# The Nexus of Environmental Performance and Economic Growth: A Panel Analysis from Organization of Islamic Cooperation Countries

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**Keywords**
*Environmental Performance, EPI, Economic Growth, Panel Analysis, OIC Countries*

**Abstract**
Climate change continues to pose a critical threat to the planet, driven by human activities such as deforestation, fossil fuel consumption, and intensive livestock farming. These practices contribute significantly to the rise in greenhouse gas emissions, thereby intensifying global warning. The intricate link between human economic activities and environmental sustainability underscores the need to understand how environmental performance affects economic outcomes. This study evaluates the relationship between environmental performance and economic growth using panel data for Asian member states of the Organization of Islamic Cooperation (OIC) for the years 2020 to 2022. Data on Environmental Performance Index and Gross Domestic Product growth were collected from the Yale Center for Environmental Law & Policy and the World Bank. Panel data regression was used by selecting the best parameter estimates from three panel data regression models, namely Common Effect Model (CEM), Fixed Effect Model (FEM), and Random Effect Model (REM). The findings reveal that Air Quality (AQ) has a statistically significant negative effect on Gross Domestic Product (GDP). In contrast, Waste Management (WM), Water and Sanitation (WS), and Heavy Metals (HM) do not have a statistically significant effect on GDP. However, Environmental Health (EH), when considered collectively, demonstrates a significant influence on economic growth.

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## 1. Introduction

The Environmental Performance Index (EPI) is a strongly performance-oriented composite index. It offers a scorecard that highlights leaders and laggards in environmental performance and provides practical guidance for countries that aspire to move toward a sustainable future. Currently, EPI is focused on climate performance in anticipation of major policy discussions on countries' commitments to mitigating greenhouse gas emissions. The EPI team emphasizes that climate change is linked to other policy objectives, exacerbating public health, biodiversity loss, agricultural inefficiency, and many other environmental issues (Yale Center for Law & Policy, 2022).

Asia faces a wide array of environmental issues. Mass deforestation is one of the most significant environmental concerns that the region is currently grappling with. The primary factors contributing to this issue are land clearance for agricultural activities and logging. From 2001 to 2019, Southeast Asia experienced deforestation in an area of around 235,500 square miles, larger than the size of Ukraine, with 50% of clearance happening in Indonesia. Indonesia and Myanmar rank among the top ten nations impacted by deforestation, with a decrease in forest area of 22.28% and 27.22%, respectively, from 1990 to 2020 (FEBIS, 2023).

The availability of water is also a major challenge. Based on data from the Economic and Social Commission for Asia and the Pacific (2018), the proportion of water available has reduced because of the amount used for agriculture. The proportion of water withdrawn for agriculture was more than 90% for 13 countries in the region, with particularly high rates in Central Asia. Agriculture serves as the primary catalyst for freshwater extraction in Asia, but there has also been a notable shift in the ratio of water used from rural to urban areas due to the process of urbanization. The anticipated decline in freshwater availability in low latitude countries, such as intensively watered regions in China and India, is closely associated with climate change.

In terms of material resource use (comprising fossil fuels, biomass, metals, and non-metallic minerals), the Asia-Pacific region is the most resource-intensive region in the world, both in terms of domestic material consumption and material footprint. While the world average is only 1.2 kg of domestic material consumption per dollar of economic output, this amount is roughly double in the Asia-Pacific region at approximately 2kg (Economic and Social Commission for Asia and the Pacific, 2018).

Poor air quality is also a dangerous problem in Asia. Based on the Air Quality Life Index report released in August 2023, Indonesia, China, India, Pakistan, Bangladesh, and Nigeria contribute 75% of the total global air pollution burden due to high levels of air pollution and large population (BBC News, 2023).

Natural damage will have an impact for decades to come and could even be permanent. Human economy and the natural world are closely connected. Without an untouched natural environment, no development can be sustained (Chowdhury & Islam, 2017). The impact of environmental damage and the costs incurred by the state to overcome its damage will affect a country's economic growth.

