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A CROSS-SECTIONAL STUDY OF SUSTAINABILITY ASSESSMENT

Abstract: *The sustainability assessment is becoming a worldwide matter as more and more organizations are creating various methodologies for comparing countries in terms of sustainable development. This paper tries to test the association between the human development index and the environmental performance index by conducting a cross-sectional study for 105 countries in three points in time: 2000, 2006 and 2012. Previously, the analysis of GDP-GHG emissions-energy use-population nexus was conducted for emphasizing the outliners and for understanding better the correlation between the human development index and the environmental performance index. The results suggest a positive association between the 2 indices. The statistical significance was tested and it also generated positive results. Further studies should focus on assessing the sustainability by analyzing more aggregated indicators in space and time.*

Keywords: *Human development index, environmental performance index, cross-sectional study*.

JEL Classification: C21, Q56

1. Introduction

Since the second half of the 20th century, the sustainability assessment has become a worldwide issue as the environmental problems, such as the significantly increased pollution, the natural resource depletion and the environmental degradation, have been thoroughly analyzed starting with "The Limits to growth" report (Meadows et al, 1972: 25). The evolution of socio-economic and environmental nexus is influenced by the population growth, the carrying capacity of the environment and by other ecological factors, by the acquisition, utilization, conservation and distribution of resources, by the population growth, by the administrative limits (the mankind institutions and the knowledge of their human resources) and by the technological limits. The status and the interactions between all these constraints are more and more analyzed and discussed. The worldwide decision-making use models for investigating the possible scenarios of a certain policy in order to further chose the better known option (Meadows et al, 1972: 20).Many indices have been developed lately for analyzing the performance of a country or a project in what concerns its sustainability. Several studies (Narula and Reddy, 2015; Liu, 2014; Martchamadol and Kumar, 2013; Singh et al., 2012) discuss the criteria of grouping this indicators and the steps made in choosing them for evaluating the sustainability performance in a country based on an index. In this context, more and more studies create and explain new indices for determining the sustainability of a country (Narula and Reddy, 2015) or/and of a smaller area or project (Mori and Christodoulou, 2012).No model is perfect; still its main features should be the consistency of the results. Their importance is given by the overall simplistic picture presented for a certain subject when the economic-social-environmental nexus is more and more debated for formulating better policies, strategies, programs, projects and indicators.

This paper will focus on analyzing the performance indices applied atmacro level (country level) as these quantitative tools become increasingly used by policy makers. The purpose of this research is to examine the relationship between the environmental performance index and the human development index by performing a cross-sectional analysis for 105 world countries. The methodological framework combines the relevant researches conducted on this subject with the data analysis. The used data comes from several databases which will be presented thoroughly in the methodology section of this paper.

The main questions that underpin this research are:

- How has the GDP - GHG emissions-energy use-population nexus been evolvingin 126 countries since 1990?Which are the main outliners?
- Is there a relationship between the environmental performance index (EPI) and the human development index (HDI) for 2000, 2006 and 2012?

The remainder of this paper presents the state of art in the field of sustainability indices in the second section, the methodological framework of this research in the third section and the empirical findings of the study in the fourth section. To the best of our knowledge, no similar studies analyzed the association between EPI and HDI for 105 countries. This study could represent a starting point in further analyses on the relationship between sustainability indices during time that provide us relevant information for improving the sustainable policies.

2. The state of the art

Sustainability has more and more become debated and considered worldwide since 1980 (World Wildlife Fund, 1980). The first definition of sustainable development presented in the Bruntland Report "Our Common

Future"and the most used one is "the development that meets the needs of the present without compromising the ability of future generations to meet their own needs"(Brundtland et al., 1987). This report continues the work of Meadows et al. (1972)and it draws attention to the development limits and the population growth while emphasizing the main global issues, such as the need for environmental protection and good resource management. Further, many measures were taken for mitigating the environmental pollution and degradation, for diminishing the fossil fuel use, for controlling the population growth as well as for increasing the social welfare. So, sustainability indicators were created for a better understanding of these issues and for better decision making in terms of adopted policies. The indicators and indices are permanently improved and analyzed in order to examine the sustainability status of each country or region. However, without global common goals by applying signed treaties and common actions, the achievement of sustainable development remains to be far too long expected. This raises the concern of how much and for how long the environmental capacity could still support the human activities.

