UDC 330.341
DOI 10.21272/mmi.2018.3-30

JEL Classification: O11, Q56

Hichem Dkhili,
Assistant Professor,
Faculty of Law, Economics and Management of Jendouba, University of Jendouba,
Jendouba, Tunisia

ENVIRONMENTAL PERFORMANCE AND INSTITUTIONS QUALITY: EVIDENCE FROM DEVELOPED AND DEVELOPING COUNTRIES

This paper summarizes the arguments and counterarguments within the scientific discussion on the issue of the environmental performance and institutions quality. The main purpose of the research is an econometric model which incorporates macroeconomic and institutional variables in a sample of 187 countries observed during the period 2002-2015. Systematization literary sources and approaches for solving the problem of the difference of institutions quality and values of environment performance index. Methodological tools of the research methods were 14 years of research contain 48 developed countries and 139 developing countries. We used dynamic panel data models and especially the system Generalized Method of Moment (GMM) estimator of Arellano and Bover (1995). The research empirically confirms and theoretically proves that the level of growth proxied by the GDPG exerts a positive effect on the level of the environmental performance and institutional quality, (represented by control of corruption, regulatory quality, government effectiveness and rule of law and act), are significantly on the environment performance for the whole sample. Then, we prove that a good institutions quality enhance a significantly environment performance for developed countries. The results of the research can be useful for developing countries indicate that all variables reflected institution qualities decreased the environmental performance except for the government effectiveness which exerts a positive and significant effect.

Keywords**:** Developed countries, Developing countries, Environmental performance, Institutional quality, GMM estimator.

Introduction. The socially responsible company has no longer become an economic agent whose sole objective is the pursuit of profit, but is bound to preserve its environment and to be concerned about the expectations of its stakeholders (adherence to the principles of sustainable development)

In this context, Sustainability is a characteristic of dynamic systems that maintain themselves over time; it is not a fixed endpoint that can be defined. Environmental sustainability refers to the long-term maintenance of valued environmental resources in an evolving human context.

Considering the importance of these themes, this debate has been taken up by several authors in several contexts. In this context, Al-Tuwaijri and al. (2004) paper suggest a “good” environmental performance that significantly associated with a “good” economic performance, and also with more extensive quantifiable environmental disclosures of specific pollution measures and occurrences. Furthermore Böhringer and Ochem (2007) conclude that Sustainability indices for countries provide a one-dimensional metric to valuate country-specific information on the three dimensions of sustainable development: economic, environmental, and social conditions. In addition, the contribution of Cracolici, and al. (2009; 2010) tries to a new analytical framework for assessing spatial disparities among countries. They present a combination between relevant economic and ‘non-economic’ (mainly social) aspects of a country’s performance in an integrated logical framework.

On contrary, Cho and al. (2010) studies the link between environmental disclosure and corporate impression management to investigate later two hypotheses using a cross-sectional sample of corporate environmental disclosures contained in US 10-K annual reports which advances that Organizational citizenship behaviors for the environment (OCBEs) are increasingly advocated as a means of

complementing formal practices in improving environmental performance, (Alt and Spitzeck; (20160)).

Consequently, the Environmental Sustainability Index (ESI) is a composite index that tracks a diverse set of socio-economic, environmental, and institutional indicators that characterize and influence environmental sustainability at the national scale. It was launched in 1999 by Professor Daniel C. Esty, director of the Yale Center for Environmental Law & Policy, in cooperation with Columbia University's Center for International Earth Science Information Network (CIESIN) and the World Economic Forum's Global Leaders for Tomorrow Environment Task Force. Nevertheless, our contribution tries to answer the question of relationship between environment performance and institutions quality.

Given these reasons and the concerns of the previous review of the literature in this context such as the studies of (Elisa and Heiko, 2016) ; (Meng;2014); (Mavragani;2016); (Elisa and Heiko,2016); (Gallego-Álvarez ,2014); (Imeida, and García-Sánchez ,2017); (Echavarren ,2016); Husted and Sousa-Filho ,2017); Tamazian and Bhaskara Rao ,2010); (Jamali and al. ,2017), (Chikalipah, 2017). We adopt an empirical model of the Environmental Performance Index with the difference of institutions quality and values. We take the initiative to discuss on empirical findings for a sample of 187 countries observed during the period 2002-2015 distributed for two sub-samples developed and developing countries.

This paper is organized into four sections. The first is concerned to the introduction. The second section will be devoted to explaining the Literature review. As for the third section, it develops the methodology adopted, empirical analysis, data, model and specifications variables, the interpretation, discussion of the results. The conclusion obtained is the subject of the fourth section.

