

Environmental Performance and HDI: Evidence from Countries Around the World

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Abstract: The purpose of the present paper is to evaluate the relationship between Environmental Performance and Human Development in countries around the World during 2006- 2010. To do so, we used overall Environmental Performance Index (EPI) data from the Yale Center for Environmental Law and Policy and Human Development Index (HDI) data from Human Development Report of the World Bank for a sample of 114 countries of which 28 were developed and 86 were developing countries selected base on the data availability. The findings of the paper using a panel data regression model support a positive and significance relationship between EPI and HDI for the whole countries as well as the sample of developed countries. However, regarding the case of developing countries suffering environmental degradation the results indicate that higher human development index does not necessarily improve the Environmental Performances in these countries. Perhaps more public awareness and more support of international organizations such as United Nations may play an important role in this regard.

Key words: Environmental Performance Index (EPI) • Human Development Index (HDI) • Panel

INTRODUCTION

Nowadays the importance of the environment and vital role in advancing the development of different countries is undeniable. Optimal use of environmental sustainability and sustainable development in the country can be guaranteed and not pay attention to underlying issue can dangeren social, cultural, political and economics sets. Thus, understanding the role of risk development programs factor and reducing them and understanding the barriers and reduce them to strengthen the incentives can lead to success in environment protection. Analysis of environmental crises and destruction of natural resources with increasing population has caused more people. Today in their attempts to prevent environmental degradation, on the other hand, only one or more of the nature of the resource is not created just for one generation, but also provided with each generation to preserve and restore the proper operation of it should be delivered to future generation. Nature and environment and sustainable development as the foundation of life, always had a special significance, but achieves in science and industry,

population arbitrary banning the exploitation of natural resources, finally all our nature to avoid risk resident, only habitable planet is faced to danger of serious damage. One way to tackle this major threat to sustainable development and the human development index. Considering the environment and natural resources as a platform for sustainable development, support life and human society are the natural and cultural heritage, growth of population, access to alternative employment services, lack of resources and lack of efficient is development pattern causes excessive pressure on the environment and renewable natural resources. Today, environment degradation and natural resources planner and policy makers thought of as a global problem that has attracted. Due to the human development of a high-yield investment in the development process, particularly sustainable development is considered. Beside the change in order to prevent damage to the environment and renewable natural resources is one of the important factors in accelerating development index [1]. In the developing and developed countries in entire study period 2006 to 2010 data compilation method are discussed.

In this regard, the main hypothesis of this paper is as follows:

Human development index has Positive and significant impact on environmental performance index in developing and developed countries and the entire study. Data required reports and statistics published using external and international web site including WDI, WB (the World Bank) and UNDP, the paper structure is as follow:

The concept of environmental Kuznets curve and environmental performance index and the process index will be deal with this study and the concept of human development index and how the trend in the countries were studied and the relationship between human development index and environmental performance index are described. Then the structure has been introduced and is estimated using the model.

Concept of Environmental Kuznets Curves: Kuznets in 1965 between per-capita income and inequality income to the contrary is a relation U.

His study shows that increasing income inequality in per-capita income in the first increase. After reaching a certain level of income distribution and economic growth continuing to go. The relationship between per-capita income and income equality can be show like a bell-shaped curve. This empirical phenomenon is known as Kuznets curve. In the 1990 and the Kuznets curve is a new concept. Empirical examples of the relationship between environmental degradation and per-capita income and income levels shows a U similar contrast between the per-capita income and income inequality in the Kuznets curve. (Diagram 1) The Kuznets curve describing the relationship between environmental quality and per-capita income levels are considered and for the first time in the study of Panayotou called as an environmental Kuznets curve [2].

The Concept of EPI: One of the important indexes of developing countries in 21st century is the environmental performance or development environmental. Various references were introduced the various indicator of environmental performance in the past. Since the index doesn't show a real lack of national environmental components and the short coming and criticism that the experts around the world, especially in developing countries from the ESI reports.