In this regard, many studies have focused on establishing the statistical relationship between various economic, social and environmental indicators. While one of the main focuses of policy makers is to decouple the economic growth from the environmental degradation and pollution, a lot of econometrical research has emerged on determining the causal relationships between the gross domestic product, the energy use and the dioxide emissions on different scale levels. For example, Raupach et al. (2007) have emphasized the implications of these relationships for global equity by observing that the majority of the global population (rapidly developing countries, such as China)is highly increasing the dioxide emissions although this population has generated approximately 20% of the global emissions in the past.

A large and growing body of literature investigates new approaches for achieving sustainable development and for greening the economy. So, new and more complex assessment tools are proposed for evaluating the change (improvement or deterioration) of various indicators or indices in space and in time. Numerous organizations and studies (Ismail and Abdullah, 2012; Afgan and da GraçaCarvalho, 2000; Wackernagel and Yount, 1998) have attempted to propose a series of indices for assessing the sustainability; still, their consistency is questionable (Narula and Reddy, 2015).The composite indices explain a matter of interest with a single value over time. For example, the tools for footprint evaluation, which considers mostly the carrying capacity of the environment, are also inconsistent and generate different results, as these are not standardized yet (Čuček at al., 2012). Additionally, the sustainability concepts are still difficult to define or are too complex to be equally understood while the human awareness is unknown (Liu, 2014).

Siche et al. (2008) compare the environmental sustainability index (ESI), the ecological footprint as well as the emergy performance indices and they observe differences in methodology, complexity and units of measurement. Moreover, the results indicate ESI as the best indicator from the three analyzed ones; still, it fails to measure sustainability because too many variables are considered into the model. The study presents the limitations of these three analyzed indicators as being the staticity of the revealed situation(Siche et al., 2008). In addition, Čuček et al., (2012)explain the different types of footprint evaluation such as the ecological footprint (EF), the sustainable environmental performance indicator (SEPI) and the sustainable process index (SPI), as well as describes the various tools used for footprint evaluation. The composite footprint evaluation indicators (EF, EPI, SPI) are difficult to address as the data is unavailable and uncertain (Čuček at al., 2012).

Further, studies on the analysis of various indices in time and space are lately emerging. For example, the environmental performance is measured by applying the data envelopment analysis for 26 countries for 3 years which concluded that the rankings of each country is influenced by the weighting of each considered indicator in the final index and that the technological progress generate a more environmental performing countries (Zhou et al., 2007). Another study (Datta, 2014) analyses the relationship between the human development index and the agricultural sustainability index for 99 countries in 3 years and this study found a negative correlation between these two indices, especially a stronger one for the developed countries.

In brief, the sustainability indices help ranking the analyzed countries for indicating the best practices. None of them are perfect, but improvements are more and more made to increase their consistency. These indices are relevant if the decision-makers are helped to observe the past performance as well as to suggest some scenarios for the future policies.

3. Methodology

Lately, three types of studies regarding sustainability issues are emerging: studies on comparing various indices from a methodological point of view; studies on statistical analysis of one or more indices; studies on determining the relationship between various indices in one or more countries in different time and space.

This paper addresses 2 current topics: the position and contribution of different countries to the GDP- GHG emissions-energy use-population nexus and the relationship between two indices: the human development index and the environmental performance index.

