



## Human Development and Country Governance as Determinants of Environmental Performance

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**Abstract:** With climate change rapidly becoming a more pressing issue in recent years, many governments have realized that they could not isolate environmental performance apart from other measures of development. As such, this study seeks to investigate the relationship of human development and governance to environmental performance. Using multivariate linear regression on cross-country data for 2010, it was found that human development and governance are directly and significantly related with environmental performance. It was further found that a country's economic development category is not a significant predictor of environmental performance. This study provides additional evidence on the nature of the relationship of human development and governance to environmental performance to guide policy makers and implementers in pursuing sustainable development through improved human development and governance initiatives and programs.

**Keywords:** governance index, human development index, environmental performance index, sustainable development, environment management, environmental sustainability

### 1. INTRODUCTION

Today, climate change has become a fact as the world endures the unpredictable wrath of nature as a result of unsustainable and wasteful human activities through the years. Natural calamities and disasters are occurring more often in unusual places such that livelihood is grossly affected. For instance, an increase in the amount of rainfall may bring about a decrease in crop yield and may even contribute to health deterioration and eventual displacement of people living in low-lying areas that are now flooded.

While the effects of climate change have greatly been felt and noticed recently, the United Nations has already included environmental concerns in its agenda as early as 1972 during the Stockholm Conference which gave rise to the creation of the United Nations Environment Programme (UNEP). Such concern for environment was again highlighted in the 1992

Earth Summit in Rio de Janeiro which produced the Rio Declaration on Environment and Development and Agenda 21. Commitments were renewed and enhanced in 2012 during the "Rio+20" United Nations Conference on Sustainable Development (UNCSD) which also marks the 20th anniversary of the Rio Conference. Commitment of UN member-states to these environmental agenda is voluntary and the implementation of related strategies in the respective country largely depends upon the level of governance.

The Philippines, for example, ranked 42nd among 132 countries in the 2012 Environmental Performance Index prepared by Yale and Columbia universities. It now belongs to the strong performers group, even beating the United States, Australia, Singapore and South Korea to name a few. According to Environment and Natural Resources Secretary Ramon Paje as reported by Punongbayan (2012) of the Philippine



Star, the strong regulatory efforts of the government achieved a decline in the amount of total suspended particulates (TSPs), a measure of air pollution, from 166 µg/Ncm (micrograms per normal cubic meter) in June 2010 to 116 µg/Ncm toward the end of 2011. The World Health Organization set 90 µg/Ncm as the normal standard for TSP because too much of these particulates can severely contribute to respiratory infections and other diseases. Moreover, Paje also mentioned about the moratorium of cutting of trees in natural and residual forests in the country, and that 10M board feet of illegal logs and lumber were confiscated and 452 cases were filed against violator of forestry laws. Furthermore, he mentioned about the National Greening Program that includes planting of 1.5B trees in 1.5M hectares of land in a six-year period.

The government was already able to plant 69M seedlings in at least 118,000 hectares nationwide. These must have been the reasons why the Philippines gained perfect scores in the following indicators: outdoor air pollution, change in forest cover, and growing stocks in forests.

There seems to be a positive relationship between good country governance and environmental performance. While countries strive for better living condition for their citizens, economic development seems to be a primary concern as this development would bring improvement in the society. However, economic development, at certain stage of growth, is pursued at the expense of natural environment. Hence, the United Nations as well as the World Bank and International Monetary Fund, are promoting sustainable development which would provide progress to the current generation as well as future generations towards better human living condition. The focal point of this drive to provide better living condition to each of the countries' citizens would be human development that extends to future generations. Improved human development includes access to better employment, better health services, more exercise of civil and political rights, cleaner air and water, and increased literacy. With this, we also see a

positive relationship between human development and environmental performance.

This relationship between country governance and environmental performance as well as between human development and environmental performance are the subject of this study. Specifically, the study aims to: (1) determine whether country governance has significant impact on environmental performance, (2) determine whether human development has significant impact on environmental performance, and (3) whether the level of economy of the country also significantly affects environmental performance.