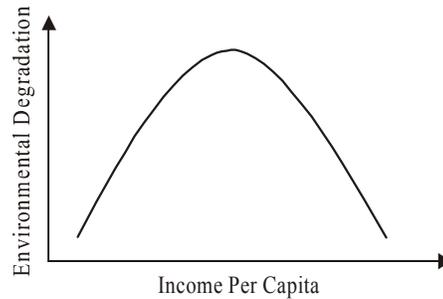


Diagram 1: Environmental Kuznets curve

This index was revised from early 2005 and released a new environmental index that compared to developed countries who currently prevail in the environment and every two years to be released in the world economic forum in Davos. The reporting of environmental performance index in some countries shows that the pollution control and natural sources management outcomes has a little factors which jointly in developed Colombia universities, research center, especially in America, world economic forum in Davos, Switzerland and Union Research Center Europe. The ability of government to protect the environment shows in the coming decade and contains important information about the different approaches to global environmental issues [3] Environmental performance index measure progress, set global desired environmental outcomes that current policy allows to consider the state. It is anticipated that the environmental performance index is valuable for decision makers, because of the limited number of input and output and time is short and medium term that the rate of response and action plan in the level of planning was raises [4].

The EPI Framework: Environmental performance index as part of national efforts in environmental protection measure in countries. The result reflect our efforts on the ground are the best measure of environmental policies.

EPI indicators on measurable result rather than input such as emission or deforestation will focus such as the cost of the policy. Each index can be related to the objective of good policy. EPI measures and insists the two main aims of environmental policies, that are as follows:

- Reduce the environmental burden on human health
- Raising life proper management of natural resources and ecosystem.

This 25 index reflects the current thinking in art and is the best environmental health and environmental sciences. Some of this criteria can pursue a particular topic. The rest of the development policy more difficult to measure variable related to the following. The long-term index of public health or environmental objective of sustainable development is concerned. For each country and each index value based on the result of dialogue between the exciting country and objective of policy is calculated. This is origin of the four sources:

- Standards set by international organization
- Target agreed by treaty or international organization
- Leading national regulatory requirement
- Expert judgment based on scientific consensus [5-7].

The Concept of Human Development Index (HDI): Human development as a process of increasing peoples options and increase the comfort level of living is the defined. Human development itself is a target and this target is nothing except the development of human potential, in other words. The human development and human health knowledge by working and creation of living human entity can be organized in a world. Food for human life, human development index is evaluated. The human development index is an attempt to release GDP focus on developing the production of document and substituting different view of the circuit [8] HDI as central to human development reports indeed, latest international effort to find a measure of development states that the three criteria of education and GDP per-capita composed hope. Using the above criteria are due to important and undeniable role in increasing human capabilities [9].

HDI is one of the important indexes of economic development or the development of a country and today has many applications in national and international level. Countries with the help of status as compared with other countries. Most cases of HDI can help to stimulate constructive dialogue about the policy is to require state. Instead of using the index of per- capita income to the broader aspects of development has been focused. While this index and criteria for the measuring the welfare measure and assess

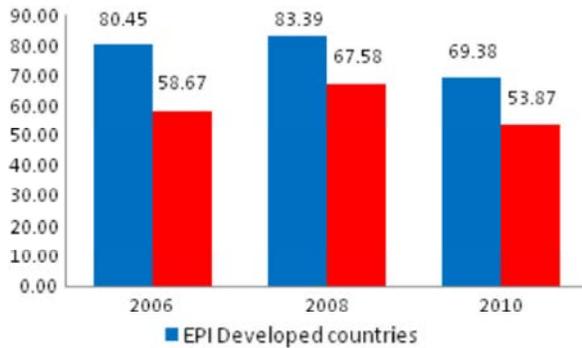
components of human development indicators to identify area that, in terms of economic policy in various spheres of social and cultural. Including providing the appropriate fields to identify guidance and supports protection of human talent and creating organization and coordinating the various institutions and agencies social security programs with the development of the social insurance and supports of vulnerable groups, providing the necessary measure to empower people or use to improve the economic situation [10].

The Relationship Between EPI and HDI: One of the factors affecting the environment is Preferences or incomes of the net effect. Based on such studies have been applied as Tayek and Kristrom and Florenz, Shown that consumer demand for environmental goods reacts to income changes.