Literature review. Organizational citizenship behaviors for the environment (OCBEs) are increasingly advocated as a means of complementing formal practices in improving environmental performance (Elisa and Heiko; 2016). Based on a content analysis of 533 Chinese listed companies, this study examines how corporate environmental performance affects not only the level of detail of a company's environmental disclosures, but also what information is disclosed (Meng;2014). The paper of Mavragani (2016) focuses on examining the extent to which the openness of a market economy and the quality of the institution affect environmental performance. The majority of the current studies focus on the Environmental Kuznets Curve and the level of economic growth. Further Elisa and Heiko(2016) had adopted a capability perspective, he propose that a firm's employee involvement capability translates into environmental performance through the manifestation of unit-level OCBEs, and that this relationship is amplified by a shared vision capability. And found a positive relationship between top-down environmental initiatives and bottom-up behaviors. Also, the results of Meng (2014) show that (1) both poor and good performers have more disclosure than the median (i.e., “mixed”) performers, which provides empirical evidence to support a nonlinear relationship between corporate environmental performance and environmental disclosure; (2) poor performers disclose more soft information on environmental performance than good performers, and good performers disclose more solid information; and (3) although poor performers increase disclosure after being exposed as environmental violators, they avoid disclosing negative environmental information, such as the violation and the associated penalties. This study provides additional evidence for a nonlinear relationship between environmental performance and disclosure in emerging markets, and suggests environmental disclosure may not be a valid signal to differentiate good performers from poor performers in contemporary China. For Mavragani (2016), by applying factor analysis, an empirical model of the Environmental Performance Index is estimated, suggesting that there is a significant positive correlation between a country’s economic growth, the openness of an economy, high levels of effective governance, and its environmental performance. The study of Gallego-Álvarez (2014) tries to analyze the environmental performance of countries and the variables that can influence it. At the same time, we performed a multivariate analysis using the HJ-biplot, an exploratory method that looks for hidden patterns in the data, obtained from the usual singular value decomposition (SVD) of the data matrix, to contextualize the countries grouped by geographical areas and the variables relating to environmental indicators

included in the environmental performance index.

These results confirm that the selected indices are consistent with previous studies, suggesting that environmental performance increases in line with economic development and that good governance increases a country's levels of environmental protection.

Imeida, and García-Sánchez (2017) explains that by using an ecological composite index as the dependent variable and focusing on two national dimensions: sociopolitical characteristics and economics. Environmental performance is measured using the Composite Index of Environmental Performance (CIEP) indicator proposed by García-Sánchez et al. (2015).

Echavarren (2016) analyzes the effect of environmental degradation, the affluence hypothesis, and postmaterialist theory to assess the environmental concern of individuals in 51 countries.

His results support the degradation hypotheses, where the importance of water scarcity in a country and national biodiversity are the major variables that explain individual environmental concern among all the indicators of environmental degradation. The affluence hypothesis is rejected and the postmaterialist theory is supported only at the individual level.

More specifically, the study of Husted and Sousa-Filho (2017) examines how the governance of sustainability projects as collaborative, in-house, or outsourced projects, affects corporate environmental, social, and governance (ESG) performance. Hypotheses are developed that collaborative sustainability projects achieve the greatest levels of ESG performance, followed by in-house projects, and then outsourced projects. However, Tamazian and Bhaskara Rao (2010) investigate the linkage between not only economic development and environmental quality but also financial development and institutional quality. We employ the standard reduced-form modeling approach to control for country-specific unobserved heterogeneity and GMM estimation to control for endogeneity. Jamali and al. (2017) advance an analytic framework to help better trace the meaning and practice of CSR in developing countries, which draws from an institutional logics approach combined with the Scandinavian institutionalism perspective on the circulation of ideas. Chikalipah, (2017) explores the impact of the institutional environment on the performance of 291 microfinance institutions in 34 sub-Saharan Africa countries during the period 2006 to 2014, by analyzing the unbalanced panel data using fixed effects and generalized method of moments (GMM) estimation techniques. The panel regression results demonstrate strong evidence that a strong institutional environment has a positive effect on the performance of microfinance institutions in sub-Saharan Africa.

Empirical analysis. In the empirical analysis, we provide firstly information about data and methodology. Secondly, we specify our econometric model and we defined variables. Thirdly we give some descriptive statistics for all variables used in the econometric model. Also, we present the correlation coefficients between variables. Finally, we discuss empirical findings for the whole sample as well as for the two sub-samples developed and developing countries.