This research aims to discuss environmental performance and economic growth. Research on similar topics has been conducted previously. Samimi et al. (2011) investigates the relationship between environmental performance and economic growth in the Organization of Islamic Cooperation (OIC) countries during the years 2006-2008. Chowdhury & Islam (2017) investigated the relationship between environmental performance and GDP growth rate in BRICS countries. Research by Zhang et al. (2020) investigated energy and environmental efficiency in central and western European countries using the Data Envelopment Analysis (DEA) method. Jain et al. (2023) investigated the relationship between economic growth and environmental performance using a large sample of data from 180 countries over the period 2002 to 2017. The previous research on this matter is explained in more detail in the literature review section.

Different from existing research, this article measures the relationship between environmental health and economic growth using the latest data available: from 2020 to 2022. The selection of data for 2020 is based on the Environmental Performance Index report published by Yale Center for Environmental Law & Policy. In 2020, for the first time, the Yale Center for Environmental Law & Policy raises not only the issue of air quality, sanitation & drinking water, heavy metals on Environmental Health, but also waste management issues.

This study aims to evaluate the relationship between Environmental Performance and economic growth using panel data in Asian member states of the OIC from 2020 to 2022. This paper is structured as follows. Section 2 presents the theories relating to research. Section 3 describes data and methodology used in research. Section 4 presents the results and the discussion. Section 5 concludes the result and provides the relevant recommendations.

## 2. Literature Review

### *2.1. Economic Growth*

Economic growth is a process of continuous changes in the economic conditions of a country towards a better state over a certain period. To measure economic growth, Gross Domestic Bruto (GDP) is a crucial measure (Hutahaean, 2019). GDP is the production value of goods and services produced by production units in a country within a certain period. There are four components of GDP; household consumption, investment, government spending and net exports.

### *2.2. Environmental Health*

The Environmental Performance Index (EPI) is a method for measuring and numerically marking the environmental performance of a country's policies, highlighting the degradation of the planet's life-supporting systems that humans rely on. The 2022 Environmental Performance Index (EPI) provides a data-based summary of sustainability conditions worldwide. Using 40 performance indicators across 11 problem categories, the EPI ranks 180 countries based on their progress in improving environmental health, protecting ecosystem vitality, and mitigating climate change (Yale Center for Law & Policy, 2022).

The overall EPI ranking shows which countries are the best at addressing the environmental challenges faced by each country. Exceeding the aggregate score and tracing data to analyze performance based on problem categories, policy objectives, peer groups, and countries provides greater value for policymakers. Detailed views and comparative perspectives can help in understanding the determinants of environmental progress and in refining policy choices (Yale Center for Law & Policy, 2022).

In 2020, for the first time, the Yale Center for Environmental Law & Policy raises not only the issue of Air Quality, Sanitation and Drinking Water, Heavy Metals on Environmental Health, but also Waste Management issues. Air quality consists of several indicators in the form of PM2.5 (Particulate matter having a diameter ≤2.5 microns), Household Solid Fuels, Ozone, Nitrogen Oxides, Sulfur Dioxide, Carbon Monoxide, and Volatile Organics. Sanitation and Drinking Water consists of Unsafe Sanitation and Unsafe Drinking Water. Heavy Metals is represented by Lead Exposure. While Waste Management consists of Controlled Solid Waste, Recycling, and Ocean Plastics (Yale Center for Law & Policy, 2022).

### *2.3. Previous Studies*

Samimi et al. (2011) investigates the relationship between environmental performance and economic growth in OIC countries during the years 2006-2008. The paper concluded that there is a positive and significant relationship between environmental performance and economic growth in OIC countries during the studied period. The paper also found that the positive impact is higher for countries with higher income levels and that countries with a higher share of industry and manufacturing sectors in their GDP have a lower EPI score, due to the higher level of pollution issued by these sectors.

Chowdhury & Islam (2017) investigated the relationship between environmental performance and GDP growth rate in BRICS countries. The authors used econometric analysis and regression analysis to analyze the data. The results of the study showed that there is a negative relationship between environmental performance and GDP growth rate in BRICS countries. This means that as the environmental performance of a country improves, its GDP growth rate tends to decrease. The paper also found that the relationship between environmental performance and GDP growth rate is stronger in countries with higher levels of economic development.