Incomes greater than 1 in response to environmental goods and this implies are being that luxury goods. The high levels of income will be greater demand for environmental goods that the demand for a healthier environment makes the government to make laws to improve environmental conditions.

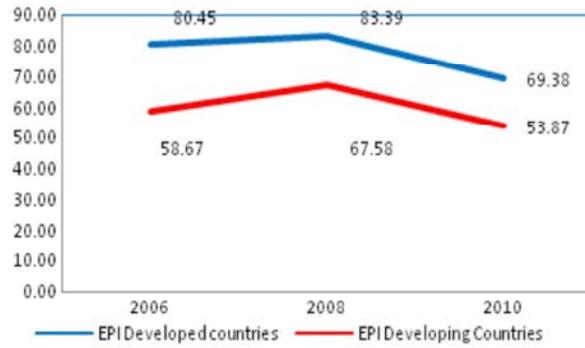
Considering that HDI is an important indicator in measuring human development and includes the effects of social variables such as, health effects, political rights, civil liberties and education, this is considered as the preferred affect, because the level of education and awareness affect on political rights and civil liberties of citizens in the positive and also Education indicators in population density also depends on the HDI and when a country's level of education increases Population growth rate declined and subsequently decreases the pressure on natural resources and EPI will increase. The people of the communities where they have a higher level of social development (For example, the number of educated people are more) they feel more concerned about the environmental hazards. The people of this communities trying to create less pollution What in the areas of social and individual life and Finally, have higher environmental performance index [11].

The Study of EPI Proceeding in the Case Studied Countries: In this study the number of 114 countries including 86 developing and 28 developed



Yale Center for Environmental Law and Policy(2006and2008and2010)

Diagram 2: Linear diagram column chart and a comparison of developed and developing countries, following a period of (2006-2010)



Yale Center for Environmental Law and Policy(2006and2008and2010)

Diagram 3: Non-weighted average column chart and a comparison of developed and developing countries, following a period of (2006-2010)

countries have studied¹. The non-weighted average and a comparison of environmental performance indicators developed and developing countries, average of all countries and at the same time during 2006- 2010.

Take a brief regard to non-weighted diagram for EPI for developing countries and developed a following study is evident in diagrams 1 and 2.

Although both countries have had a downward trend in 2010, but the gap between the environmental performance of countries show that the performance of developed countries in the period (2010-2006) in the field of environmental performance indicators is much better and more impressive to developing countries. Following the result of a review of performance indicators developed in 28 countries and 86 developing countries confirms the environmental Kuznets curve, this indicates that the low levels of development and severity of environmental degradation is more at the cause of economic activity. The intensity of agriculture and resource extraction activity to achieve the necessary infrastructure and seek to achieve industrialization and heavy industries and drain resources waste and pollution more environment, but at the higher levels of development,

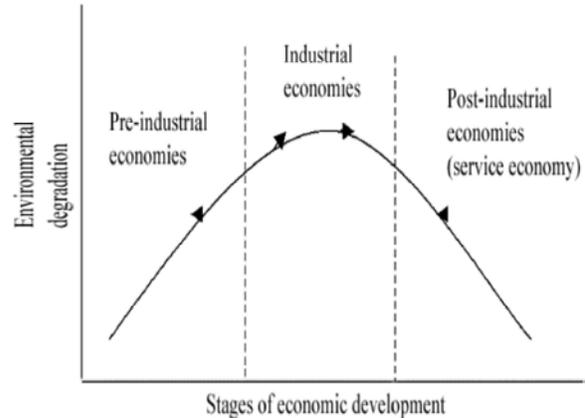


Diagram 4: Environmental Kuznets curve: locus of state Source: Panayotou, T.(2003).” Economic Growth and environment. Economic Survey of Europe. No.2,p:46

structural change and move the industrial structure of the services and with more efficient use of technologies such as information technology and communication and also increase the demand for a better environment to achieve the goal of sustainable development environment, reduce the environment damage. In this section in Figure 4 for a

¹**Developed Countries:** Austria, Belgium, Canada, Czech Republic, Denmark, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Israel, Italy, Japan, Netherlands, New Zealand, Norway, Poland, Portugal, Slovak Republic, Slovenia, Spain, Sweden, Switzerland, Trinidad and Tobago, United Kingdom, United States.