Data and methodology. To test the relationship between environment performance and institutions quality, we used in this paper a sample of 187 countries observed during the period 2002-2015. Considering the difference of institutions quality and values of environment performance index, this whole sample is divided into two sub-samples. The first one is related to develop countries and covers 48 countries. The second one refers to developing countries and contains 139 countries. Data used in this study are collected from different sources. For example, the environment performance index is collected from (YCELP – Yale Center for Environmental Law and Policy (YCELP), Yale University) and (CIESIN – Center for International Earth Science Information Network (CIESIN), Columbia University), macroeconomic variables are drowning from the World Development Indicators (WDI) and institutions quality is collected from the Worldwide Governance Indicators (WGI).

To avoid the endogeneity problem and the reverse causality, we used dynamic panel data models and especially the system Generalized Method of Moment (GMM) estimator of Arellano and Bover (1995).

Also, the GMM estimator is considered as the most appropriate method with regard to the individual dimension 187 countries and the temporal dimension 14 years. Hence, the number of countries is very higher than the observed period.

Model specification and variables definition. The econometric model to be tested in this paper combines macroeconomic and institutional variables. This model can be written as follow:

$$EPI_{i,t}=\beta_0+ \beta_1 GDPPC_{i,t}+ \beta_2 TENC_{i,t} +\beta_3 RENC_{i,t} + \beta_4 INDUS + \beta_5 \sum_{i=1}^{n} INST_{i,t} + +£_{i,t} \quad (1)$$

Where; *(GDPPC)* is the real gross domestic product growth per capita. *(TENC)* is the total final energy consumption. *(RENC)* is the share of renewable energy in total final energy consumption. *(INDUS)* is the industry, value added (% of GDP).*(INST);* are institutional variables. These institutional variables inform on the legal and the political system of our sample to investigate whether they affect the environment performance. We introduce in our model control of corruption *(CCOR),* regulatory quality *(REGQU)* government effectiveness *(GOVEFF)* and legal enforcement of contracts *(RLAW).* These institutional variables are ranged between -2.5 and 2.5. Where value of -2.5 implies weak governance and value of 2.5 indicates strong governance.

This econometric model is tested in several steps. We introduce gradually institutional variables. This is in order to have the partial or individual and the global effect of institutions quality on the environment performance. For example, in the first model, we introduce only the institutional variable of control of corruption (CCOR). In the second model, we added the regulatory quality variable (REGQ). In the third model we introduce the government effectiveness variable. The fourth and the last model combine all institutional variables used in this study.

Findings. Descriptive statistics and correlation matrix. Table 1 below summarizes descriptive statistics for the two sub-samples developed and developing countries. Descriptive statistics are presented to describe the basic characteristics of the data used in this study. For each variable, we have the average value, the standard deviation, the minimum and the maximum values.

Table 1 – **Descriptive statistics**

Developing countries						*Developed countries*				
Variable	Obs	Mean	Std. D	Min	Max	Obs	Mean	Std, D	Min	Max
epi	1916	45,675	13,665	14,51	96,45	670	70,929	10,147	7,96	97,52
gdppc	1804	2,489	5,32	-62,21	50,116	648	2,359	3,83	-22,29	30,342
tenc	1147	68,205	28,871	4,122	99,997	425	68,968	24,132	6,002	99,998
renc	1320	30,736	29,644	0,008	98,27	481	34,401	30,896	0,553	100
indus	1660	29,563	13,63	5,78	84,283	611	30,641	18,12	4,764	210,61
ccor	1878	-0,472	0,67	-1,924	1,789	671	1,07	0,894	-1,79	2,557
regq	1877	-0,455	0,712	-2,675	1,382	669	1,077	0,746	-2,53	2,263
goveff	1877	-0,463	0,678	-2,487	1,596	669	1,139	0,755	-2,136	2,431
rlaw	1900	-0,481	0,733	-2,669	1,768	671	1,084	0,72	-1,566	2,12

Table 1 above indicates that the average value of environment performance index is 45.675 for developing countries and 70.929 for developed countries. From these statistics, we conclude that the environment performance in developed countries is more efficient than developing countries. However, the maximum values for the two groups of countries are almost similar with 96.45 for developing countries and 97.52 for developed countries.