Zhang et al. (2020) investigated energy and environmental efficiency in central and western European countries using the DEA method. The results indicated that the United Kingdom ranked the highest in energy and environmental efficiency, followed by Ireland. The study emphasized the importance of enhancing energy efficiency for sustainable economic growth and environmental protection in the region. The findings also suggested policy recommendations to reduce vertical fiscal imbalances to enhance environmental capacity and efficiency of local governments. Additionally, the study highlighted the impact of industrial upgrading on carbon emissions and the need to restrict self-interested investment preferences of local governments to promote environmental protection. The research discussed the potential for sustainable economic growth through energy efficiency in central and western European countries, emphasizing the need for reform in the energy sector in most of the countries in the region.

Jain et al. (2023) investigated the relationship between economic growth and environmental performance using a large sample of data from 180 countries over the period from 2002 to 2017. The study tested the Environmental Kuznets Curve (EKC) hypothesis, which defines the relationship between economic growth and environmental deterioration. The results suggest a negative association between

economic growth (proxied by per capita GDP) and environmental performance (proxied by Environmental Performance Indices) in certain regions, such as Asia, Eastern Europe, and North America, indicating that higher economic growth may be detrimental to environmental performance.

Unlike previous studies, this research examines the relationship between environmental health and economic growth using the latest data, specifically from the years 2020 to 2022. The research focuses on selected Muslim countries in the Asian region. Additionally, the measurement of environmental health in this study uses the latest standards from the Yale Center for Environmental Law & Policy, which not only raises the issue of air quality, sanitation & drinking water, and heavy metals on environmental health, but also waste management issues.

## 3. Research Methodology

This study employs a quantitative approach to assess the correlation between environmental performance and economic growth utilizing panel data regression from Asian member states of the OIC during the period of 2020 to 2022. The sample population consists of 23 Asian countries which are members of the OIC. Data for all variables and countries were sourced from the Yale Center for Environmental Law & Policy and the World Bank database spanning from 2020 to 2022. Since data from the Yale Center is published biennially, the intervening years are filled with averages. The countries, GDP and environmental health scores listed in Table 2.

Table 1. Description of Variables

| Variables | | Measurements | Description | Data Sources |
|---|---|---|---|---|
| Dependent variable | Economic growth | Gross Domestic Product (GDP) | Gross Domestic Product (current US$) | World Bank |
| Independent variables | Environmental Health | Air Quality (AQ) | Environmental Performance Index scores on air quality | Yale Center for Environmental Law & Policy |
| | | Water & Sanitation (WS) | Environmental Performance Index scores on sanitation & drinking water | Yale Center for Environmental Law & Policy |
| | | Heavy Metals (HM) | Environmental Performance Index scores on heavy metals | Yale Center for Environmental Law & Policy |
| | | Waste Management (WM) | Environmental Performance Index scores on waste management | Yale Center for Environmental Law & Policy |

Table 1. presents a description of the variables used in the study. The dependent variable in this study is economic growth as measured by GDP that is obtained from the World Bank. The independent variable consists of environmental health which is categorized into four types; AQ, WS, HM, and WM. Data for the four categories were obtained from the Yale Center for Environmental Law & Policy.

Panel data regression was used by selecting the best parameter estimates from three panel data regression models; Common Effect Model (CEM), Fixed Effect Model (FEM), and Random Effect Model (REM). According to Gujarati (2024), regression using panel data combines cross-sectional and time-series data, resulting in more observations and a more comprehensive assessment than using solely cross-sectional and time-series data.

## 4. Results and Discussion

This study aims to describe the relationship between environmental performance and economic growth using panel data in Asian member states of the OIC from 2020 to 2022.

