The Effect of Economic Growth, Human Development Index and Environmental Quality Index on Sustainable Development Goals: Study in Indonesia

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Abstract. This article examine and analyze the factors that affect the Sustainable Development Goals (SDGs). In this study, the variables utilized to assess the ability to fulfill the Sustainable Development Goals (SDGs) include economic growth (GRDP), the Human Development Index (HDI), and the Environmental Quality Index (EQI). Panel data regression was employed as the research method. The data used is annual data from all provinces in Indonesia, specifically 34 provinces from 2018 to 2022. A Cartesian diagram is also used to determine which areas are capable of achieving the SDGs. The findings revealed that the determinants of the GRDP Index, HDI, and EQI affected the SDGs in 34 Indonesian provinces. The greatest influence occurs in the HDI variable, where increasing the HDI is the most efficient pillar in achieving the SDGs.

Keywords: Sustainability Development Goals (SDGs), economic growth (GRDP), Human Development Index (HDI), Environmental Quality Index (EQI)

1 Introduction

After the previous agenda, known as the Millennium Development Goals (MDGs), was not properly implemented, the Sustainable Development Goals (SDGs) are now becoming a global discourse [1]. The SDGs are an expansion of the MDGs [1]. The SDGs are expected to be completed by 2030, with challenges that are not only directed toward quantitatively measurable outcomes but also quality [2]. The SDGs are a process based on the notion of "fulfilling the needs of the present without compromising future generations' needs" [3].

The Sustainable Development Goals (SDGs) are comprised of three interrelated and mutually reinforcing pillars: economic (economic sustainability), social (social sustainability), and environmental (environmental sustainability) [4]. The Sustainable Development Goals (SDGs) are defined as development that meets the requirements of the present without compromising the right of future generations to meet their own needs [5]. The Sustainable Development Goals (SDGs) have the concept of ensuring the quality of human existence while not surpassing the ecosystem's ability to maintain it [6]. Thus, the notion of the Sustainable Development Goals (SDGs) is a development that meets the requirements of the present without jeopardizing future generations' ability to fulfill their own needs. According to Hidayat [7], SDGs are actions to address present needs as the primary exchange process between society and nature.

There are 17 pillars, 3169 targets, and 303 indicators in the Sustainable Development Goals (SDGs) for all countries around the world. Pillars 1–6 are the core agenda, which is a

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continuation of the MDGs, while pillars 7–17 are new foundations, namely: (1) no poverty in any form in all corners of the world; (2) no hunger, no more hunger, (3) achieve food security, and encourage sustainable agricultural cultivation; Good health and well-being, ensuring a healthy life and promoting a prosperous life for all people of all ages; (4) quality education, ensuring equal distribution of quality education and increasing learning opportunities for all; (5) gender equality; (6) clean water and sanitation; (7) clean and affordable energy, (8) sustainable economic growth, productive employment and decent work for all; (9) industry, innovation and infrastructure; (10) reducing gaps; (11) city and community sustainability; (12) responsible consumption and production; (13) climate action, act quickly to combat climate change and its consequences; (14) underwater life, conserving and maintaining the sustainability of the sea and the life of marine resources for sustainable development; (15) life on land, including the protection, restoration, and enhancement of terrestrial ecosystems, the sustainable management of forests, the reduction of barren land, and land swaps; (16) strong and peaceful judicial institutions; and (17) collaborative efforts to achieve goals.

This article does not analyze all 17 pillars but instead focuses on economic growth, the human development index, and the environmental pillar, which includes the environmental quality index. To be stated to be sustainable, the three pillars form a unity that interacts with one another. Social and economic objectives must be met while accounting for the environmental impact. The economic pillar begins with economic growth indicators. Every country or region in the world must engage in economic development efforts. Development efforts strive to achieve social welfare and poverty abolition [8]. The Sustainable Development Goals (SDGs) are an attempt to reconcile two opposing paradigms of economic expansion and natural resource depletion. Todaro and Stephen [9] argue that high and sustainable economic growth is a trade-off with efficient natural resources.

Next is the social pillar with the human development index (IPM) indicator. The HDI is a human development indicator that serves as a baseline [10]. The HDI is made up of three major components: health, education, and income. The HDI demonstrates the presence of a development process in Indonesia. The following pillar is the environmental pillar, which is represented by the Environmental Quality Index (IKLH) indicator. Poverty reduction that does not consider the environmental effects cannot be called a Sustainable Development Goal (SDG), because the environment is the third pillar of how to carry out or accomplish development while maintaining environmental sustainability. The first issue addressed by the Sustainable Development Goals was environmental degradation (SDGs). Environmental degradation can be avoided by conserving environmental quality. The environmental quality index combines the air quality index, the water quality index, and the land cover quality index into a single composite index.