For the GDP growth per capita, descriptive statistics show that the average level of growth for developing countries is 2.489% with a minimum value of -62.21% and a maximum value of 50.116%. With regard to developed countries, the mean of level of growth per capita is 2.359%. The maximum and the

minimum values are respectively 30.342% and -22.29%. These statistics indicate that on average the level of growth is almost the same for developing and developed countries. However, when we examined the minimum value, developing countries registered high negative value of -62.21% and developed countries recorded also negative level of growth of GDP per capita of -22.29%. This means that in the two sub-samples there are countries that knowed slow and negative growth but it is more worrying for developing countries.

CCOR, REGQU, GOVEFF and VACC are considered as institutional variables. They reflect the quality of governance. These values run from -2.5 to 2.5, with higher values corresponding to better governance. The most noticeable thing in Table 1 is that all these variables recorded on average negative values for developing countries and positive values for developed countries. For example, we can quote that CCOR registered on average -0.472 for developing countries and 1.070 for developed countries. In the same line of idea, developing countries recorded on average of government effectiveness a value of -0.463; however this value is about 0.755. The same trend is attributed to the others institutional variable such as rule of law and regulatory quality. When we examined the maximum values for institutional variables, we conclude that they are very higher for developed countries and around 2.5 the higher value. However, they are about 1.5 for developing countries. From these statistics, we can conclude that developed countries have strong institutional context with strong governance indicators. However, it seems that developing countries suffer from weak institutional context with negative and weak level of governance.

After having discussed descriptive statistics, the following development aims to check the nature and level of correlation among all variables used in this study. Table 2 presents the correlation matrix.

Table 2 – **Correlation Matrix**

	epi	Ccor	Regq	Goveff	Rlaw	gdppc	Tenc	Renc	indus
Epi	1.0000								
Ccor	0.5296	1.0000							
Regq	0.4507	0.3647	1.0000						
goveff	0.5855	0.2313	0.4331	1.0000					
Rlaw	0.4504	0.5912	0.3018	0.5426	1.0000				
gdppc	-0.0160	0.0185	0.0100	0.0192	0.0148	1.0000			
Tenc	-0.0584	-0.0269	-0.0014	-0.0149	-0.0149	-0.0013	1.0000		
Renc	0.0403	0.0713	0.0466	0.0616	0.0502	0.0225	-0.9148	1.0000	
indus	-0.0438	-0.0166	-0.0350	-0.0468	-0.0380	0.0799	0.2672	-0.2186	1.0000

Table 2 shows that CCOR, REGQ, GOVEFF, RLAW and RENC are positively correlated with the environmental performance index. However, there was a negative association between GDPPC, TENC, INDUS and environmental performance index. Also, Table 2 indicates that there is no high correlation between variables. This leads to confirm the absence of the multicollinearity problem. It should be noted that the only exception is the high level of correlation between Rule of Law and control of corruption. These two variables are institutional variables.

Empirical Results and Discussion. Empirical findings are given in tables 3, 4 and 5 below. Table 1 represents results for the whole sample, Table 2 is relative to developed countries and Table 3 summarizes main findings for developing countries. For these three estimations, we apply for the GMM estimator in two steps. The validity of the instrumental variables is tested using Sargan test of over-identifying restrictions and over a test of the absence of serial correlation of the residuals. The test for AR (2) is more important because it will detect autocorrelation in terms of levels. For all regressions, probabilities associated to Sargan and AR (2) test are higher than 5%. This implies the validity of instrument and the absence of autocorrelation.

The first step in our empirical analysis consists to test the determinants of environment performance

in the presence of institutions quality for the whole sample of 187 countries observed during the period 2002-2015. Empirical findings are displayed in Table 3 below.

Table 3 – **Results of Two-Step System dynamic panel-data for whole sample**

	Model (1)		Model (2)		Model (3)		Model (4)	
Epi	Coef,	Z	Coef,	Z	Coef,	Z	Coef,	Z
epi L1,	0,929	12,660***	0,917	12,910***	0,920	11,310***	0,919	11,35***
Gdppc	0,013	5,650***	0,011	4,700***	0,012	4,890***	0,013	5,19***
Tenc	-0,097	-12,310***	-0,103	-12,280***	-0,100	-11,850***	-0,100	-11,97***
Renc	-0,098	-13,360***	-0,101	-13,150***	-0,097	-12,350***	-0,098	-12,37***
Indus	0,018	2,910***	0,018	2,910***	0,018	2,900***	0,016	2,67***
Ccor	-0,096	-1,110	-0,209	-1,930*	-0,211	-1,860*	-0,169	-1,51
Regq	—	—	0,200	1,820*	0,146	1,390	0,237	2,26**
Goveff	—	—	—	—	0,026	0,300	0,061	0,63
Rlaw	—	—	—	—	—	—	-0,158	-1,44
_cons	12,581	12,630***	13,643	13,300***	13.213	12.68***	13,264	12,93***
Sargan test	67,654		68,862		66,809		70,211	
Prob> chi 2	0,0848		0,0804		0,0962		0,097	
AR (1)	-1,5204		-1,5230		-1,5218		-1,523	
Prob> Z	0,1284		0,1276		0,1281		0,128	
AR (2)	0,9087		0,9204		0,9174		0,923	
Prob >Z	0,3635		0,3573		0,3589		0,356	
Nbre of inst	60		61		62		63	
Nbre of Obs	1153		1151		1151		1151	