Table 2. GDP and Environmental Health Score

| Year | Countries | AQ | WS | HM | WM | EH | GDP |
|---|---|---|---|---|---|---|---|
| 2020 | Afghanistan | 17.7 | 28.0 | 0.0 | 0.0 | 20.0 | 19955929061 |
| | Azerbaijan | 24.9 | 45.5 | 41.0 | 0.0 | 32.7 | 42693000000 |
| | Bahrain | 41.2 | 56.6 | 58.7 | 60.4 | 49.2 | 34621807713 |
| | Bangladesh | 20.2 | 27.3 | 23.2 | 5.0 | 22.4 | 3.73902E+11 |
| | Brunei Darussalam | 68.4 | 85.6 | 68.4 | 42.5 | 74.0 | 12005799654 |
| | Indonesia | 26.8 | 28.4 | 34.6 | 49.8 | 29.0 | 1.05905E+12 |
| | Iran | 49.2 | 53.6 | 27.4 | 19.0 | 48.3 | 2.39735E+11 |
| | Iraq | 36.3 | 49.6 | 29.6 | 0.0 | 39.5 | 1.80924E+11 |
| | Jordan | 58.0 | 62.6 | 46.7 | 43.1 | 58.6 | 43700383099 |
| | Kazakhstan | 32.0 | 55.1 | 52.8 | 2.2 | 40.8 | 1.71082E+11 |
| | Kuwait | 55.0 | 67.4 | 56.8 | 0.0 | 57.3 | 1.05949E+11 |
| | Kyrgyzstan | 27.0 | 45.5 | 40.8 | 0.0 | 33.7 | 8270468614 |
| | Lebanon | 47.8 | 59.7 | 43.6 | 61.4 | 53.1 | 31712128254 |
| | Malaysia | 50.3 | 57.6 | 62.1 | 81.4 | 55.4 | 3.37456E+11 |
| | Oman | 36.4 | 58.3 | 37.0 | 0.0 | 43.4 | 75909397659 |
| | Pakistan | 9.9 | 17.4 | 23.0 | 31.1 | 14.6 | 3.00426E+11 |
| | Qatar | 48.6 | 66.5 | 59.2 | 60.2 | 56.9 | 1.44411E+11 |
| | Saudi Arabia | 37.4 | 59.3 | 35.4 | 61.4 | 47.2 | 7.34271E+11 |
| | Tajikistan | 15.2 | 30.9 | 15.7 | 0.0 | 20.7 | 8133963813 |
| | Turkmenistan | 42.0 | 47.3 | 43.5 | 59.2 | 45.0 | 45818000000 |
| | United Arab Emirates | 48.6 | 67.2 | 54.3 | 26.8 | 55.2 | 3.49473E+11 |
| | Uzbekistan | 15.0 | 52.0 | 27.8 | 0.0 | 29.7 | 60224701297 |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| | Maldives | 51.2 | 47.8 | 55.4 | 9.6 | 48 | 3712604580 |
| 2021 | Afghanistan | 16.6 | 28.05 | 0 | 2.2 | 18 | 14266499430 |
| | Azerbaijan | 23.5 | 45.55 | 40.7 | 15.4 | 31.7 | 54825411765 |
| | Bahrain | 37.95 | 56.6 | 58.35 | 61.4 | 47.25 | 39288670213 |
| | Bangladesh | 17.3 | 27.35 | 23 | 7.7 | 20.25 | 4.16265E+11 |
| | Brunei Darussalam | 65.05 | 85.65 | 68 | 51.1 | 71.05 | 14006496617 |
| | Indonesia | 24.15 | 28.45 | 34.3 | 39.6 | 27.15 | 1.18651E+12 |
| | Iran | 45.4 | 53.65 | 27.15 | 23.8 | 45.1 | 3.59097E+11 |
| | Iraq | 34.05 | 49.65 | 29.35 | 10.5 | 37.25 | 2.07692E+11 |
| | Jordan | 54.35 | 62.65 | 46.4 | 41.5 | 55.4 | 46296100141 |
| | Kazakhstan | 30.3 | 55.15 | 52.5 | 14.9 | 39.15 | 1.97112E+11 |