First, the analysis of the energy use-GHG emissions-GDP-population nexus was conducted to understand better the need for new approaches in terms of assessing the sustainability in any field. These four indicators, expressed in total values, were collected from the CAIT Climate Data Explorer and the United

Nations Energy Statistics Yearbook 2013for the period between 1990 and 2012. The greenhouse gas emissions were considered in total values excluding the land-use change and forestry due to the uncertainty of data (CAIT Climate Data Explorer, 2015). The 126 analyzed countries gather around 6.604 billion persons, which represent around 89% of the world population. An empirical data analysis was conducted for all the126 countries during 1990-2012 and a more thoroughly comparison between countries was performed for 10 years (2003-2012). Finally, a cross-country analysis of the 7 outliners was made for 2012 in order to estimate the possible changes in the overall values of 126 countries for the analyzed nexus based on a simulation with 5% and 10% reductions of energy use and greenhouse gas emissions. The 126 worldwide countries have been chosen for the cross-country study according to the data available for all four indicators in 2012.

These indicators should also be analyzed in per capita measurements as the total values per country indicate the impact of each state on the world environmental pollution and energy use while the per capita values could focus more on the social impacts of energy use, GDP and GHG emissions. However, many studies (Cowan et al, 2014; Govindaraju and Tang, 2013) focused on the social dimension and, so, this research sheds a new light on the contributions of each country on the world economic growth, pollution increases and energy use changes (section 3.1) as well as on the relationship between the environmental performance index and the human development index (section 3.2).

In the second section of the results, we tried to estimate the relationship between the human development index (HDI) and the environmental performance index (EPI)in 2012, 2006 and 2000 by applying a cross-sectional analysis in IBM SPSS Statistics. SPSS is useful for determining the association between variables and for data transformations (Leech et al., 2005).105 countries out of 126 have been analyzed due to the missing data either for EPI or for HDI. The indices were gathered from the developers' websites and, in the case of HDI 2006, the index values were calculated based on the HDI trends reported by the United Nations Development Programme (2015). The human development index takes into consideration three main indicators: life expectancy, education and gross national income per capita. Likewise, the environmental performance index represents an improved index based on the sustainability performance index and it was created since 2006(Emerson et al., 2012). This index analyzes the environmental health and the ecosystem vitality by considering several indicators among which are found several greenhouse gas emissions, such as CO2 emissions per capita, and the renewable electricity use (Emerson et al., 2012). More details on the methods used for creating the indices HDI and EPI could be found on their websites (http://hdr.undp.org/en/content/human-development-index-hdi and http://sedac.ciesin.columbia.edu/data/set/epi-environmental-performance-index-pilot-trend-2012).The cross-sectional study considered other indicators analyzed in the 3.1 section of this paper for grouping the countries.

For analysis purpose, we classified the countries into 3 groups of EPI values: low (values less than 50), medium (values range between 50 and 60) and high (values over 60). Likewise, we divided the countries into 4 categories of population: very high (more than 100million persons), high (50-100 million persons), medium (10-50 million persons) and low (less than 10 million persons). The HDI group was already divided by the United Nations Development Programme (2015) into 4 categories of HDI: very high, high, medium and low.

4. Results and Discussion

4.1. The analysis of the GDP – GHG emissions – energy use – population nexus

The relationships between GDP, greenhouse gas emissions, energy use and the population change have been intensely analyzed during the years. Since 1972, when the report “The limits to growth”(Meadows et al., 1972) was released by the Club of Rome, the evolution of the relationships between economic development, population growth, resource overexploitation, human health and environmental degradation became more and more emphasized on scientific, politic, business level. However, the past studies focused on analyzing either some of these four indicators in a relation with others, or by comparing fewer countries or a certain region, such as the study conducted by Govindaraju and Tang (2013) which analyzed the causal relationship between GDP, carbon dioxide emissions and coal consumption in per capita values for India and China.