Table 3 indicates that the lagged independent variable is positively and significantly correlated with the environment performance index. This means that the level of environment performance of the last year acts positively on the current level of performance.

Also findings indicate that the GDPPC exerts a positive and significant effect on the environment performance. As proxy of wealth or economic development, GDPPC represents the ability of a country to ensure to its citizens good living conditions, with regard to economic, social and environmental dimensions. In the same line of idea, countries with higher level of growth are able to solve environmental problems since they have necessary financial resource to protect environment. Countries recording high level of GDP will improve all public services such as health conditions and public and private education two necessary pillar for a sustainable society. Our results are similar to Cracolici et al, (2009; 2010), Scruggs, (1999), Swamy and Fikkert (2000).

The use of energy was considered as the most factors disturbing environment quality. Energy consumption is recognized more pollutant. It's for this reason that we introduce two variables that reflect the use of energy; we mean the total final energy consumption and the renewable energy consumption. Empirical results indicate that these two proxies of energy use highly increase the environmental performance with a level of 1% of significance. These results are surprising since the use of energy deteriorates environmental quality. However, it should be noted that the EPI is an index which comprises objectives, policy categories and indicators corresponding to environmental health and ecosystem vitality. It's obvious that the use of energy especially not clean threatens environmental quality but it can enhance socioeconomic conditions since it offer more opportunity for investment and consequently for employment. Also, it's considered as a primary input for transport activities which makes easier the movement of passengers and products.

With regard to institutional quality represented by control of corruption, regulatory quality, government

effectiveness and rule of law, almost of them act significantly on the environment performance. Institutions quality appeared as a crucial factor for explaining variation in governance and economy (Duit and al., 2005). However, their effects are mixed. For example, control of corruption is negatively and significantly correlated with the dependent variable. Corruption is confirmed by several studies that it leads to slow growth since it limits foreign direct investment. The direct association between growth and environmental performance highly explain the indirect relationship between corruption and environmental performance. Countries with high levels of corruption tend to have low levels of environmental performance. In contrary, countries with low levels of corruption perform better on the EPI. (Ebert and Welsch, 2004, Duit and al., 2010). However, in this study we have introduced control of corruption and not corruption as an institutional indicator of governance. The control of corruption means the willingness and the reaction of government to fight corruption. In this case, the interpretation of empirical result becomes totally different. This means that an increase of control of corruption decreases the environmental performance, which is not logical. We can explain this association as follow; the effort required by these countries to fight corruption is not optimal. Also, a strong work is needed to control and to avoid corruption.

The second institutional variable used in this study is positively and significantly correlated with the dependent variable. Empirical findings indicate that regulatory quality increases the environment performance. The development of performance environment is dependent to the effectiveness of public administration especially education and health. In a country with good regulatory quality, it results an improvement of health conditions and quality of public and private education. Also, existent or newly firms respected and protected environment in which they operate. Consequently, the environment performance will be enhanced.

In the following development, we will interpret results only for developed countries. Like for the whole sample, institutional qualities are introduced gradually in our econometric models. For the first column we integrate only control of corruption. We added regulatory quality for the second model. Government effectiveness is introduced in the third model. Finally, we tested the fourth model taking into account the rule of law. Empirical results relative to developed countries are displayed in Table 4 below.