Developing countries: Albania, Algeria, Angola, Argentina, Armenia, Azerbaijan, Bangladesh, Benin, Bolivia, Brazil, Bulgaria, Burkina Faso, Burundi, Cambodia, Cameroon, Central African Republic, Chad, Chile, China, Colombia, Congo, Costa Rica, Democratic Republic of Congo, Dominican Republic, Ecuador, Egypt, Arab Rep., Ethiopia, Gabon, Georgia, Ghana, Guatemala, Guinea, Guinea-Bissau, Haiti, Honduras, India, Indonesia, Ivory Coast, Jamaica, Jordan, Kazakhstan, Kenya, Kyrgyz Republic, Malawi, Malaysia, mali, Mauritania, Mexico, Moldova, Mongolia, Morocco, Mozambique, Namibia, Nepal, Nicaragua, Niger, Nigeria, Pakistan, Panama, Papua New Guinea, Paraguay, Peru, Philippines, Romania, Russian Federation, Rwanda, Senegal, Sierra Leone, South Africa, Sri Lanka, Sudan, Swaziland, Syrian Arab Republic, Tajikistan, Tanzania, Thailand, Togo, Tunisia, Turkey, Turkmenistan, Uganda, Ukraine, Uzbekistan, Venezuela, RB, Vietnam, Zambia

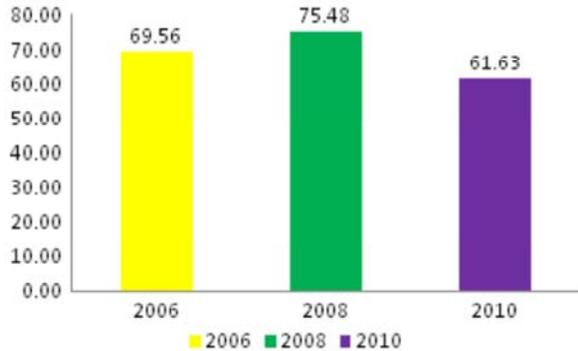


Diagram 5: Comparative and non-weighted average diagram of EPI for all studied countries in the same time from 2006_2010
Source: Yale Center for Environmental Law and Policy(2006,2008,2010)

better understanding of the countries on the environmental Kuznets curve locate in that area to be explained.

As the above diagram is defined, developing countries studied in the pre-industrial economic are in the first area and developed countries are in the second and third area, namely industrial economics.

As can be seen in diagram (5) the whole world countries performance (114 developed and developing countries studied) in the field of EPI in 2008 compared to 2006 is more favorable and positive and show more government attention to the environmental issue, but unfortunately as shown in diagram, EPI in 2010 compared to 2006 and 2008 has had descending proceeding because of lack of precise, stable and long-term planning of governments about environment and sustainable development.

The Study of HDI Proceeding in the Case Studied Countries: For studying the HDI of entire studied countries (86 developing countries and 28 developed countries), comparative and average non-weighted diagrams of HDI for developed and developing countries over the period of study are offered as follows:

With a look to non-weighted diagram of HDI for developing and developed countries in the case studied, is evident in figure 6 and 7 the performance of developed countries in the period(2006-2010) about HDI in comparison with developing countries are much more favorable and significant. the gap between developed and developing countries in the diagrams shows the developmental level of developed countries and the result of the study seeking performance level of HDI about 28