This study seeks to contribute additional evidence on the nature of the relationship of human development and governance to environmental performance and hopefully presents a more convincing impetus for policymakers and policy implementers to aggressively pursue sustainable development goals through human development and governance.

## 2. REVIEW OF RELATED LITERATURE

### 2.1 Environmental Performance

Climate change does not favor a particular type in of economy. The effects of carbon dioxide emission have no boundary. The excessive emission of one country affects the rest of the countries in the world as greenhouse gases cannot be contained in just one country. We have seen numerous calamities that are believed to have been brought by climate change. "As climate change is economy neutral, mitigation measures must seriously consider how to bring both the developed and the developing world together in developing strategies that are mutually reinforcing and environmentally sustainable" (Hossain & Selvanathan, 2011, p. 28).

In the 2010 Environmental Performance Index (EPI) Report, the index is presented to have two major components which are embodied in



these objectives: environmental public health and ecosystem vitality. Environmental public health which is 50% of the EPI rating has the following indicators: environmental burden of disease, access to drinking water, access to sanitation, urban particulates, and indoor air pollutions. The other half of the EPI rating is contributed by ecosystem vitality which has 20 subcomponents and one of these is greenhouse gas emissions, an indicator under the climate change policy category. Other indicators within ecosystem vitality serve to measure improvement in policy categories of forestry, fisheries, agriculture, biodiversity & habitat, and the effect of water & air pollution on ecosystem.

Global Sherpa (2010) stated that when the ranking is based only on the environmental public health component rather than the index, it would be the more highly developed countries taking the higher ranks. It was further mentioned that there is an evidence of trade-off between environmental public health and ecosystem vitality with the conclusion that developed countries tend to have higher ratings in environmental health while developing countries have better ratings in the ecosystem vitality component.

## 2.2 Country Governance

In 1992 Rio Earth Summit, attending countries signed the Rio Declaration in which Principle 7 states: "In view of the different contributions to global environmental degradation, States have common but differentiated responsibilities" (United Nations Conference on Environment and Development, 1992). This means that all countries have common responsibility to protect the environment. It also emphasizes that countries differ in responsibilities in the sense each country has different contribution to the environmental problems and also they have different capacities to mitigate its effects or even prevent worsening conditions. Developed countries acknowledged their greater responsibility because of their prior environmental exploits and their financial power to work on solutions. Moreover, the same document also stated that environmental

protection should be an integral part of the development process; hence, countries "should eliminate unsustainable patterns of production and consumption and promote appropriate demographic policies" to ensure sustainable development. It has been observed that Asia has an increasing economic development trend. While developed nations are not in opposition to this growth pattern, what they are pushing for is a limit to greenhouse gas emission through policies on renewal energy and use of technologies that promote both growth and pollution reduction (Someshwar, 2008).

In 1987, the World Commission on Environment and Development (WCED), through its publication entitled "Our Common Future," has defined sustainable development as "development that meets the need of the present without compromising the ability of the future generations to meet their own needs" (WCED, 1987, p. 2). Central to the attainment of sustainable development is the role of the government. The World Bank stated that: "Government must maintain a central role. Private markets provide little or no incentive for curbing pollution. Whether it be air pollution in urban centres, the dumping of unsanitary wastes in public waters of the overuse of land whose ownership is unclear, there is compelling case for public action" as quoted by Gill, Singh and Matwah (2010).

Needless to say, the government has a big part in environment protection and conservation towards sustainable development. It has a big mandate to towards promoting environmental wellness; hence, it can greatly influence environmental performance of the country. The World Bank Worldwide Governance Indicators (WGI) Project defines governance as: "the set of traditions and institutions by which authority in a country is exercised. This includes (1) the process by which governments are selected, monitored and replaced, (2) the capacity of the government to effectively formulate and implement sound policies, and (3) the respect of citizens and the state for the institutions that govern economic and social interactions among them." It has six dimensions, namely: voice and accountability,



political stability and absence of violence, government effectiveness, regulatory quality, rule of law, and control of corruption.