Table 4 – **Results of Two-Step System dynamic panel-data Developed countries**

	Model (1)		Model (2)		Model (3)		Model (4)	
Epi	Coef,	Z	Coef,	Z	Coef,	Z	Coef,	Z
epi L1,	0,833	82,550***	0,814	8,280***	0,813	7,030***	0,736	6,870***
Gdppc	0,003	1,170	0,002	1,020	0,000	0,020	0,011	4,320***
Tenc	0,032	5,240***	0,044	6,700***	0,043	7,270***	0,037	2,680***
Renc	0,078	11,320***	0,082	10,040***	0,083	10,470***	0,065	4,440***
Indus	-0,006	-1,660*	-0,002	-0,340	-0,006	-0,920	-0,015	-1,600
Ccor	-0,654	-4,160***	-1,082	-4,760***	-0,932	-3,180***	-2,390	-4,240***
Regq			0,784	4,190***	1,081	2,600***	0,163	0,370
Goveff					-0,323	-0,790	-0,211	-0,680
Rlaw							3,982	5,280***
_cons	7,619	8,160***	7,472	8,650***	7,477	9,050***	11,995	7,720***
Sargan test	24,513		22,795		21,7457		20,0575	
Prob> chi 2	0,9997		0,8912		0,7845		0,9997	
AR (1)	-2,204		-2,2258		-2,2877		-2,0724	
Prob> Z	0,0275		0,026		0,0222		0,0382	
AR (2)	-1,2286		-1,1832		-1,2286		-1,2303	
Prob >Z	0,2192		0,2367		0,2394		0,2185	
Nber of inst	60		61		62		63	
Nbre of Obs	325		323		323		323	

Like results of whole sample, the lagged dependent variable exerts a positive and significant effect on the environment performance. This means that the EPI of the last year is correlated positively and significantly with the EPI of the current year.

For developed country, the effect of GDPPC on the dependent variable EPI is positive and significant only in the fourth model which combines all institutional variable used in this study. In contrary, its effect is not significant when we introduce gradually institutional variable in model 1, model 2 and model 3. This means, that the level of growth increased the environment performance only in the presence of all indicators of governance and not only in the partial presence of institutional variables.

Results indicate also that the use of energy either total final consumption or renewable energy improves significantly the environment performance. Like for the whole sample, energy consumption enhances the EPI. As we explain this result in table 3, energy is considered as a primary input for transport activities which makes easier the movement of passengers and products. Also, there is an important part of energy used in developed countries which is clean energy that protect environment and created added value. So, energy can exert a positive effect on EPI when this energy is a clean energy and canalized with rational level.

For the effect of institutional qualities, empirical results indicate the same effect founded in table 3 relative to the whole sample. For example, only the control of corruption decreases significantly the EPI. However, results indicates that regulatory quality and rule of law act positively and significantly on the environment performance. From these results, we conclude that the presence of institutional qualities is more significant to improve environment performance for developed countries. Also, descriptive statistics confirm that strong governance spur environment performance. All average values for theses institutional variables are positives and around (1) contrary to developing countries, where all average of governance indicators are negative. Table 4 makes evidence those good institutions quality such rule of law in the legal system set and the regulatory quality improve environment performance for the case of developed countries.

Table 5 below presents results of developing countries. As we estimate determinants of EPI for whole sample and developed countries, the third steps of our empirical analysis is done for the second sub-sample of developing countries.

Table 5 – **Results of Two-Step System dynamic panel-data Developing countries**

	Model (1)		Model (2)		Model (3)		Model (4)	
Epi	Coef,	Z	Coef,	Z	Coef,	z	Coef,	Z
epi L1,	0,933	197,870***	0,933	18,240***	0,932	17,550***	0,931	17,430***
Gdppc	0,018	9,480***	0,018	9,380***	0,020	9,150***	0,021	10,170***
Tenc	-0,073	-11,090***	-0,074	-10,520***	-0,066	-9,370***	-0,071	-10,040***
Renc	-0,078	-11,370***	-0,078	-11,670***	-0,072	-10,610***	-0,076	-11,130***
Indus	0,028	5,610***	0,028	5,520***	0,030	6,740***	0,026	5,270***
Ccor	-0,187	-2,000**	-0,186	-1,870*	-0,264	-2,560**	-0,251	-2,750***
Regq	—	—	-0,008	-0,110	-0,124	-1,740*	-0,058	-0,850
Goveff	—	—	—	—	0,281	4,730***	0,261	3,480***
Rlaw	—	—	—	—	—	—	-0,111	-1,670*
_cons	9,169	12,070***	9,251	11,980***	8,559	10,700***	9,079	10,890***
Sargan test	57,502		57,414		55,702		55,216	
Prob> chi 2	0,3121		0,315		0,3735		0,391	
AR (1)	-1,3572		-1,3582		-1,3568		-1,3595	
Prob> Z	0,1747		0,1744		0,1748		0,174	
AR (2)	1,1871		1,188		1,1837		1,1853	
Prob >Z	0,2352		0,2348		0,2365			
Nbre of inst	60		61		62		63	
Nbre of Obs	828		828		828		828	

Like for the whole sample and for developed countries, the effect of the lagged depended variable and the GDP growth is positive and significant. Here again, the environmental performance of the current year depends positively on the previous EPI. Also, the level of growth acts positively and significantly on the EPI by improving health condition, education and by reinforcing the protection of environment.