| | Kuwait | 51 | 67.45 | 56.45 | 16.2 | 54.4 | 1.37384E+11 |
| | Kyrgyzstan | 25.25 | 45.55 | 40.5 | 3.6 | 31.4 | 9249133946 |
| | Lebanon | 44.5 | 59.75 | 43.3 | 52.9 | 49.7 | 23131941557 |
| | Malaysia | 47 | 57.6 | 61.75 | 57.6 | 51.7 | 3.73832E+11 |
| | Oman | 34.1 | 58.3 | 36.75 | 16.4 | 41.2 | 88191977373 |
| | Pakistan | 7.8 | 17.45 | 22.75 | 23.5 | 13 | 3.48517E+11 |
| | Qatar | 45.35 | 66.55 | 58.8 | 60.4 | 54.3 | 1.79732E+11 |
| | Saudi Arabia | 35.1 | 59.3 | 35.15 | 60.9 | 44.8 | 8.74156E+11 |
| | Tajikistan | 13.7 | 30.9 | 15.5 | 3.2 | 18.65 | 8937805347 |
| | Turkmenistan | 40.35 | 47.35 | 43.2 | 53.9 | 43.65 | 50007428571 |
| | United Arab Emirates | 45.15 | 67.2 | 53.95 | 35.1 | 52.3 | 4.15179E+11 |
| | Uzbekistan | 15.85 | 52.05 | 27.55 | 7.9 | 28.1 | 69600614987 |
| | Maldives | 51.6 | 47.8 | 55.05 | 17.3 | 48.25 | 5254366310 |
| 2022 | Afghanistan | 15.5 | 28.1 | 0 | 4.4 | 16.0 | 10199124549 |
| | Azerbaijan | 22.1 | 45.6 | 40.4 | 30.8 | 30.7 | 78721058824 |
| | Bahrain | 34.7 | 56.6 | 58 | 62.4 | 45.3 | 44383297872 |
| | Bangladesh | 14.4 | 27.4 | 22.8 | 10.5 | 18.1 | 4.60201E+11 |
| | Brunei Darussalam | 61.7 | 85.7 | 67.6 | 59.7 | 68.1 | 16681536467 |
| | Indonesia | 21.5 | 28.5 | 34 | 29.5 | 25.3 | 1.3191E+12 |
| | Iran | 41.6 | 53.7 | 26.9 | 28.7 | 41.9 | 4.13493E+11 |
| | Iraq | 31.8 | 49.7 | 29.1 | 21.1 | 35.0 | 2.64182E+11 |
| | Jordan | 50.7 | 62.7 | 46.1 | 40.0 | 52.2 | 48653381781 |
| | Kazakhstan | 28.6 | 55.2 | 52.2 | 27.7 | 37.5 | 2.25496E+11 |
| | Kuwait | 47 | 67.5 | 56.1 | 32.3 | 51.5 | 1.75363E+11 |
| | Kyrgyzstan | 23.5 | 45.6 | 40.2 | 7.2 | 29.1 | 11543966559 |
| | Lebanon | 41.2 | 59.8 | 43 | 44.4 | 46.3 | 16873251644 |
| | Malaysia | 43.7 | 57.6 | 61.4 | 33.8 | 48.0 | 4.07027E+11 |
| | Oman | 31.8 | 58.3 | 36.5 | 32.8 | 39.0 | 1.14667E+11 |
| | Pakistan | 5.7 | 17.5 | 22.5 | 15.8 | 11.4 | 3.74697E+11 |
| | Qatar | 42.1 | 66.6 | 58.4 | 60.6 | 51.7 | 2.36258E+11 |
| | Saudi Arabia | 32.8 | 59.3 | 34.9 | 60.3 | 42.4 | 1.10857E+12 |
| | Tajikistan | 12.2 | 30.9 | 15.3 | 6.4 | 16.6 | 10492123388 |
| | Turkmenistan | 38.7 | 47.4 | 42.9 | 48.5 | 42.3 | 56542857143 |
| | United Arab Emirates | 41.7 | 67.2 | 53.6 | 43.4 | 49.4 | 5.07064E+11 |
| | Uzbekistan | 16.7 | 52.1 | 27.3 | 15.9 | 26.5 | 80391853887 |
| | Maldives | 52 | 47.8 | 54.7 | 25.0 | 48.5 | 6170638747 |