Our first analysis, on the evolution of GDP, GHG emissions, energy use and population, concludes that, overall, the grand totals for the 126 analyzed countries per each indicator registered increases during 1990-2012. Thus, the increases of the 126 countries’ population, GDP, energy use, respectively GHG emissions were 132.00%, 177.78%, 150.65%, respectively 149.37% during 1990-2012 and 110.60%, 126.65%, 124.29%, 124.18% during 2003-2012.The results indicate an increase of population in 110 countries while only 16 countries registered relatively small decreases of this indicator (European countries and Japan). The highest increases of population were registered in the Middle East countries, such as Qatar and the United Arab Emirates. This still confirms the fact that the population growth is and it will be a main problem when considering the environmental, social and economic status. Only 3 countries (Greece, Italy, and Zimbabwe) registered a decrease of the gross domestic product during 2003-2012, meaning that the economic development is a priority globally. In what concerns the energy use, it could be observed a decreasing trend in 33 countries of 126 while 6 countries registered an increase of the energy use by more than 100% during 2003-2012. These 6 countries are Mongolia, Qatar, Oman, Congo Rep., Iceland and Bolivia, and are followed by China, which registered an increase of 98.32% in

2012 compared to 2003. 33 countries of 126 have decreased the greenhouse gas emitted, among which it could be found the majority of the European Union's countries, the United States, Canada and New Zealand. The highest increases of the GHG emitted into the atmosphere could be observed in the Middle East and India during 2003-2012.It might be noticed the relation between the high level of energy use and the high level of GHG emissions. So, as many authors (Cowan et al., 2014) argue, our analysis confirms the necessity of implementing sound policies on reducing the energy use while economic growth decouples from it, in order to diminish the GHG emitted into the atmosphere for reaching or preserving the welfare of the present and future generations.

Generally, the countries with the highest number of population and the highest energy use have also the highest GDP and the highest GHG emissions, as could be observed in table 1.

Table 1.The highest 10 of 126 countries on population, GDP, energy use and GHG emissions in 2012

No.	Population (Thousands persons)	GDP (million $ 2005)	Energy Use (ktoe)	GHG emissions (MtCO2e)
1	China	United States	China	China
2	India	Japan	United States	United States
3	United States	China	India	India
4	Indonesia	Germany	Russian Federation	Russian Federation
5	Brazil	United Kingdom	Japan	Japan
6	Pakistan	France	Germany	Brazil
7	Nigeria	Italy	Brazil	Germany
8	Bangladesh	India	South Korea	Indonesia
9	Russian Federation	Canada	France	Mexico
10	Japan	Spain	Canada	Iran

Data source: based on CAIT Climate Data Explorer (2015) and the United Nations (2015)

The developing countries use more and more resources due to their main desire: the economic development, while the ecological and social dimensions are somehow secondly placed (Datta, 2014). In this context, the main question is: it is ethical to impose to the less developed countries to apply the same environmental friendly strategies as the developed ones, which in the past were (and some of them still are) the main polluters and resource intensive? Depends on which dimension we want to focus on because, unfortunately, as history shows, the economic growth means also environmental degradation and, further, social problems. We have to acknowledge that, in order to work, the environmental and social strategies implemented for sustainable development should, first, focus on assuring the basic needs of population (such as food and shelter).

Figure 1, figure 2 and figure 3 illustrate the relationship between the pairs: energy use - GDP, energy use - GHG emissions and GDP - GHG emissions, for all the 126 countries in 2012. The main outliner countries in the relation energy use – GDP are China (with the highest energy use and, also, a high GDP), the United States (with the highest GDP and almost the highest energy use), India, Russia, Japan, Germany, Brazil and France. The main outliner countries in the relation energy use – GHG emissions are China, the United States, India, Russia, Japan, Brazil and Germany, all with the highest energy use and the highest GHG emissions.

