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The Impact of Environmental Performance on Economic Growth: A Study of ASEAN Countries

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ABSTRACT

The aim of this study is to explore the effect of environmental performance on economic growth, the effect of environmental performance on health expenditure, the effect of health expenditure on economic growth, and the role of health expenditure in mediating the effect of environmental performance on economic growth. The study uses a quantitative research method with a verification approach and utilizes secondary data from the World Bank Indicator. Purposive sampling has been used in this study, and the sample involved countries from the ASEAN region. The statistical analysis tool used in this study is EViews version 12. The results indicate that environmental performance has an impact on economic growth, that environmental performance affects health expenditure, that health expenditure has an impact on economic growth, and that health expenditure can mediate the impact of environmental performance on economic growth. According to the study's findings, ASEAN companies must reduce the environmental damage caused by their activities in order to improve their environmental performance, which will help boost economic growth in ASEAN countries.

Keywords: ASEAN, Economic Growth, Environmental Performance, Health Expenditure, Quantitative Research Method

JEL Classifications: F64; F65

1. INTRODUCTION

Environmental concerns have been a source of debate over the past decade due to the expanding operations of businesses and the utilization of advanced technology. In reality, however, the operations performed and the technology employed by corporations have led to substantial detriment to the environment. Such harm manifests itself in the form of significant carbon dioxide (CO₂) emissions in the atmosphere. From 1850 to 2021, the total carbon dioxide released into the air has amounted to approximately 2500 billion tons. This figure is the result of a continuously accelerating rise in CO₂ outflows. Specifically, in ASEAN (Association of Southeast Asian Nations) countries, in 2020, the total CO₂ emissions in Indonesia amounted to 591.3 million tons, making it the ninth largest CO₂ producer in the world. This figure was largely

generated by fossil-fueled power plants, motorized vehicles, forest fires, burning waste, and industrial activities, indicating a significant contribution of industrial activity to environmental damage. Not only Indonesia, Vietnam is also among the top twenty countries as the largest CO₂ emitters in the world, with emissions in 2020 amounting to 322.1 million tons.

Industrial activities, such as the one previously mentioned, can have a detrimental effect on multiple facets of life, including the community, the corporate entity involved, and even the nation. One potential effect on the nation is a decrease in economic growth (Muna et al., 2023; Wanof and Gani, 2023). The International Monetary Fund (IMF) reported that the more challenging it is for a country to shift to renewable energy sources, the higher the necessary taxes or regulations on greenhouse gas emissions to

inspire emission reduction, thus resulting in a larger economic price in terms of decreased output and a rise in inflation. If this occurs, it will inevitably lead to a decrease in economic growth in each country. According to a World Bank study conducted in 2021, the economic losses due to the health effects of air pollution totaled US\$8.1 trillion, or 6.1% of global Gross Domestic Product (GDP) in 2019. Luhut Binsar Panjaitan, Indonesia's Coordinating Minister for Maritime Affairs and Investment, further stated that climate change and environmental degradation are having an adverse impact on economic and social development. According to Greenpeace Southeast Asia's calculations, Indonesia suffered economic losses of US\$ 121 million due to air pollution-related environmental damage, while other nations such as Vietnam endured losses of US\$ 190.4 million.

These conditions should be addressed as expeditiously as possible, for if left unchecked, it will impede and even damage the economies of ASEAN nations. Irfan D. Yananto, Indonesia's Coordinator for Climate Resilient Development, has declared that climate change and its accompanying pollution must be taken much more seriously, for if not, it can trigger economic losses in Indonesia. As such, the notion of environmental performance is raised in this analysis. Environmental performance refers to an organization's ability to create a healthy environment and to strive to reduce any negative environmental impacts caused by its operations. Environmental performance is highly imperative, since the better the environmental performance of an organization, the lesser the impact of its operations on the environment.

Efforts to enhance environmental performance for the better will have a significant impact on economic growth. Bennett et al. (2017) states that the magnitude of carbon dioxide emissions (as part of environmental performance measurements) in the past and present will have far-reaching implications for economic, political and social life in the future (Lisaria Putri et al., 2023). As per the research conducted by Akadiri et al. (2019), it is evident that environmental performance can influence economic growth in a country. Other studies such as Mavragani et al. (2016), Le and Sarkodie (2020), and Sekrafi and Sghaier (2018) also illustrate a correlation between environmental performance and economic growth. In a macroeconomic approach, 75 countries, including the G20 and the EU, showed a positive relationship between environmental performance, institutional quality, and open economy (Mavragani et al., 2016). Similarly, researchers discovered a positive relationship between economic growth and environmental performance in emerging and developing economies (EMDE) (Le and Sarkodie, 2020). Contrastingly, Sekrafi and Sghaier (2018) determined that environmental performance effects on economic growth in the Middle East and North Africa (MENA).