Based on these premises, the hypotheses tested are thus:

$H_{1o}$  = country governance has no significant impact on environmental performance

$H_{1a}$  = country governance has a significant impact on environmental performance

### 2.3 Human Development

The Human Development Index (HDI) prepared by the UNDP has three dimensions: life expectancy index, education index, and income index. Life expectancy index is based on life expectancy at birth which is a proxy for the capability for long and healthy life. Education index is based on two indicators, namely: mean years of schooling and expected years of schooling, which are proxies for access to knowledge. Income index is based in gross national income per capita which is a proxy for a decent standard of living. The HDI rating is then computed as the geometric mean of these three dimensions.

The UNDP (2011) reported that the global average HDI increased by 18% from 1990 to 2010, which reflected improvements in life expectancy, literacy and income of the countries. While countries had an increase in their income, there were also increases in literacy and life expectancy, as delivery of social services have improved. Countries with high HDI tend to have higher life expectancy because these countries are able to provide their citizen better access to health services. Moreover, in providing better living conditions to their citizen, these countries also made improvements in their environmental condition specifically in environmental public health which is incidentally 50% of EPI. As such countries with higher HDI, may also have higher EPI.

Moreover, the UNDP (2011) reported that countries with very high Human Development

Index (HDI) ratings accounted for the largest share of the world carbon dioxide emission at about 64% between 1850 and 2005. From that value, the Unites States contributed about 30%, China at 9%, the Russian Federation at 8% and Germany at 7%. However, besides carbon dioxide emission, EPI rating includes many other indicators which may make countries with high HDI to also have high EPI. In a study by Samimi, Kashefi, Salatin & Lashkarizadeh (2011), they found that HDI has a positive and significant effect on EPI. Moreover, they said that increase in human development index mean “better access to health services, political rights, civil liberties, adult literacy and civil registration rates will result in the increment of environmental performance” (p. 300).

In the light of the aforementioned review, the following hypotheses were tested:

$H_{2o}$  = human development has no significant impact on environmental performance

$H_{2a}$  = human development has a significant impact on environmental performance

### 2.4 Level of Country Economy

Sanglimsuwan (2011) found that there exists a short-run inverted-U relationship between carbon dioxide emission and gross domestic product (GDP) per capita. The relationship becomes positive again after it reaches a threshold. Holtz-Eakin & Selden (1995) found that as economies tdevelop, the propensity to emit decreases but the global carbon-dioxide emissions will continue to grow as contributed by the rapid economic and population growth of non-developed countries. United Nations Development Programme (UNDP), as mentioned by Hossain & Selvanathan (2011), reported in 2004 that the share of the Organisation for Economic Co-operation and Development (OECD) on greenhouse gas (GHG) emissions was almost one-half of the global GHG emissions while the middle income and other developing nations contributed the remainder. Moreover, Both the Unites States and China contributed about 40% of such GHG emission. However, the



2006 pilot EPI report showed a positive linear relationship between environmental performance and GDP per capita with R-squared value of 0.702 (Esty, 2006).

These inputs give way to the following hypotheses:

$H_{3o}$  = *level of economy has no significant impact on environmental performance*

$H_{3a}$  = *level of economy has a significant impact on environmental performance*

### 3. MODEL SPECIFICATION

This study employed multivariate linear regression analysis on 2010 cross-country data to investigate the relationship of human development and country governance to environmental performance. The model expressed mathematically is:

$$EPI = \beta_0 + \beta_1 GI + \beta_2 HDI + \beta_3 EL + e$$

where:

EPI is environmental performance index

GI is governance index

HDI is the human development index

EL is the category of country economy

e is the error term

### 4. METHODOLOGY

#### 4.1 Data Sources

Human development was measured using the Human Development Index (HDI) of the United Nations Development Programme (UNDP). HDI is the geometric mean of its three dimension indices, namely: life expectancy or health index (based in life expectancy at birth), education index (based on mean year of schooling and expected years of schooling), and income index (based on gross national income, PPP, US\$). The rating would range from 0 to 1.

