 2 Coefficients

Variables	Standardized Coefficient		t	p-value
	$\widehat{\boldsymbol{\beta}}$	Std. Error		
GDP	-0.2027053	0.0888342	-2.28	0.035**
FDI	-1.058121	0.5273889	-2.01	0.066**
INF	2.618019	0.8480227	3.09	0.006**
EDUEX	1.091119	0.5540773	1.97	0.065*
RNDEX	78.60228	54.89859	1.43	0.170
POPGROW	75.37846	27.64296	2.73	0.014**
EXP	-1.011514	0.4609705	-2.19	0.043**

***p<0.01, **p<0.05, *p<0.1

Source: *secondary data, processed*

The first variable in Model 2, which focuses on economic factors, Gross Domestic Product (GDP), has a negative coefficient towards EPI. This finding means that, while holding other variables constant, every unit rise in GDP would result in a 0.20 unit point fall in EPI, which is significant at the 5 percent level. Meanwhile, Foreign Direct Investment (FDI) is a variable that, like GDP, estimates that a unit increase in FDI would decrease EPI by 1.06 points, *ceteris paribus*, also significant at the 5 percent level. This finding is consistent not only with the GDP estimation but also with a previous study by Kurniawan (2016) that stated that FDI may choose to invest domestically if the GDP is high.

Moving on to the next variable in Model 2, this study discovered a positive correlation between Inflation (INF) and EPI. The table above illustrates this relationship, showing that, while holding other variables constant, an increase of one unit in INF will result in an increase of 2.62 units in EPI, with a 5 percent significance level. On the contrary, it is discovered that a rise in the Education Expenditure (EDUEX) variable will result in a 1.09 unit point increase in the EPI, *ceteris paribus*. Surprisingly, the estimate for the variable R&D Expenditure (RNDEX) shows no significancy at any level, indicating that in this study, there is no relationship found between RNDEX and EPI. This may be the result of government spending on R&D may be directed at fields like information technology, which may have little to do with the environment.

In regard to the variable Population Growth (POPGROW), this study estimates indicate that, at a 5 percent significance level, and while holding other variables constant, a point increase in POPGROW will also result in a large units point increase in EPI by 75.38. Meanwhile, for the last variable included in Model 2, Exports (EXP), the estimation shows a negative correlation with EPI, meaning that a point rise in EXP will result in a 1.01 unit point decrease in EPI. The environmental costs of increased production for export, which might result in environmental degradation, may be reflected in this negative relationship. These results demonstrate the complex relationships that exist between economic activity and environmental health, indicating the criticality of policies that seek to strike a balance between environmental sustainability and economic growth. Therefore, in order to reconcile export-driven growth with environmental protection, future studies must investigate possible mitigating techniques and go deeper into the particular industries driving these trends.

Table 4: Model 3 Coefficients

Variables	Standardized Coefficient		t	p-value
	$\widehat{\boldsymbol{\beta}}$	Std. Error		
LITER	0.0000561	0.0001392	0.40	0.692
UNEMP	-0.2850014	0.1202789	-2.37	0.034**
POV	-3.414259	1.699083	-2.01	0.060*
HDI	1.585876	1.025316	1.55	0.139
GINI	-2.377115	1.168958	-2.03	0.056*
CLEANW	3.010387	6.214521	0.48	0.635
INTER	-0.8165358	0.3815768	-2.14	0.048**

***p<0.01, **p<0.05, *p<0.1

Source: *secondary data, processed*

For the last Model 3, which focuses on human well-being variables, only four of the seven variables in this model that may be said to have a relationship with the dependent variable, EPI, which all of the three other variables, which are Human Development Index (HDI), Clean Water Availability (CLEANW), and Literacy Rate (LITER), are shown to not correlate with the dependent variable, and not significant in any level of significance. This finding also suggests that, within the context of

this model, these three factors are not responsible for variances in EPI. It implies that additional model variables may be more important in explaining the observed variations in EPI.