Contrary to the findings for whole sample and for developed countries, the two proxies of energy use; total energy consumption and renewable energy consumption decreases significantly the environmental performance at level of 1% of significance. This result can be explained by the quality of energy used by most of domestic and foreign investments which is not clean energy and which threatens health conditions and environment quality in developing countries. Despite benefits for human health, energy use affects negatively global health. Air pollution from incomplete combustion of fossil fuels and biomass fuels is recognized as the most worrying factor that affects health condition. Effects on workers in energy industries are the second biggest health impact globally. In this line of idea, Wang (2010) reports that 43 million people would die of respiratory infection each year.

As for the effect of institutions quality, empirical findings indicates that all variables reflected institution qualities decreased the environmental performance except for the government effectiveness which exerts a positive and significant effect. The negative effect of these variables confirms the poor quality of governance for developing countries. As for example, the average of all institutional variables is negative and around (-0.4). This value implies weak governance which negatively affects the environmental performance. Hence, developing countries must improve the quality of different institutions. As per our results, these countries should implement suitable policy measures in order to enhance health conditions, education and protect environment to improve the environmental performance.

Conclusion. Environmental risks have a significant impact on organizations as it affects investment decisions, stakeholder interactions and government regulations. In recent years, society has shown increased interest in environmental issues of both policies and researchers especially ecological economists. The purpose of this paper is to investigate the relationship between environment performance and institutions quality. To this end, we used a sample of 187 countries observed during the period 2002-2015. Considering the difference of institutions quality and values of environment performance index, this whole sample is divided into two sub-samples. The first one is related to developed countries and covers 48 countries. The second one refers to developing countries and contains 139 countries. To avoid the endogeneity problem and the reverse causality, we used dynamic panel data models and especially the system Generalized Method of Moment (GMM) estimator of Arellano and Bover (1995). Also, the GMM estimator is considered as the most appropriate method with regard to the individual dimension 187 countries and the temporal dimension 14 years. From the empirical findings, we conclude that the level of growth proxied by the GDPG exert a positive effect on the level of the environmental performance for the three sample; the whole sample, developed countries and developing countries. GDPPC represents the ability of a country to ensure to its citizens good living conditions, with regard to economic, social and environmental dimensions. Also, Countries recording high level of GDP will improve all public services such as health conditions and public and private education two necessary pillar for a sustainable society.

Also, empirical results show that institutional quality represented by control of corruption, regulatory quality, government effectiveness and rule of law, act significantly on the environment performance for the whole sample. However, their effects are mixed. For example, control of corruption is negatively and significantly correlated with the dependent variable. However, regulatory quality increases the environment performance.

With regard to developed countries, empirical results indicate the same effect for the whole sample. Only the control of corruption decreases significantly the EPI. However, results indicates that regulatory quality and rule of law act positively and significantly on the environment performance. From these results, we conclude that the presence of institutional qualities is more significant to improve environment

performance for developed countries. This implies that good institutions quality like rule of law in the legal system set and the regulatory quality improve environment performance for the case of developed countries.

Results for developing countries indicate that all variables reflected institution qualities decreased the environmental performance except for the government effectiveness which exerts a positive and significant effect. The negative effect of these variables confirms the poor quality of governance for developing countries. For example, the average of all institutional variables is negative and around (-0.4). This value implies weak governance which negatively affects the environmental performance.

This paper has some relevant policy implications. The results obtained have real-world applications and can be useful for policy makers. Developing countries should implement suitable policy measures in order to enhance health conditions, education and protect environment to improve the environmental performance. Also, these countries are invited to use clean energy that reduce the CO2 emission and preserve the environment.