Kroll C, et al. [11] conducted various studies related to the Sustainable Development Goals (SDGs), with research findings proposing the concept of sustainability, which is based on the concept of needs and work, as the main exchange process between society and nature and supports social sustainability from a conceptual and analytical standpoint. Rassanjani S, [12] conducted additional research that outlines the main elements of sustainable development and governance and discovers that sustainability is a socially institutionalized adaptive labor process in which innovation plays an important role. This research produces a conceptual framework for policy-making toward sustainability.

Then, according to the findings of Pradhan et al. [13], the MDGs program has a beneficial impact on poverty eradication in Nigeria, and to accomplish the SDGs, the government at all levels must implement adequate and sustainable poverty reduction

initiatives. Salsabila [14] conducted the subsequent study, which found that accomplishing the SDGs requires a conceptual framework and methodology, not just socioeconomic and environmental statistics and that the relevance of all SDGs indicators is a key indicator in reaching targets. Another result is that the success of the SDGs agenda is influenced by a political process that is fact-based and takes scientific knowledge into account early in the policy cycle.

The following study is by Beni et al, [15], discovered that HDI has a direct and significant effect on economic growth in Bali Province and that infrastructure expenses and economic growth have a direct and significant influence on income distribution inequality in Bali Province. Through economic growth in Bali Province, HDI and infrastructure costs have an indirect impact on income distribution inequality. The HDI and infrastructure costs, which are improving year after year, as well as improved public welfare, will produce an increase in regional economic capacity, where the real sector of a region will move well and, ultimately, economic growth will expand, reducing income disparity.

2 Literature Review and Hypothesis Development

2.1 Sustainable Development Goals (SDGs)

The Sustainable Development Goals (SDGs) aim to promote community well-being by meeting human needs and aspirations [2]. Sustainable development is fundamentally concerned with achieving an equitable distribution of development among present and future generations [12]. The Sustainable Development Goals (SDGs) include not just economic but also intellectual, emotional, moral, and spiritual development [3]. Sustainability is critical to finding answers to global challenges such as insufficient food access, environmental degradation, natural resource decline, and forest loss, as well as decreasing nutrition and public health, and welfare (poverty) [16]. The Sustainable Development Goals (SDGs) are global concerns that have become goals and are widely recognized by society [2]. Because environmental and social integration is trade-offs, a policy-based strategy, as well as a conceptual approach, are required [13].

The notion of Sustainable Development Goals (SDGs) must take into account socially and culturally appropriate demands, transmit values that establish varied consumption standards within the boundaries of environmental capabilities, and everyone can aspire to them [2]. However, there is a risk that meeting these needs will be contingent on achieving maximum economic growth or production needs. The Sustainable Development Goals (SDGs) explicitly need economic growth if the primary needs cannot be met by other means, as long as the expansion is based on sustainable principles. However, in practice, great production activity can coexist with widespread poverty. This illness has the potential to affect the environment.

According to Swain and Yang [2], the essence of the concept of Sustainable Development Goals (SDGs) is basically: development that can meet the needs of today's society without neglecting future generations' ability to meet their needs, as a process of change in which the use of resources, the direction of investment, development orientation, and institutional changes are always in balance and synergistically strengthen each other's current and future potency.

The notion of Sustainable Development Goals (SDGs) indicates the existence of a limit, which is established by the level of society and social organization in terms of natural resources and the ability of the biosphere to absorb diverse influences from various human activities. Technology and human capital can be updated to usher in a new era of economic progress. Thus, the Sustainable Development Goals (SDGs) are methods that promote current and future development by taking into account the sustainability, capabilities, and functions of the natural environment's components and ecosystem.

2.2 Economic growth

Economic growth is a prospective economic development condition that reflects rising output per capita and rising living standards [9]. In actual economic activity, economic growth refers to the physical development of a country's goods and services, such as an increase in the number of industrial goods produced, infrastructure development, an increase in the number of schools, an increase in service sector production, and an increase in capital goods production [14].

Economic growth differs from economic development in that both phrases describe economic progress, but they are frequently employed in different contexts. Growth is always used as a broad term to describe a region's level of development as measured by the national income index. Meanwhile, economic growth in a certain area is frequently related to development [2].

2.3 Human Development Index (HDI)

UNDP (United Nations Development Programme) explains that human development is a process that expands human options. Human development, as a concept or term, encompasses a very broad dimension of development. Development should be evaluated and comprehended from the perspective of humans, not just economic progress, in the idea of human development.