In research conducted by several academics on environmental performance and economic growth, there are studies which demonstrate a direct or indirect correlation between environmental performance or economic growth and other variables. Bahrami et al. (2017) probed the impact of environmental performance on health expenditures and ascertained that access to hygienic sewer systems and energy intensity had a considerable effect

on health expenditures. Health expenditure, a recurrent expense issued by both the public and private sector, is meant for health-related purposes. Dinçer and Yüksel (2019) discovered through their research that total health expenditure and public health expenditure have an impact on economic growth in the long run. A similar study was also conducted, and it was discovered that there is a two-way causal relationship between health expenditure and economic growth in the short term (Sethi et al., 2020). The influence of health expenditure on the relevant variables is subject to certain conditions and scenarios. This suggests the potential of health expenditure as an intervening or moderating variable. The focus of this study is the relationship between environmental performance, economic growth, and health expenditure in ASEAN member countries. The study utilizes countries listed in the World Bank as the population and specifically examines ASEAN member countries as the sample. This study is motivated by the lack of research that combines these variables in the ASEAN region, with previous studies having been conducted in African countries and other developing countries. The aim of the research is to determine: (1) the impact of environmental performance on economic growth in ASEAN countries, (2) the impact of environmental performance on health expenditure in ASEAN countries, (3) the impact of health expenditure on economic growth in ASEAN countries, and (4) the role of health expenditure in mediating the impact of environmental performance on economic growth in ASEAN countries.

2. LITERATURE REVIEW

The focus of this study is the interplay between environmental performance, economic growth, and health expenditure in ASEAN member countries. The study employs countries listed in the World Bank as its population, and focuses on ASEAN member countries as its sample. The reason for this focus is due to the lack of research that has examined these variables in conjunction within the ASEAN region, with previous studies having only been conducted in African countries and other developing nations. The objective of the study is to explore: (1) the effect of environmental performance on economic growth in ASEAN countries, (2) the effect of environmental performance on health spending in ASEAN countries, (3) the effect of health spending on economic growth in ASEAN countries, and (4) the role of health spending as a mediator in the relationship between environmental performance and economic growth in ASEAN countries. Additionally, we will elaborate on each variable and the relationship between them to construct a research hypothesis. This will provide a clearer understanding of the variables and how they are related, leading to a more robust and focused study.

Environmental performance is the efficacy of an organization in creating a salubrious atmosphere and abating deleterious impacts on the environment caused by organizational activities (Bennett et al., 2017; Ikhsan, 2009; Lankoski, 2000; Permana and Lestari, 2021). Economic expansion is a progressive enrichment of people's living standards, which is evidenced by the efficiency of economic activity and income in the country over a specified period (Christiansen and Sezerel, 2020; Ivic, 2015; Poliduts and Kapkaev, 2015; Sukirno, 2016).

According to Bennett et al. (2017) global warming caused by poor environmental performance (such as emissions of carbon dioxide and other greenhouse gases) in the past and present has profound implications for economic, political and social life in the future. This statement is supported by research by Akadiri et al. (2019), which shows that environmental performance (as represented by environmental pollution) can affect economic growth in a country.

Mavragani et al. (2016) presented evidence that environmental performance is positively correlated with macroeconomic performance (GDP) across 75 countries, including G20 and EU nations. Subsequent studies have confirmed that environmental performance and economic growth possess a positive relationship in the EMDE (Le and Sarkodie, 2020) and MENA (Sekrafi and Sghaier, 2018) regions. Consequently, this study hypothesizes that:

H1: There is a causal relationship between environmental performance and economic growth.