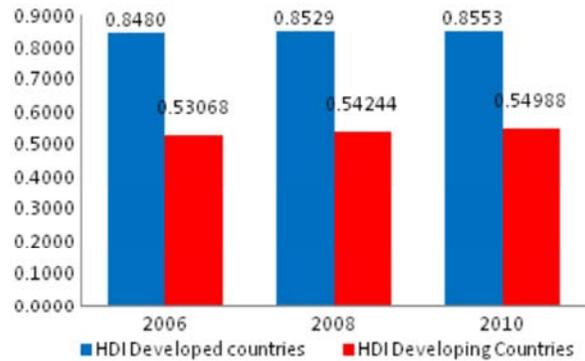


Diagram 6: Comparative non-weighted average
Source: research computing and UNDP

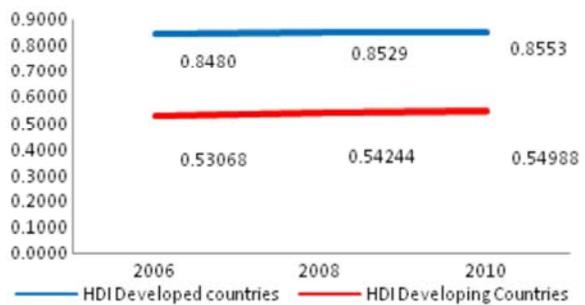


Diagram 7: Comparative non-weighted average linear diagram of HDI of developed and developing countries following a period of (2006_2010)
Source: research computing and UNDP

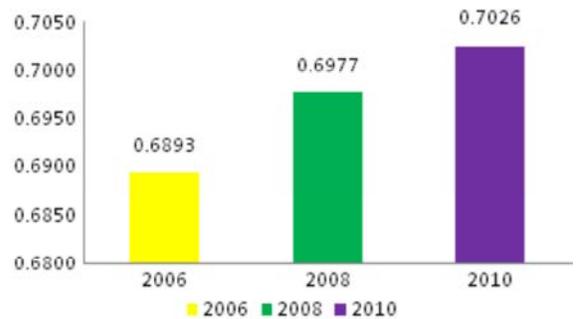


Diagram 8: Comparative and non-weighted average diagram of HDI for all studied countries in the same time from (2006_2010)
Source: research computing and UNDP

countries and 86 developing countries indicates that in developing countries due to low awareness and low of income and health and distance, amount and intensity of human development in countries is so more and tangible. This eliminates, needs to increase the economic activity, people awareness, level of community health and also long-term an accurate and stable planning takes a government in developing countries.

As can be seen in figure (8) the performance of the whole world (114 developed and developing countries studied) in the field of human development index since 2006 until 2010 has been a trend, this suggests shows that greater attention to human development category of countries.

Model, Data and Estimation Methodology: In order to examine the impact of the environment and human development index and discover the degree of importance of each of factors in suggested Costantini and Monni and Gurluk used following model:

Dimension Index:

$$EPI_{it} = \beta_0 + \beta_1 MHDi_{it} + \beta_2 GOV_{it} + \beta_3 LnGDP_{it} + \beta_4 LnGDP_{it}^2 + \epsilon_{it}$$

In which the purpose of EPI_it is environmental performance index and MHDi_it is modified human development index, GOV is quality of governance and LnGDP_it is logarithm GDP per Capita (Constant 2000 US \$) (income index) and LnGDP²_it is Standard error of the index and i shows country and t shows time.

To examine the relationship between human development index of environmental performance used to indicators of various statistical data that details of the environmental performance of Yale university and Columbia university data and indicators of human development index free annual reports from the UN development program in 2011 and index came from the World Bank has been obtained. It is necessary to explain that the environmental performance index that is published every two years and only the information from 2010,2008, 2006 of this index were available.

The HDI is a summary measure of human development. The HDI measures the average achievements in a country in three basic dimensions of human development:

- Life expectancy index: The life expectancy index measures the relative achievement of a country in life expectancy at birth.
- Education index: The education index measures a country's relative achievement in both adult literacy and combined primary, secondary and higher gross enrollment.
- GDP index: The GDP index is calculated using per capita in US\$. The Per-capita US\$ is adjusted with respect to purchasing power parity terms in US dollars.