Governance was measured using the average scores of six indicators of governance of World Bank, namely: voice and accountability, political stability and absence of violence, government effectiveness, regulatory quality, rule of law, and control of corruption, each rated within the range of -2.5 to +2.5. The composite score was derived as the six indicators all loaded to one factor only.

The Environmental Performance Index (EPI) developed by both the Yale Center for Environmental Law and Policy of Yale University and the Center for International Earth Science Information Network of Columbia University in collaboration with the World Economic Forum and the European Commission's Joint Research Centre was used as proxy for environmental performance. Prior to 2006, these bodies prepared the Environmental Sustainability Index (ESI), but they shifted to more outcome-oriented indicators in 2006. Hence, EPI includes ratings on how countries are near the targets based on international treaties and agreement, environmental and public health standards by international organization, scientific literature and expert opinion. EPI covers 25 performance indicators which were grouped into two main categories: environmental public health and ecosystem vitality. The possible rating would range from 0 to 100.

The two-way economic classification of the International Monetary Fund (IMF) was used to identify whether the country is an advanced economy or an emerging and developing one. The IMF identified 33 advanced economies in its October 2010 World Economic Outlook. These countries are: Australia, Austria, Belgium, Canada, Cyprus, Czech Republic, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Israel, Italy, Japan, Luxembourg, Malta, Netherlands, New Zealand, Norway, Portugal, Singapore, Slovak Republic, Slovenia, Korea, Spain, Sweden, Switzerland, United Kingdom, United States, Hong-Kong (SAR) and Taiwan. The rest of the countries not identified as belonging to advanced economies were categorized as part of the emerging and developing economies for purposes of this study.



Given these different sources, the 2010 data provided the most recent and complete indices and thus was used in the study.

#### 4.2 Data Analysis Method

The study primarily used multivariate linear regression to determine the underlying relationship of human development, governance and economic development level to environmental performance. Correlation was done to determine the nature of the relationship of human development and governance to the two components of environmental performance index which are environmental public health and ecosystem vitality.

### 5. RESULTS AND DISCUSSION

The main aim of the study is to ascertain the relationship of human development, governance and economic development level to environmental performance.

Subjecting the data to multivariate linear regression analysis, the following regression estimates are drawn based on the resulting coefficients presented in Table 1.

$$EPI = 34.23 + 3.07GI + 37.12HDI + 0.31EL$$

Results of the study show that GI positively contributes to EPI with coefficient of 3.07 while HDI positively contributes to EPI with coefficient of 37.12, and both are statistically significant at  $\alpha=0.05$ . On the other hand, the effect of the category of the country economy, whether advanced or emerging and developing, is not statistically significant.

Table 1  
*Results of Multiple Linear Regression*

Variable	$\beta$	SE ( $\beta$ )	t	Sig.(p)
Intercept	34.23	4.20	8.15	0.00
HDI	37.12	6.17	6.02	0.00
GI	3.07	1.44	2.13	0.03
EL	0.31	2.65	0.12	0.91

Note:  $n=161$ ;  $R^2=0.5204$ ;  $F(3,157)=56.79$ ;  $p<0.00$

The significant positive effect of GI to EPI means that better governance results to better environmental performance. Country governance has the following six dimensions: voice and accountability, political stability and absence of violence, government effectiveness, regulatory quality, rule of law, and control of corruption. When citizens can freely voice out their issues, including disagreements to government actions, the government would be more accountable and would readily respond to environmental issues. When the government is politically stable and the country is not plagued by violence, the government can focus on measures to improve the environment. Moreover, low corruption would also mean that the government would be making appropriate use of its resources towards funding environmental initiatives. Better environmental laws and policies as well as their proper implementation are expected in an effective government with high regulatory quality and strong rule of law.