Environmental performance is the capacity of an organization to create a healthy environment and lessen negative environmental effects due to organizational activities (Bennett et al., 2017; Ikhsan, 2009; Lankoski, 2000; Permana and Lestari, 2021). Meanwhile, health expenditure is a regular sum of money given out by both the public and private sectors for health-related purposes (Ndedi et al., 2017; OECD, 2000; WHO, 2019). Ibukun and Osinubi (2020) have suggested that the lower the environmental performance in a country, the higher the health expenditure for that country. Poor environmental performance may lead to a rise in local medical expenses because of air and water pollution, which is hazardous to human life (Charfeddine, 2017; Hao et al., 2018). Anwar et al. (2021) conducted a study on environmental performance and health expenditure in 87 countries, and concluded that environmental performance (as exemplified by carbon dioxide) had an effect on per capita health expenditure. Other studies illustrate that environmental performance (such as access to sanitary sewage systems and energy intensity) also has an influence on health expenditure, as shown in the results of research by Bahrami et al. (2017) conducted in 109 developed and developing countries.

Environmental performance can be portrayed by multiple indicators, such as carbon dioxide, nitrogen and sulfur dioxide emissions, which can have a long-term effect on health expenditure in Malaysia (Abdullah et al., 2016). Ullah et al. (2020) found that an upsurge in carbon dioxide emissions would result in an increase in health expenditure in Pakistan. Additionally, Yazdi et al. (2014) revealed that sulfur oxide and carbon monoxide emissions can have a considerable positive influence on public health expenditure in Iran. Consequently, this study supposes the following hypothesis:

H2: Environmental performance affects health expenditure.

Health expenditures are a routine outlay of both public and private funds, intended to be used for health-related objectives (Ndedi et al., 2017; OECD, 2000; WHO, 2019). Economic growth is a beneficial increment of people's living standards, which is depicted in the productivity of economic activity and income within a given country over a period (Christiansen and Sezerel, 2020; Ivic, 2015; Poliduts and Kapkaev, 2015; Sukirno, 2016).

Sahnoun (2018) suggests that improved health expenditure can catalyze economic growth. This stands corroborated by the findings of Dinçer and Yüksel's study (2019), which revealed that in the long run, both total and public health expenditure have a positive influence on economic growth. This is in accordance with the notion of Todaro and Smith (2012), who advocate for the proactive involvement of public policy in the promotion of economic growth through both direct and indirect investment. Health expenditure is an example of indirect investment (Anggraeni, 2017).

Piabuo and Tieguhong (2017) discovered that a single unit alteration in health expenditure has the potential to raise GDP per capita by 0.38 and 0.3 units, with a noteworthy divergence of 0.08 units. Sethi et al. (2020) also examined an analogous issue in the South Asian region and discovered that in the short-term, there is a two-way causality relationship from health expenditure to economic growth. Health expenditure also has an impact on economic growth in the United States (Raghupathi and Raghupathi, 2020). Thus, this research proposes the following hypothesis:

H3: Health expenditure has a bearing on economic growth.

Environmental performance is the capability of an organization to create a beneficial atmosphere and minimize the detrimental effects on the environment caused by their operations (Bennett et al., 2017; Ikhsan, 2009; Lankoski, 2000; Permana and Lestari, 2021). Economic development is an advantageous progression of people's living standards, which is manifested in the efficiency of economic activity and revenue in the nation over a specified timeframe (Christiansen and Sezerel, 2020; Ivic, 2015; Poliduts and Kapkaev, 2015; Sukirno, 2016). Health expenditure is the regular outlay dispensed by both the public and private sectors that are meant for health-related purposes (Ndedi et al., 2017; OECD, 2000; WHO, 2019).

Health expenditure can have an impact on environmental performance and vice versa, and can thereby influence economic growth (Charfeddine, 2017; Erçelik, 2018). Consequently, Khan (2019) posits that health expenditure is a medium through which environmental performance and economic growth are connected. Khan et al. (2020) demonstrated that elevated environmental performance can bolster public health expenditure, which in turn can cause a strain on economic growth due to inefficiencies and reduced labor productivity. Thus, this research puts forward the following hypothesis:

H4: Health expenditure can act as an intermediary between environmental performance and economic growth.

3. METHODS

This study employs quantitative research with verification techniques, which is deemed highly appropriate for data-related research in order to gauge and evaluate hypotheses (Creswell, 2003). According to Nariwati (2008), verification methodology is a means to validate hypotheses via statistical means by aggregating data from various sources such as field data and reports. The statistical

analysis tool employed in this study is EViews version 12. The variables covered in this study include environmental performance, economic growth and health expenditure, where the latter serves as the dependent variable. The per capita Gross Domestic Product (GDP) in US dollars was used to assess economic growth (Khan et al., 2020; Poliduts and Kapkaev, 2015; Sukirno, 2016). GDP is the total value of goods and services produced within a country, using the production resources of both domestic entities and foreign entities (Sukirno, 2016).