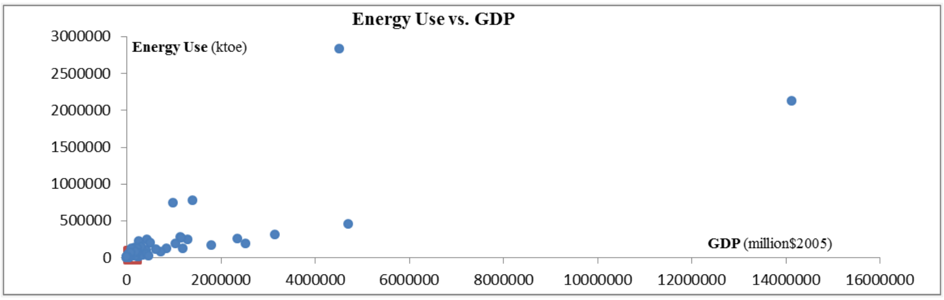

Figure 1. Energy use versus GDP in 126 world countries in 2012
Data Source: World Bank, 2014

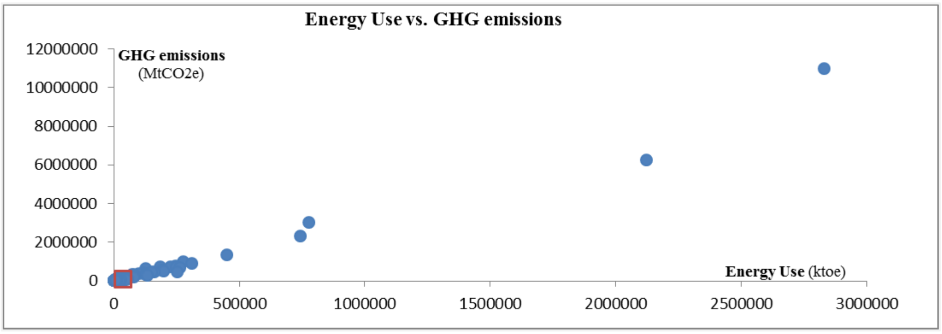

Figure 2. Energy use versus greenhouse gas emissions in 126 world countries in 2012
Data Source: World Bank, 2014

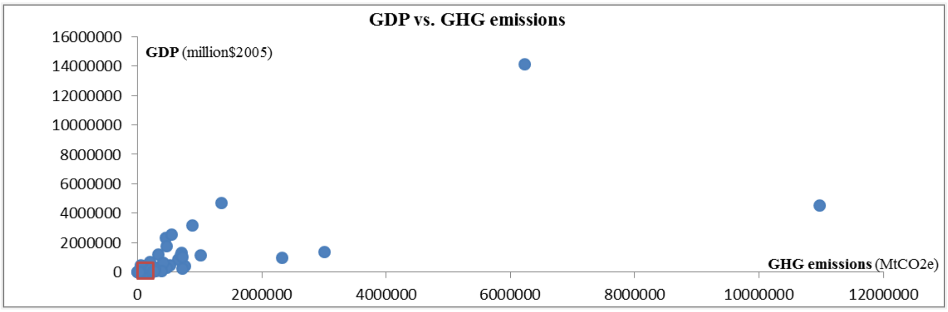

Figure 3. GDP versus greenhouse gas emissions product in 126 world countries in 2012
Data Source: World Bank, 2014

The shares of Romania and the 7 outliners of each indicator are presented in table 2. The evolution of population, GDP, energy use, GHG emissions and population density of China, the United States, India, Russia, Japan, Brazil and Germany influences significantly the evolution of these indicators for the overall 126 countries. The United States had a share of 26.15% of total GDP (126 countries) in 2012, being the most developed country from this economic point of view, while the BRIC countries (Brazil, Russia, India and China) had a cumulative share of 14.86% of total GDP (126 countries) in 2012. In addition, the BRIC countries have the highest share of total population 44.35% (126 countries) in 2012, meaning that their needs might increase faster than those of the United States or of other developed countries and, so, the energy use and the GHG emissions might as well increase in the future. The BRIC countries, except Russia, and the United States have registered highly increases of population, GDP, emissions and energy use during 1990 – 2012 while Japan has registered a much smaller increase. China has doubled its energy use and its emissions in 2012 compared to 1990 while India has increased it by more than 140% during the same analyzed period. However, when comparing to 2003, these increases shrink for the BRIC countries while, in the United States, the energy use and the emissions reduce by 6.2%, respectively 7.74%.