Moreover, the significant positive effect of HDI to EPI means that improvements in the dimensions of HDI resulted to better environmental performance. One of these dimensions is per capita income. Economic development that brought increase in per capita income might have given citizens greater access to education and better access to health services. These two are the other dimension of HDI. Together with economic development, the more financially capable a government is the better will it be in delivering services and improving the living condition. In doing so, government made efforts through better policy implementation to reduce environmental burden of disease, provide better access to drinking water and sanitation, and lessen urban particulates and indoor air pollutions than affects the health of citizen. These efforts of the government led to higher rating in the environmental public health dimension of EPI that greatly contribute to a better EPI rating.

In addition, as presented in Table 2, the correlation analysis between HDI and the two components of EPI shows a positive correlation



between HDI and environmental public health which supports the statement in the previous paragraph. Also, there is a negative correlation between HDI and ecosystem vitality.

Table 2  
*Results of Correlation*

Variable	GI	HDI	ENV	ECO
GI	1.000			
HDI	0.774*	1.000		
ENV <sup>a</sup>	0.725*	0.951*	1.000	
ECO <sup>b</sup>	-0.148†	-0.387*	-0.364*	1.000

Note: n=161; \*p<0.01; †p=0.061

<sup>a</sup>environmental public health; <sup>b</sup>ecosystem vitality

This negative relationship implies that greater economic development activities as evidenced by gross national income per capita, negatively affect ecosystem vitality. Yet even with a low rating in the ecosystem vitality dimension of EPI, the overall EPI rating was still high because HDI has a very strong positive correlation with environmental health though a weak negative correlation with ecosystem vitality. While the correlation between GI and ecosystem vitality is not significant, there is however, a strong positive and significant correlation between GI and the environmental public health component of EPI. This means that governments with high governance rating would tend to have high EPI rating through activities that improve environmental public health.

Further tests yielded satisfactory compliance to the assumptions of ordinary least squares (OLS) regression. Analysis of residuals and test for linearity proved that these assumptions of OLS were not violated. No tolerance value fell below 0.10 that would have indicated multicollinearity. Both Kolmogorov-Smirnov and Shapiro-Wilk test results support normality of the residuals. Furthermore, the p-values of both Cochran-Bartlett's and Levene's tests were greater than 0.05 hence homoscedastic. Finally, seven outliers were detected but they were not found to be influential because their respective Cook's distances were all less than the threshold of 0.3192.

## 6. CONCLUSION AND RECOMMENDATION

Both human development and country governance have a positive and significant effect on environmental performance, while the level of country economy has no significant effect. Countries should continue their efforts to improve their economy because it tends to increase per capita income. Also, citizens will have better access to education. Moreover, this economic development would financially enable the government to provide better living conditions to its citizens by reducing environmental burden of disease, provide better access to drinking water and sanitation, and lessen urban particulates and indoor air pollutions that affects the health of citizens, thereby improving life expectancy. These efforts of the government would lead to higher rating in the environmental public health dimension of EPI. To achieve an even higher EPI rating, countries should exert more efforts in finding ways to conform to sustainable development to reverse the negative effect of unmanaged development to ecosystem vitality. It should establish and properly implement policies that improve the condition of forestry, fisheries, agriculture, biodiversity and habitat, and reduce water and air pollution.

Moreover, improvement should be made on the six governance dimensions. Government should promote freedom of expression and free media. When citizens are empowered to express their concerns freely, they become more critical about government actions and would make the government more accountable. Also, with quality regulatory authority, rule of law, and government effectiveness, sound environmental policies are established and properly implemented. In addition, when there is less corruption, greater political stability and absence of violence, the government is able to focus on implementing environmental initiatives and use resources appropriately. This improved governance will lead to better environmental performance.

Further research is recommended on other variables that may impact environmental



performance like country competitiveness, technology adoption, and research and development.

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