This study leverages environmental performance as an independent variable, with emission footprint as the pivotal benchmark for evaluating it. Emission footprint is construed to signify the entire amount of emissions discharged into the atmosphere (e.g. SO₂, particulates, CO, CO₂, etc.), aquatic (e.g. COD, etc.) and terrestrial (e.g. residual waste) environments by a given system or product. Alvarez et al.(2012), Burman et al. (2018), Alvarez et al.(2012), Burman et al. (2018), Scrucca et al. (2020), and Xu et al. (2019) have all used this indicator in their research.

In this investigation, the intervening factor is health expenditure. This factor's metric is health expenditure per capita expressed in current US dollars (Ndedi et al., 2017; WHO, 2019). Health expenditure per capita in US dollars is the total amount spent on healthcare per person, expressed at the prevailing exchange rate for the year in US dollars.

This study relied on secondary data spanning 5 years. (2015-2019) obtained from World Development Indicator and made available on the World Bank's official website, namely <https://data.worldbank.org>. The World Bank's website is prioritized because the data it contains is deemed authentic and relevant (Haseeb et al., 2019). The populations in this study are countries registered with the World Bank. This study employed a non-probability sampling technique with a purposive sampling approach. Then the samples in this study are ASEAN member countries.

Path analysis is being used in this study to test the hypothesis. Ghazali (2011) reveals that path analysis is part of the expansion of multiple linear regression analysis. Path analysis is employed to assess the strength of direct and indirect relationships between variables in a study. (Lleras, 2005). The regression equation in path analysis is formulated as follows:

$$Z : \beta_1 X + \varepsilon \quad (1)$$

$$Y : \beta_2 X + \beta_3 Z + \varepsilon \quad (2)$$

Information:

Y : Economic Growth (GDP)

X : Environmental Performance (CO₂)

Z : Health Expenditure

β : Standardized regression coefficient

ε : Error

The sobel test was used to test the mediation hypothesis in this study. According to Abu-Bader and Jones (2021), the Sobel test is used to examine the indirect relationship between the independent

variable (X) and the dependent variable (Y) which is mediated by the intervening variable (Z). The sobel test process can be carried out using the help of a sobel test computer calculator (such as <http://quantpsy.org/sobel/sobel.htm>) or using the following formula:

$$Z = \frac{ab}{\sqrt{b^2 S_a^2 + a^2 S_b^2}}$$

Where the coefficient a refers to the path between the independent variable (X) and the intervening variable (Z), Sa is the standard error on this path (coefficient), b refers to the path between the independent (X) and intervening (Z) variables dependent (Y), Sb is the standard error on this path (coefficient).

4. RESULTS

The descriptive statistical results of the entire research data are presented in Table 1 below:

From Table 1 above, it can be seen that the variable (X) of environmental performance has an average value of 1.006297, a median value of 0.923873, a maximum value of 2.854169, a minimum value of -0.994252, a standard deviation of 1.051683, the skewness value is 0.056271, and the kurtosis value is 2.096213 with a total of 50 observations.

Variable (Y) economic growth has an average value of 4.559800, a median value of 2.520000, a maximum value of 17.36000, a minimum value of 0.370000, a standard deviation of 4.744495, a skewness value of 1.498776, and a kurtosis value of 4.284881 with a total of 50 observations.

Variable (Z) health expenditure has an average value of 0.487489, a median value of 0.452745, a maximum value of 0.725355, a minimum value of 0.319542, a standard deviation of 0.122094, a skewness value of 0.503985, and a kurtosis value of 2.193014 with a total of 50 observations.