Development must be carried out in a balanced manner, according to the notion of development that focuses on humanity, namely a balance between developing and deploying capabilities. This indicates that human development is concerned with more than only human capacities, such as the capacity to acquire greater health, live longer, or have a higher degree of education. However, we must also pay attention to how people use their abilities for activities that might enhance their life, such as working [5].

The Human Development Index is an index that assesses a region's or country's socio-economic development by combining accomplishments in education, health, and adjusted real income per capita [1]. According to the United Nations Development Program (UNDP), the Human Development Index (HDI) includes three composite indicators that are used to measure a country's average achievement in human development: length of life, as measured by life expectancy at birth; education, as measured by the average length of schooling and literacy rate of the population aged 15 years and over; and standard of living, as measured by per capita expenditure that has been adjusted for inflation. This index has a value between 0 and 100 [9].

2.4 Environmental Quality Index EQI)

An index or indicator is a method of reducing the amount of data and information to its most basic form while retaining its vital significance. The Environmental Quality Index (EQI) is a preliminary description or indicator that gives a rapid conclusion of an environmental situation over a certain scope and period. The Environmental Quality Index is a basic measurement tool that provides a comparison or aims for each applicable indicator and standard based on applicable laws and regulations. To get an ideal reference, the Environmental Quality Index is frequently utilized as a universal reference or reference on a worldwide scale. Many types of research on the environmental quality index have been conducted, and numerous studies on EQI, such as the Environmental Sustainability Index (ESI), Environmental Performance Index (EPI), and the Virginia Environmental Quality Index (VEQI), have been published. Environmental Quality Indexes are classified as follows:

a) Air Pollution Index

The air quality index may be used to determine the state of air quality in a certain location. The air quality index was established to make it easier for the public to know the state of ambient air quality using basic information, rather than using units that the public does not understand.

b) Water Pollution Index

Measurement of river water quality or pollution can be performed by using the composition of physical parameters (odor, color, amount of dissolved solids, turbidity, taste) chemical (inorganic materials: iron, zinc, aluminum, hardness, chloride, manganese, pH, sulfate, and copper), and bacteriological (number of bacteria and total coli).

c) Quality of Life Index and Biological Index

The quality of life index (IMH) is one of the composite indicators used to measure the level of community welfare. The composite indicator is a single indicator that is a combination of several sectoral people's welfare indicators. Therefore, this indicator is very useful in measuring the results of general policies that are cross-sectoral. This quality of life index is a combination of three single indicators, namely the Infant Mortality Rate (IMR), One-year Life Expectancy (LE), and Literacy Rate (Lit).

d) Land Quality Index

Soil or land quality index is a value that describes the condition or quality of soil or land in an area that is approached by two indicators, namely the volume of waste per day (m^3) that is not transported per km^2 and the percentage of households with the final collection of feces in the form of a tank/final disposal channel waste in each provincial capital.

3 Method

Based on the data and research, this study employed a quantitative method to assess and analyze the impact of the GRDP Index, HDI, and EQI on the SDGs in 34 Indonesian provinces over three years, from 2018 to 2021, to identify pillars that require additional reinforcement. It is required by the province.

The following is the hypothesis of this study:

H_1: GRDP index affects the SDGs in 34 provinces in Indonesia

H_2: HDI affects the SDGs in 34 provinces in Indonesia

H_3: EQI affects the SDGs in 34 provinces in Indonesia

The secondary data utilized was panel data, which included statistics on per capita income, the Human Development Index (HDI), the EQI, and the poverty rate in 34 Indonesian provinces from 2018 to 2021. Data on per capita income, HDI, and poverty rates were gathered from Central Statistics Agency publications, while EQI was obtained from Ministry of Environment and Forestry publications. This study's statistical analysis steps include panel data regression techniques selection, panel data regression, and classical assumption testing [7]. The equation employed in this research is as follows.

$$SDGs_{it} = \beta_0 + \beta_1 PDRB_{it} + \beta_2 IPM_{it} + \beta_3 IKLH_{it} + \varepsilon_{it}$$

Where β_0 in (1) is a constant/*intercept*, ε is *the error term*, *i* is a province, *t* is the year, and $\beta_{(1\text{-}3)}$ is the coefficient of each independent variable.

4 Results and Discussion

The results of data processing based on numerous tests may be reported in this study, including table 1 shows the results of the panel regression model selection test based on the Chou test.

Table 1. Chou Test Results

Effect Test	Coef.	Prob.
Cross-section F	1,136	0,203
Cross-section Chi-Square	37,102	0,033

Based on the chi-square cross-section probability of 0.033, which is less at the 5% significance level, Ha is accepted, and the fixed effect model is adopted. The results of the panel regression model selection test based on the Hausman test, the probability of 0.083 is larger than the 5% significance threshold, thus H0 is approved, and the random effect is the more appropriate model utilized.