For each of those dimensions, an index value is computed on a scale of 0-1 where “0” corresponds to the minimum and “1” to the maximum assigned value for the corresponding indicator. Individual index for a given country is computed as the following general formula:

$$\frac{(\text{actual value} - \text{minimum value})}{(\text{maximum value} - \text{minimum value})}$$

The HDI is then calculated as a simple arithmetic average of the three indexes (13). The HDI formula consists of three index abovementioned:

$$HDI = 1 / 3(\text{Life expectancy index}) + 1 / 3(\text{Education index}) + 1 / 3(\text{GDP index})$$

Recent study modifies conventional HDI by subtracting the GDP share from the formula. Thus the MHDi does not include the income factor and eliminates multi collinear issues between the EPI and the GDP in the regression analysis. Therefore the MHDi is expressed by a simple average of the two dimension index, which, in this study, are life expectancy at birth and education index. The education index is the combination of two-thirds weight of the adult literacy rate and one- third weight of primary, secondary and higher gross enrollment ratio [11, 13, 14].

Also, in this research model estimation method, is based on panel data method. This method is a combination of time series and cross sectional data. Each of the method in time series and cross sectional data, there are shortcoming in the integrated method can be reduced.

In data integration method, first two tests are performed. To determine the equivalent width of the source countries the differences within the countries of origin of the F test and for determine fixed or random effects methods used to determine the affect of the test. The study of these two tests,has been the same affect selected. Also in this study came from the lists of countries based on the 2011 index of economic the world bank group are classified to developing countries and developed countries. According to this classification the available data for each country, have studied including 14 countries, 86 developing and 28 developed countries.

CONCLUSION

The result of model evaluation by using the method of Generalized Least Squares from 2006 up to 2010 has been shown in tables 1, 2 and 3.

Table 1: The result of model evaluation in developed countries

D-W stat	F- statistic	R-squared	Prob.	t-stat	Coefficient	Variable
2.587	1065044	0.871868	0.0000	5.087903	8970160.*	MHDI
			0.0000	4.742744	8.793876*	GOV
			0.0000	5.217569	5941.333*	LnGDP
			0.0000	-5.290079	-281.3450*	LnGDP ²

*Significant at 1% confidence level

Source: research computing

Table 2: The result of model evaluation in developing countries

D-W stat	F- statistic	R-squared	Prob.	t-stat	Coefficient	Variable
0.886032	9.0700134	2.37	0.3116	-1.049818	-22969.00	MHDI
			0.0000	7.517204	35.34789*	GOV
			0.0440	-2.212967	-58.58328**	LnGDP
			0.0715	1.949648	3.195459	LnGDP ²

*Significant at 1% confidence level **Significant at 5% confidence level

Source: research computing

Table 3: The result of model evaluation in whole countries

D-W stat	F- statistic	R-squared	Prob.	t-stat	Coefficient	Variable
0.927151	19.09045	2.33	0.0001	4.366412	149782.9*	MHDI
			0.0000	5.882286	24.75370*	GOV
			0.0269	2.327287	317.6503**	LnGDP
			0.0781	-1.824411	-18.21446	LnGDP ²

*Significant at 1% confidence level **Significant at 5% confidence level

Source: research computing

- The result of GLS regression evaluation in developed countries in Table 1 shows:

The regulated human development index has a positive and meaningful effect on environmental performance of developed countries.

It means the increment of human development index in developed countries corresponds to the high level of development and better access to health services political rights, civil liberties, adult literacy and civil registration rates will result in the increment of environmental performance which proves the proposed hypothesis.

- The result of GLS regression evaluation in developed countries in table 2 shows:

The regulated human development index does not have a positive and meaningful effect on environmental performance of developed countries since developing countries are in the beginning of development path and aggregation of human resources therefore by investing less in health services and education, human development of these countries has a negative effect on

environmental performance index and does not prove the proposed hypothesis.

- The result of GLS regression evaluation in all countries in table 3 shows:

The regulated human development index has a positive and meaningful effect on environmental performance index of all countries. It means the increment of human development index results in the increment of environmental performance index in all countries thus the hypothesis about the positive and meaningful relation between human development index and environmental performance index in all studied countries is proved.

Findings of this article indicate the differences between developed countries and developing countries vividly. Therefore by comparing the result of human development it will be found that Human development should be the first purpose of developing countries and organizations such as United Nations can effectively help in order to globalize these countries and the globalization process helps the developing countries not to await human development for a long time.

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