In accordance with what has been stated in the previous section, this study uses path analysis to test the hypothesis. Therefore, this study consisted of two regression analyzes. The first regression analysis which is then called sub-structural 1 is used to explain the effect of the environmental performance variable (X) on the health expenditure variable (Z). Then a second regression analysis was carried out which was then called sub-structural 2 which was used to explain the effect of environmental performance variables (X)

Table 1: Descriptive statistical

Descriptive Statistics	EP X	EC Y	HE Z
Mean	1.006297	4.559800	0.487489
Median	0.923873	2.520000	0.452745
Maximum	2.854169	17.36000	0.725355
Minimum	-0.994252	0.370000	0.319542
SD	1.051683	4.744495	0.122094
Skewness	0.056271	1.498776	0.503985
Kurtosis	2.096213	4.284881	2.193014
Observations	50	50	50

SD: Standard deviation

and health expenditure (Z) on economic growth (Y). Following are the results of path analysis in this study:

According to Table 2, the regression equation is obtained in the path analysis for sub-structural 1 in this study, namely:

$$HE=0.401+0.019 EP+\epsilon_1 \tag{3}$$

The above sub-structural regression equation 1 can be described as follows:

- a. The constant of 0.401 states that if the value of the environmental performance variable (X) does not increase, the value of the health expenditure variable (Z) is 0.401.
- b. The regression coefficient of the environmental performance variable (X) is 0.019 with a positive value, meaning that for each addition of one environmental performance value, the value of health expenditure increases by 0.019 and other variables are considered constant.

According to Table 3, the regression equation is obtained in path analysis for sub-structural 2 in this study, namely:

$$EC=0.707+0.008 EP+4.08 HE+\epsilon_2 \tag{4}$$

The above sub-structural regression equation 2 can be described as follows:

- a. The constant of 0.707 states that if the values of the environmental performance variable (X) and health expenditure (Z) do not increase, then the value of the economic growth variable (Y) is 0.707
- b. The regression coefficient of the environmental performance variable (X) is 0.008 with a positive value, which means that for each additional environmental performance value, the value of economic growth increases by 0.008 and all other variables are held constant
- c. The regression coefficient for the health expenditure variable (Z) is 4.08 with a positive value, implying that for every increase in health expenditure, the value of economic growth rises by 4.08 while all other variables remain constant.

According to Table 3, the probability value of the environmental performance variable (X) is 0.0002<0.05, with a t count of 4.049008 >t Table 1. 67793. As a result, these findings support Hypothesis 1, which holds that environmental performance has a significant impact on economic growth. Table 2 also shows that the probability value of the environmental performance variable

Table 2: Results of regression analysis sub-structural 1

Variable	Coefficient	t-statistic	Probability
C	0.400731	11.77579	0.0000
EP_X	0.019027	3.859477	0.0003

R²: 0.240052

Table 3: Results of regression analysis sub-structural 2

Variable	Coefficient	t-statistic	Probability
C	0.400731	11.77579	0.0000
EP_X	0.007625	4.049008	0.0002
HE_Z	4.08E-05	3.341914	0.0016

Adjusted R²: 0.489495

(X) is 0.0003<0.05, with a t count value of 3.859477> t Table 1. 67722. As a result, these findings support Hypothesis 2, which states that environmental performance has a significant impact on health expenditure. Finally, according to Table 3, the probability value of the health expenditure variable (Z) is 0.0016<0.05, with a t count value of 3.341941> t Table 1. 67793. As a result, these findings support Hypothesis 3, which holds that health spending has a significant impact on economic growth.

In this study, the Sobel test will be used to test the mediation hypothesis, as stated in the previous section. The following are the results of the Sobel test that was carried out using the help of the website <http://quantpsy.org/sobel/sobel.htm>

The p-value of the Sobel test is 0.01<0.05, as shown in Figure 1 above. With a calculated t value of 2.51>1.96. As a result, hypothesis 4 is supported, which states that health spending can significantly mediate the effect of environmental performance on economic growth.

Furthermore, the value of the total determination coefficient can be seen to explain the value of the indirect effect of the health expenditure variable (Z) on environmental performance variables (X) and economic growth (Y). In this study, the total determination coefficient is 0.8498, or 84.98%.

5. DISCUSSION

5.1. The Effect of Environmental Performance on Economic Growth

According to the study’s findings, environmental performance has a significant impact on ASEAN economic growth from 2015 to 2019. This study’s findings are supported by the findings of Akadiri et al. (2019), who discovered that environmental performance (as measured by indicators of pollution) has an impact on economic growth (as measured by indicators of real income per capita) in a country. Bennett et al. (2017)’s economic growth theory, which states that poor environmental performance in the past and/or present has a significant impact on social, political, and economic life in the future, also supports the findings of this study.