The first variable that shows significance in this model, the Unemployment Rate (UNEMP), shows a negative correlation with the dependent variable, EPI, which at the 5 percent significance level, a rise in UNEMP of one unit will result in a 0.29 unit point fall in EPI, *ceteris paribus.* Concurrently, the Poverty Rate (POV) variable also shows a negative correlation with EPI; that is, a unit rise in POV is estimated to result in a 3.41 unit point fall in the EPI, holding other variables constant. This finding implies that, in the context of this study, lower environmental performance is linked to increased unemployment and poverty rates, which can be concluded that in this context, socioeconomic circumstances and environmental outcomes are intertwined, emphasizing how crucial it is to address economic inequality in order to improve environmental outcomes.

The next variable in Model 3 is the GINI Index (GINI), and it is discovered that the variable GINI and EPI have a negative correlation, where while holding other variables constant, a unit increase in GINI will result in a 2.38 unit point fall in EPI. This finding is consistent with GINI's theory, which states that greater values correspond to greater inequality. As for the last variable in Model 3, this study found a negative correlation between the variable Internet Accessibility (INTER) and EPI, as seen in the table above. This finding found that with the significance level at 5 percent, the estimation showed that a unit increase in INTER will reduce EPI by 0.82 units point, *ceteris paribus*.

IV. CONCLUSION

The econometric model used in this study, which describes the government's efforts through three different models, makes the Indonesian government's commitment to environmental issues very evident. The dependent variable, EPI, represents the green economy, while all independent variables represent the role of the government. The government's proactive attitude in incorporating environmental factors into economic planning and policymaking is demonstrated by this strategy. Through an examination of factors including exports, population growth, poverty rate, and unemployment rate in Model 2, this study illustrates the many approaches the government takes to support sustainable development. Furthermore, the correlation between these variables and the EPI suggests that government interventions can improve environmental performance and facilitate the shift to a more environmentally friendly economy.

The Environmental Performance Index (EPI), which measures the effect of government action on environmental sustainability, is greatly affected by all independent variables in Model 1, the Ecosystem Factor Model. These variables include Greenhouse Gas Emissions (GREEN), Forest Area (FOREST), Coal Consumption (COAL), Renewable Energy Consumption (RENEW), Water Quality (WATER), Agricultural Land Area (AGRI), and Manufacture Area (MANU). This wide range of variables illustrates the government's encompassing approach to environmental management and conservation by capturing several facets of ecosystem health and the communities' interaction with the environment. These results also highlight the importance of comprehensive environmental policies that consider various aspects of an ecosystem, paving the way for more effective environmental-related strategies in Indonesia.

In Model 2, the Economic Factor Model, only the Research and Development Expenditure (RNDEX) variable shows no significant effect towards EPI. The other variables, Gross Domestic Product (GDP), Foreign Direct Investment (FDI), Inflation Rate (INF), Education Expenditure (EDUEX), Population Growth (POPGROW), and Exports (EXP), show a significant relationship with the variable EPI. These results demonstrate the complex relationship between economic variables and the environment, meaning that more in-depth research into the fundamental mechanisms behind these linkages should be done to provide more insightful information for the policymakers looking to balance between environmental sustainability and economic development, especially in a developing country such as Indonesia.

Model 3, the Human Well-Being Factor Model, only shows four of the seven variables that are found to be significantly affecting EPI. These variables are crucial factors of human well-being and reflect the government's efforts to address socioeconomic problems and raise the quality of living for the community. A clear indication of the government's commitment to lowering social inequality is the inclusion of factors like the unemployment and poverty rates mentioned in the paragraph before. Similarly, the government's role in promoting economic justice is highlighted by the GINI Index, which offers insights into income distribution. The Internet Accessibility variable also represents initiatives to improve digital infrastructure and information access. Policymakers can better understand the social determinants of environmental performance and develop focused actions that advance both ecological sustainability and human well-being by focusing on these essential aspects of human well-being.

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