The Lagrange Multiplier (LM Test) test is used to determine which model to use between fixed effects and random effects. If the results of the Lagrange Multiplier test with a probability of 0.6579 with a coefficient of 0.172 are greater than the 5% significance level and H0 is accepted, the more appropriate model to use is the common effect.

Table 2 illustrates the estimation results of the model with the common effect model based on the panel regression findings:

Table 2. Panel Regression (Common Effect Model)

Variable Test	Coef.	t statistics	Prob.
C	-0,243	-1,104	0,142
GRDP	0,175	449,908	0,000
HDI	0,604	153,331	0,000
EQI	0,203	154,284	0,000

Based on table 2, the equation formed is as follows:
$SDGs_{it} = -0,243 + 0,175PDRB_{it} + 0,604IPM_{it}\ 0,203IKLH_{it} + \varepsilon_{it}$

The regression equation coefficient in the above equation is interpreted as follows: when GRDP, HDI, and EQI are zero, the SDGs are worth -0.243; when GRDP increases by 1%, the SDGs increase by 0.175%; and when HDI increases by 1%, the SDGs increase by 0.175%. increases by 0.604%, and when EQI rises by 1%, the SDGs rise by 0.203%, provided cateris paribus.

The coefficient value indicates that improving SDGs has the greatest impact when HDI grows by 1%. This implies that boosting the HDI is one of the most efficient pillars in advancing the SDGs, as optimal human development is projected to use the environment efficiently and sustainably as well.

The probability value of the t statistic in table 2 which is smaller than the 5% significance level shows that the GRDP, HDI, and EQI index variables have a partial effect on the SDGs. The coefficient of determination test shows the ability of the independent variables to explain the variation of the dependent variable with an adjusted R2 value of 0.99 indicating that the GRDP, HDI, and EQI index variables can explain 99% of the variation of the SDGs. The remaining 1% is explained by variables outside the model. The model's feasibility test findings have a probability value of 0.000 0.05, indicating that Ha is accepted and H0 is refused, and that the GRDP index, HDI, and EQI all affect the SDGs at the same time. It is concluded that the model in this study is worthy of acceptance.

The normalization assumption test was used to determine whether or not the residual data were normally distributed. Figure 3 shows the results of the normalization test.

Table 3. Normality Test

		Unstandardized Residual
N		130
Normal Parameters[b]	*Mean*	-2.017500
	Std. Deviation	
Most Extreme Differences	*Absolute*	1.063972
	Positive	1.063972
	Negative	-0.023325
Test Statistic		0.121688
Asymp. Sig. (2-tailed)		.108[c]

Table 3 illustrates the residual normalization test findings, where the probability of 0.108 is greater than the 5% significance level, indicating that the model is normally distributed. The correlation between independent variables was then tested using a multicollinearity test, as shown in Table 4.

Table 4. Multicollinearity Test

	GRDP	**HDI**	**EQI**
GRDP	1	0.357	-0.044
HDI	0.357	1	-0.481
EQI	-0.0435	-0.481	1

The multicollinearity test findings in table 4 demonstrate that there are no independent variables with a high correlation (greater than 0.8), implying that the model does not exhibit multicollinearity symptoms.

4.1 Analysis of Influential Factors on Sustainable Development Goals (SDGs)

The GRDP index, HDI, and EQI affect the SDGs referring to economic theories that the main purpose of development activities is to improve the welfare and standard of living of the community through development policies taken by the government following the Haror-Domar theory (Todaro and Stephen, 2006).

According to the correlation test results, all environmental quality indexes have a favorable effect on the fulfillment of basic needs. This means that if air quality, land cover, water quality, environmental health, public health, and biodiversity improve, so will the fulfillment of fundamental requirements, and vice versa.

Given that the population is both the subject and the object of development, the population has a very strong relationship with welfare. The population is both an input and a development goal in the industrial process to increase their well-being. Local government policies have a significant impact on the acceleration of economic development, which, in turn, has an impact on enhancing community wellbeing.

Based on the correlation results Meanwhile, the Human Development Index (HDI) raises awareness of the meaning of development in a broader sense, specifically in the aspects of health and education, both of which are core development goals. A country with a high-income population but a low level of education and health care, have an impact on the low life expectancy of the population of a higher-developed country.

5 Conclusion

Based on the discussion of the research findings above, it is possible to conclude that the Determinants of the GRDP Index, HDI, and EQI have an impact on the SDGs in 34 Indonesian provinces. The greatest influence comes in the HDI variable, where increasing the HDI is the most efficient pillar in increasing the SDGs. This affects optimal human development, which can use the environment efficiently and sustainably.

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