Environmental performance is integral to organizational operations, as the environment is an integral component of the triple bottom line organization model. Consequently, it is imperative that every action carried out by the organization does not detrimentally affect the environment. The more adverse the impact of the organization’s activities on the environment, the worse its environmental performance will be; conversely, the lower the negative impact on the environment, the better its environmental performance will be. The inadequate environmental performance of an organization can be attributed to the lack of oversight by pertinent entities

Figure 1: Sobel test

Input:	Test statistic:	Std. Error:	p-value:
a 0.019	Sobel test: 2.51049697	0.03087835	0.01205614
b 4.08	Aroian test: 2.46289865	0.03147511	0.01378189
s _a 0.005	Goodman test: 2.56096611	0.03026983	0.01043815
s _b 1.22	Reset all	Calculate	

or organizations overseeing environmental management as a consequence of the organization's operations. According to the markers utilized in this study, it can be observed that the higher the CO₂ discharges produced by an organization's operations, the poorer the environmental performance of the organization. Hence, both the organization in question and the environmental monitoring agency must be able to abate or reduce the amount of CO₂ emissions generated on an annual basis.

5.2. The Effect of Environmental Performance on Health expenditure

The research results show that environmental performance has a significant effect on health expenditure in ASEAN in 2015-2019. This study's findings were supported by the findings of Anwar, et al (2021), who discovered that environmental performance (as measured by carbon dioxide emissions (CO₂)) has implications for health expenditure per capita. This study's findings are also supported by the findings of Charfeddine (2017), who demonstrated that environmental performance can have an effect on health expenditure. Poor environmental performance due to corporate activities can lead to a rise in health costs used to offset or ameliorate the effect produced by the organization. Conversely, good environmental performance can help reduce health expenditure. The sustained poor environmental performance will continue to have harmful effects on the environment and the ecosystems near the organization, such as air pollution, which has an influence on human health. Consequently, the costs for tackling air pollution and the costs for treating each individual will increase.

5.3. The Effect of Health expenditure on Economic Growth

According to the findings of the study, health expenditure had a significant impact on ASEAN economic growth from 2015 to 2019. This study's findings are supported by the findings of Dinçer and Yüksel (2019), who discovered that total health and public health expenditure have an impact on a country's economic growth in the long run. The findings of this study are also bolstered by Erçelik (2018) research, which discovered that health spending has an impact on a country's economic growth. Health expenditures that continue to increase to compensate or compensate for losses caused by poor environmental performance will ultimately hinder economic growth.

5.4. The Effect of Environmental Performance on Economic Growth Mediated by Health Expenditure

The research results show that health expenditure can mediate the effect of environmental performance on economic growth significantly in ASEAN in 2015-2019. This study's findings are supported by the findings of Khan's (2019) research, which shows that the effect of environmental performance on economic growth can be mediated by health expenditure. The findings of this study are also bolstered by study conducted by Charfeddine (2017) and Erçelik (2018), which discovered that environmental performance can influence health expenditure and thus economic growth. This study's findings are also in agreement with the findings of Khan et al. (2020) who found that the higher the environmental performance (with indicators of carbon dioxide emissions) in a country, the higher public health expenditure will also be. So that in the end, it will increase the obstacles to economic growth.

Excellent environmental performance can lead to a decrease in health expenditures due to the ramifications of organizational endeavors. This, in turn, can stimulate economic expansion. Conversely, inadequate environmental performance as a consequence of organizational activities can lead to a rise in health expenditure used to balance or alleviate the effect brought about by the organization. Simultaneously, it can put strain on economic growth as health expenditure remains on the upsurge.

6. CONCLUSION

This study examined the impact of environmental performance on economic growth in ASEAN countries, with health expenditure serving as a mediating agent. The results of the tests showed that (1) environmental performance affects economic growth, (2) environmental performance has an influence on health expenditure, (3) Health spending has an influence on the economy's growth, and (4) health expenditure can mediate the impact of environmental performance on economic growth. The analysis of the effect of carbon dioxide (CO₂) emissions on health expenditure and economic growth reveals that the ongoing expansion of emissions in ASEAN necessitates corporate environmental performance enhancement in order to boost the region's economic growth. The limitation of this study is that, when using emission footprint as an indicator of environmental performance, the direct impact that environmental performance has on economic growth is minimal. This suggests that there are other indicators of environmental performance that can have a more significant effect on economic growth. Consequently, it is proposed that further research should explore other metrics of environmental performance that can influence economic growth, such as ecological footprint, water footprint, energy footprint, and/or nitrogen footprint.

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