Table 2.The share of outliners and Romania of total per each indicator and the population density

2012	**Population**(persons)	**GDP** (million US $ 2005)	**Energy Use**(ktoe)	**GHG emissions** (MtCO2e)	**Surface area** (km^2)
Total 126 countries	**5604098994**	**54054558**	**12630147.13**	**42436**	**120462172.5**
	Share of total 126 countries (%)				
Total 7 outliners, of which:	**52.26**	**55.56**	**59.48**	**60.78**	**40.70**

2012	**Population**(persons)	**GDP** (million US $ 2005)	**Energy Use**(ktoe)	**GHG emissions** (MtCO2e)	**Surface area** (km^2)
Brazil	3.01	2.11	2.20	2.39	7.07
China	20.45	8.36	22.42	25.86	7.94
Germany	1.22	5.84	2.46	2.09	0.30
India	18.73	2.58	6.15	7.10	2.73
Japan	1.93	8.71	3.57	3.17	0.31
Russian Federation	2.17	1.81	5.88	5.47	14.19
United States	4.75	26.15	16.79	14.69	8.16

Data source: based on the CAIT Climate Data Explorer (2015) and the United Nations (2015)

So, if the 7 outliners would reduce only their energy use by 5%, respectively 10%, than the energy used by the total 126 countrieswould decrease by 2.97%, respectively 5.95%. Likewise, if the 7 outliners would reduce only their GHG emissions by 5%, respectively 10%, than the greenhouse gases emitted by the total 126 countries would decrease by 3.04%, respectively 6.08%. This simulation and the results from table 2 suggest that these 7 countries could produce significant changes in terms of energy use reduction and of GHG emissions decreases due to its high share in the total 126 states.Since 2003, the evolution in time of the analyzed indicators suggests decreases of energy use and emissions while the population and the GDP increase. The main causes of this situation could be the increased meetings and international agreements on climate change and reduction of emissions, as well as an improvement in energy efficiency.Recently, the promotion of green policies, which include reduction of energy consumption and emissions, increase of energy efficiency, prevention of environmental degradation and social protection, might have achieve its purpose in starting the sustainable development.

4.2. The cross-sectional analysis of EPI and HDI

The aim of this paper is to shed a light on the relationship between the environmental performance index and the human development index by considering the cross-sectional analysis for 105 countries in 2012, 2006 and 2000.

This first sub-section presents the descriptive statistics and the frequency distribution of 105 countries by different criteria in 2012, 2006 and 2000. The frequency distributions of countries according to the HDI and the EPI are presented in table 3.

Table 3.The frequency distribution of 105 countries by type of HDI and by type of EPI in 2012

105 countries	HDI group			EPI group		
	Frequency	Valid Percent	Cumulative Percent	Frequency	Valid Percent	Cumulative Percent
very high	40	38.1	38.1	-	-	-
high	28	26.7	64.8	30	28.6	28.6
medium	23	21.9	86.7	42	40.0	68.6
low	14	13.3	100.0	33	31.4	100.0
Total	105	100.0		105	100.0	

The frequency distribution of countries in terms of human development index suggests an increase of HDI level in the 105 countries analyzed. The same situation is observed for the environmental performance index. The countries with high level of EPI increased from 19 in 2000 to 26 in 2006 and to 30 countries in 2012. The medium level of EPI was registered by 41 countries in 2000, 46 countries in 2006 and 42 countries in 2012. Finally, the low level of EPI was registered 45 countries in 2000 and 33 countries in 2006 and 2012. 11 countries have improved their EPI level from low to medium or high: Benin, Botswana, Bulgaria, Egypt, Gabon, Guatemala, Honduras, Indonesia, Paraguay, Sri Lanka, and Zimbabwe.