Table 2 shows the statistical data of the selected countries. In 2020, the highest (best) scores (highlighted in green) for air quality (AQ), water and sanitation (WS), and heavy metals (HM) was recorded by Brunei Darussalam. Meanwhile, Malaysia has the highest waste management (WM) score. Pakistan has the lowest (worst) (worst) score (highlighted in red) for AQ and WS. The lowest score for HM was recorded by Afghanistan. Meanwhile, the lowest scores (0.0) for WS were recorded by Afghanistan, Azerbaijan, Iraq, Kuwait, Kyrgyzstan, Oman, Tajikistan, and Uzbekistan. WM was a new issue covered for the first time in the 2020 EPI. The highest GDP figure was seen by Indonesia, while the lowest GDP recorded by the Maldives.

In 2021, Brunei Darussalam had the highest scores for AQ, WS, and HM. Meanwhile, Bahrain had the highest WM score. Pakistan had the lowest scores for AQ and WS. Meanwhile, Afghanistan had the lowest scores for HM and WM. The highest GDP figure in 2021 was still recorded by Indonesia, and the lowest GDP was again scored by the Maldives.

In 2022, Brunei Darussalam again saw the highest scores for Air AQ, WS, and HM. Bahrain also still had the highest WM score, while Pakistan maintained the lowest scores for AQ and WS. Meanwhile, Afghanistan had the lowest score for HM and WM. The highest GDP figure was again recorded by Indonesia, and the lowest GDP by the Maldives.

The statistical data in Table 2 shows that there is a negative relationship between overall environmental health (EH) and GDP. Even though Brunei Darussalam consistently had the highest EH scores for 2020-2022, it experienced a downward trend, as the country's GDP increased across this period. The same thing happened in Pakistan. Pakistan consistently had the lowest EH ratio for 2020-2022, with a continuing downward trend. However, Pakistan's GDP actually increased over this period.

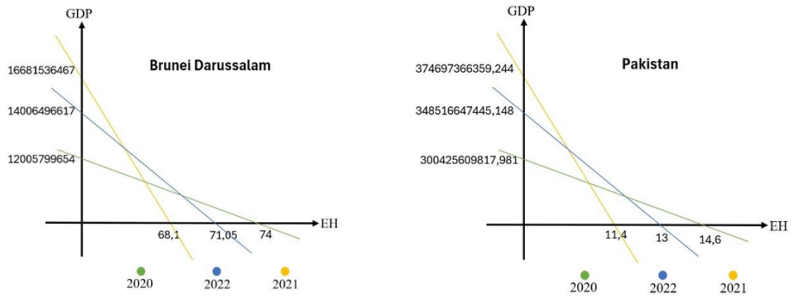


Figure 1. Relationship between EH and GDP in Brunei Darussalam and Pakistan (2020-2022)

However, regression tests were still carried out to prove the existence of a relationship between EH and GDP. This research uses panel data regression. In selecting the best model, this research carried out the Chow test and Hausman test with the following results.

Table 3. Chow Test

| Effects Test | Statistic | d.f. | Prob. |
|---|---|---|---|
| Cross-section F | 96.0486 | (22,42) | 0.0000** |
| Cross-section Chi-squares | 271.7157 | 22 | 0.0000** |

Note: (**) reject null hypothesis at alpha 5% of significant level.

Table 3 shows the results of the Chow test. A Chow test was used to see the best model between the CEM model and the FEM model, with the null hypothesis as the CEM model. The chow test results show the probability value of 0.000 < 0.05. This rejects the null hypothesis or the CEM model and accepts the FEM model.