The second sub-section presents the results of the cross tabulation which determines if there is a relationship between the countries with higher level of HDI and those with higher level of EPI. Our hypothesis is that the countries with higher EPI might be associated with lower HDI ,and vice versa, because the human development might be higher as the environmental performance is higher, and vice versa. We performed the test by comparing the EPI in 2000, 2006 and 2012 with the HDI level and we observe similar results with few differences in frequencies. These differences suggest an improvement of the environmental performance of countries as well as of the human development from 2000 until 2012. Still, we illustrate the results of cross-tabulation in table 5 only for 2012. The results indicate a high EPI for countries with very high and high HDI levels which means that our hypothesis seems to be validated. In addition, our results are in concordance with those of Zhou et al. (2007) which showed that the development of countries contributes positively to their environmental performance. However, the number of countries with low level of EPI seems to have also few countries with high HDI level (14 out of 33). This might prove that 14developed countries generate significant negative impacts on the environment. Finally, the table 4 suggests a possible relationship between the level of HDI of a country and its level of EPI. This means that the countries with higher level of HDI are more likely to have a higher level of EPI and vice versa.

Table 4. Cross tabulation for HDI level and 2012 EPI level

EPIgroup2012 * HDIgroupCrosstabulation		HDIgroup Very high	High	Medium	Low	Total
EPIgroup2012	High	24	6	0	0	30
	Medium	13	8	15	6	42
	Low	3	14	8	8	33
Total		40	28	23	14	105

Furthermore, we performed a Chi square test for examining the statistical significance of the relationship found between HDI and EPI in 2012.The test rejects the null-hypothesis, which implies the existence of no statistical significance, as the Sig. values are lower than 0.05 (Arkkelin, 2014).The table 5 presents the results which concluded the statistically significance of the relationship between the level of HDI and that of EPI in 2012.

Table 5. Testing the significance of the relationship between EPI and HDI

Chi-Square Tests	Value	df	Sig. (2-sided)
Pearson Chi-Square	43.450	6	0.000
Likelihood Ratio	52.463	6	0.000
N of Valid Cases	105		

The population number of a country does not necessarily influence the environmental performance index and the human development index. However, more countries with very high population registered a low EPI level in 2012. In addition, the figure 4 suggests a positive association of countries in terms of environmental performance and human development, by illustrating the position of each country for the relation EPI vs. HDI by considering the population categories.