Table 4. Hausman Test

| Test Summary | Chi-Sq. Statistic | Chi-Sq. d.f. | Prob. |
|---|---|---|---|
| Cross-section random | 8.380134 | 4 | 0.0786** |

Note: (**) means reject null hypothesis at alpha 5% of significant level

Then a Hausman test was used to choose the best model between the FEM model and the REM model, with the null hypothesis as the REM model. Table 4 shows the results of the Hausman test. The probability value is 0.0786 > 0.05, meaning the FEM model is rejected and the REM model is accepted. Therefore, the model used in this study is the random effect model.

Table. 5 Random Effect Model

| Variable | Coefficient | Std. Error | t-Statistic | Prob. |
|---|---|---|---|---|
| C | 3.63E+11 | 2.05E+11 | 1.771151 | 0.0813 |
| AQ | -1.27E+10*** | 2.66E+09 | -4.784754 | 0.0000 |
| WM | 1.68E+08 | 7.04E+08 | 0.238312 | 0.8124 |
| WS | 1.66E+09 | 5.92E+09 | 0.279977 | 0.7804 |
| HM | 5.37E+09 | 5.92E+09 | 0.907299 | 0.3677 |
| R-squared | 0.269703 | F-statistic | 5.908881 | |
| Adj. R-squared | 0.224059 | Prob(F-statistic) | 0.000413 | |

Note: (***) asterisk suggests the significant at 1%.

Based on the regression results above, the equation obtained is as follows:

$GDP_{it} = \alpha - \beta 1AQ_{it} + \beta_2 WM_{it} + \beta_3 WS_{it} + \beta_4 HM_{it} + \varepsilon it$

$GDP_{it} = 3.63E + 11 - 1.27E + 10AQ_{it} + 1.68E + 08WM_{it} + 1.66E + 09WS_{it} + 5.37E + 09HM_{it} + \varepsilon it$

Where:

| | |
|---|---|
| GDP : Economic growth | WM : Waste Management |
| AQ : Air Quality | $\alpha$ : The constant |
| WS : Water & Sanitation | $\varepsilon$ : Error term |
| HM : Heavy Metals | |

From the equation above, the constant value of 33.63E+11 indicates that if the independent variable in period t is constant, then the GDP value is 363,000,000,000 (363 billion). The AQ regression coefficient value of -1.27E+10 means that if the AQ value in period t increases by 1 point, then the GDP value will decrease by 12,700,000,000 (12.7 billion). The WM regression coefficient value of 1.68E+08 means that if the WQ value in period t increases by 1 point, then the GDP value will increase by 168,000,000 (168 million). The WS regression coefficient value of 1.68E+09 means that if the WS value in period t increases by 1 point, then the GDP value will increase by 1,660,000,000 (1.66 billion). Lastly, the HM regression coefficient value of 5.37E+09 means that if the HM value in period t increases by 1 point, then the GDP value will increase by 5,370,000,000 (5.37 billion).

In Table 5, regression results show that AQ has a significant negative influence on GDP. This can be seen from the probability value of 0.0000, smaller than the 5% significance level (0.0000 < 5%). Meanwhile, WM, WS, and HM do not have a significant influence on GDP.

Simultaneously, EH has a significant influence on GDP. This can be seen from the Prob(F-statistic) of 0.000413, smaller than the 5% significance level (0.000413 < 5%). The R-squared obtained is 0.269703. It means 26.97% of dependent variables can be explained by independent variables, while 73.03% is explained by other variables.

### *4.1. Impact of Environmental Health on GDP*

The EPI report divides environmental health into four issues: air quality, waste management, water and sanitation, and heavy metals. In this research, air quality has a significant negative influence on GDP, while waste management, water and

sanitation, and heavy metals do not have a significant influence.

Poor air quality is one of the most serious global public health issues, resulting in over six million premature deaths each year (Health Effects Institute, 2020). Over 99% of the global population still breathes unsafe air (World Health Organization, 2022). Urbanization and industrialization continue to emit dangerous levels of air pollutants, presenting a challenge to policymakers as they aim to develop sustainability.

In 2021, air pollution continued to increase in South Asia, home to the world's most highly-polluted nations. Sustained exposure to particulate pollution is reducing the life spans of South Asians by 5.1 years. The toll is even greater in the most polluted areas. Air pollution is also a major burden in Southeast Asia. Virtually all of Southeast Asia's 673.7 million people live in areas with fine particulate pollution that is considered unsafe by the WHO. This pollution cuts the life expectancy of the average Southeast Asian person by 1.6 years, relative to what it would be if the WHO guideline was met. In some of the most polluted areas, residents are losing up to 3.5 years of life expectancy (Air Quality Life Index, 2023).

AQ scores in EPI rankings indicate which countries are best addressing the environmental challenges that every nation faces. Air pollution is a major problem, so it requires significant expenditure from the state to overcome air pollution. The large costs allocated to overcome natural damage will cut into the allocation of other nation initiatives. This will affect the economic growth of a country.

For instance, in Jakarta, Indonesia, air pollution causes economic losses. Air pollution has cost the Indonesian economy IDR 21.5 trillion (USD 1,48 billion) (Sindonews, 2020) and in 2021, the government of Malaysia spent about MYR 2.2 billion (USD 530.8 million) on environmental protection through pollution management (Statista, 2023). Pakistan also needs to make significant changes to its development path and policies, which will necessitate significant investments in people-centric climate adaptation and resilience. These changes will require international support, according to the World Bank Group's Country Climate and Development Report for Pakistan. Pakistan's GDP is expected to decline by at least 18% to 20% by 2050 as a result of the combined hazards of catastrophic climate-related events, environmental deterioration, and air pollution. This will impede the advancement of economic growth and the fight against poverty (World Bank, 2022).

Bangladesh has been suffering from severe air pollution, indicating its

struggles in maintaining environmental and public health standards amidst rapid urbanization and industrialization. Between 2015 and 2021, the country received a total of $2.4 billion from international development funding, directed towards the implementation of the air quality programme. This extensive financial support indicates the fact that Bangladesh's air pollution problems have been globally recognized, they are affecting health and economy significantly. However, despite the fact that large sums of money have been invested, the continued absence of clean air signals the probable inadequacy of financial resources, unless these are supplements by improved governance, pro-people policies, and stakeholder support to tackle the sources of pollution such as industrial emissions, vehicular pollution, and poor waste-management practices. The situation is feeding the significance of not only targeted public funding but also a more comprehensive structural change through reformed approaches to handle the air pollution consequences (Molla, 2024).

The results of this research are in line with research by Jain et al. (2023), who found that regional and income level dynamic panel results establish the non-linear relationship between economic activities and environmental performance. It is important to note that for Asia, Eastern Europe, Latin America, the Middle East, and the Pacific, greater economic activities would be deleterious for the health of the environmental ecosystem of these nations. At the same time, it is expected that after reaching a tipping point, more growth would be positively impacting the environmental performance of these nations.

## 5. Conclusion

This study employed a quantitative approach to assess the correlation between environmental performance and economic growth utilizing panel data regression from Asian member states of the OIC during the period 2020 to 2022. By choosing the best model of panel data regression model, this paper found that air quality has a significant negative influence on GDP. Meanwhile, waste management, water and sanitation, and heavy metals do not have a significant influence on GDP. A negative relationship between Air Quality (AQ) scores and GDP can occur due to the large allocation of costs for addressing air quality issues, which can reduce attention to other initiatives that could boost economic productivity.

Concerns about environmental damage need to be addressed from the point of view of sustainable development. Economic growth often comes with environmental damage, especially in low-income and lower middle-income

countries. As a result, it is important to know how equitable growth would affect environmental quality. Policy makers therefore need to consider how equitable growth could affect the long-term health of the environment compared to unequal growth.

This research is limited to 2020 till 2022 and only assesses selected countries. The EPI report only publishes data once every two years, meaning the 2021 data used in this research is the average data from 2020 and 2022. In addition, the years of the study were also the peak period of the COVID-19 pandemic, which affected the economic growth of many countries. Future researchers could measure more variables, including not only environmental health issues but also ecosystem vitality and climate change issues. In addition, future researchers could cover a longer time period if possible.

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