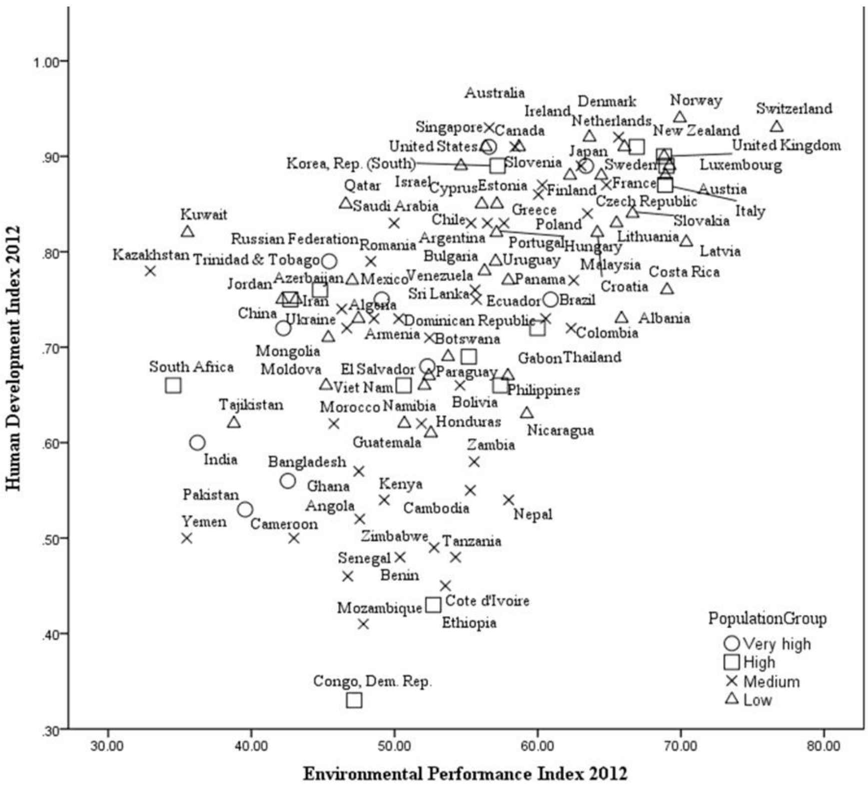

Figure 4. Relationship between HDI and EPI in 2012

For a better understanding of the association between our variables we tested the correlation by using the Spearman test because our variables are not normally distributed. The results are presented in the table 6.

Table 6.The non-parametrical correlation between the environmental performance index and the human development index for 105 countriesin 2012, 2006 and 2000

Spearman's rho correlation coefficient	HDI 2012	HDI 2006	HDI 2000
EPI 2012	0.612***		
EPI 2006		0.638***	
EPI 2000			0.646***

***statistically significant at 1%.

The non-parametric technique, i.e. Spearman test, is preferred in our case do to the lack of normality in the distribution of HDI data. This test emphasizes a positive correlation between the EPI values and the HDI ones in 2000, 2006 and 2012 with small differences as in the case of the cross tabulation. The positive correlation is suggested by the positive correlation coefficient, as well as by the Sig. value which is lower than 0.01 (Leech et al., 2005).

Finally, the environmental performance and the human development of the 105 countries analyzed have generally improved since 2000. As the gross domestic product, the emissions and the energy use are considered into the creation of the two analyzed indices -the environmental performance index andthe human development index-, it might be explained the positive evolution of HDI and EPI since 2000. This is because both the GHG emissions and the energy use have decreased since 2003 while the gross domestic product and the population have increased since 2003. Nevertheless, there might be other factors which influence the evolution of the two indices. Further analyses could examine the relation between HDI and EPI and other socio-economic and environmental indicators during time. Moreover, improvements in the indices creation methodology are constantly made and, so, better cross-country studies could be conducted.

5. Conclusions

The purpose of this research was to examine the relationship between the environmental performance index and the human development index for 105 countries in three points in time: 2000, 2006 and 2012. In order to better understand the evolution of the relationship between the two indices, the GDP-GHG emissions-energy use-population nexus was analyzed because these indicators are part of the environmental performance index and the human development index.

The analysis of the GDP- GHG emissions-energy use-population nexus emphasizes the first 7 outliners which could have a significant contribution to the total value of greenhouse gases emitted into the atmosphere by the 126 countries analyzed as well as to the total value of the energy used by these countries in the future. However, we observed decreases of energy use and emissions for the overall the 126 countries analyzed between 2003 and 2012 which might have influence positively the environmental performance index. Likewise, the increase of the gross domestic product could have positively influenced the evolution of the human development index.

The tests performed for determining if there is a statistically significant correlation between the environmental performance index and the human development index concluded in finding a positive association between these 2 indices for 105 countries in 2000, 2006 and 2012. This research could have missed the regional differences inside a country and it might not capture the real status of countries' sustainability as our analysis is based on several aggregated indicators with different methodology of index building. Moreover, each country has different strategies for sustainable development and different conditions. So, the country comparison could have unreliable results (Datta, 2014).

However, this study sheds a new light on the relationship between the human development and the environmental performance of countries by using 2 indices as it might represent a starting point in analyzing the overall status of worldwide countries in terms of sustainability.

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