Appendix 1 - **List of developed countries**

Developed Countires					
1	Argentina	17	Greece	33	New Zealand
2	Australia	18	Hong Kong	34	Norway
3	Austria	19	Hungary	35	Poland
4	Bahreïn	20	Iceland	36	Portugal
5	Belgium	21	Ireland	37	Qatar
6	Brunei	22	Israel	38	Saudi Arabia
7	Canada	23	Italy	39	Singapore
8	Chile	24	Japan	40	Slovakia
9	Croatia	25	Korea, South	41	Slovenia
10	Cyprus	26	Kuwait	42	Spain
11	CzechRepublic	27	Latvia	43	Sweden
12	Denmark	28	Liechtenstein	44	Switzerland
13	Estonia	29	Luxembourg	45	Taiwan
14	Finland	30	Malta	46	United Arab Emirates
15	France	31	Montenegro	47	United Kingdom
16	Germany	32	Netherlands	48	United States

Appendix 2 – **List of developing countries**

Developing countries					
1	Afghanistan	48	Guatemala	95	Panama
2	Albania	49	Guinea	96	Papua New Guinea
3	Algeria	50	Guinea-Bissau	97	Paraguay
4	American Samoa	51	Guyana	98	Peru
5	Angola	52	Haiti	99	Philippines
6	Argentina	53	Honduras	100	Romania
7	Armenia	54	India	101	RussianFederation
8	Azerbaijan	55	Indonesia	102	Rwanda
9	Bangladesh	56	Iran	103	Samoa
10	Belarus	57	Iraq	104	Sao Tome and Principe
11	Belize	58	Jamaica	105	Senegal
12	Benin	59	Jordan	106	Serbia
13	Bhutan	60	Kazakhstan	107	Seychelles
14	Bolivia	61	Kenya	108	Sierra Leone
15	Bosnia and Herzegovina	62	Kiribati	109	SolomonIslands

Appendix 2

16	Botswana	63	Korea,	110	Somalia
17	Brazil	64	Kosovo	111	South Africa
18	Bulgaria	65	KyrgyzRepublic	112	South Sudan
19	Burkina Faso	66	Lao People's	113	Sri Lanka
20	Burundi	67	Lebanon	114	St. Lucia
21	Cambodia	68	Lesotho	115	St. Vincent and the Gre.
22	Cameroon	69	Liberia	116	Sudan
23	Cape Verde	70	Libya	117	Suriname
24	Central African. Rep	71	Macedonia,	118	Swaziland
25	Chad	72	Madagascar	119	Syrian Arab Republic
26	China	73	Malawi	120	Tajikistan
27	Colombia	74	Malaysia	121	Tanzania,
28	Comoros	75	Maldives	122	Thailand
29	Congo, Democ.	76	Mali	123	Timor-Leste
30	Congo, Rep.	77	Marshall Islands	124	Togo
31	Costa Rica	78	Mauritania	125	Tonga
32	Côte d'Ivoire	79	Mauritius	126	Tunisia
33	Cuba	80	Mexico	127	Turkey
34	Djibouti	81	Micronesia, Fed.	128	Turkmenistan
35	Dominica	82	Moldova	129	Tuvalu
36	DominicanRepublic	83	Mongolia	130	Uganda
37	Ecuador	84	Montenegro	131	Ukraine
38	Egypt, Arab Rep.	85	Morocco	132	Uzbekistan
39	El Salvador	86	Mozambique	133	Vanuatu
40	Eritrea	87	Myanmar	134	Venezuela,
41	Ethiopia	88	Namibia	135	Vietnam
42	Fiji	89	Nepal	136	West Bank and Gaza*)
43	Gabon	90	Nicaragua	137	Yemen
44	Gambia, The	91	Niger	138	Zambia
45	Georgia	92	Nigeria	139	Zimbabwe
46	Ghana	93	Pakistan		
47	Grenada	94	Palau		

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Х. Дкхілі, асистент, Університет Джендуба (Джендуба, Туніс).

Результативність екологічної політики та якість державного управління: досвід країн з розвиненою та транзитивною економікою

Стаття присвячена вивченню питань взаємозв'язку індексу результативності екологічної політики держави та індексу якості державного управління. Проведене дослідження будується на основі аналізу результатів розробленої автором економетричної моделі, яка включає макроекономічні та інституційні змінні у вибірці з 187 країн за період 2002-2015 рр. У статті на основі проведеного теоретичного аналізу систематизовано світовий науковий доробок щодо інструментарію оцінювання зв'язку між результативністю державної політики у сфері охорони навколишнього середовища та інституційного забезпечення економічного розвитку. Масив статистичної інформації було сформовано для 48 розвинутих країн та 139 країн, що розвиваються. Для аналізу панельних даних було використано узагальнений метод моментів (Generalized Method of Moments), запропонований Ареллано и Бовер (1995р.). Емпіричні результати дослідження підтвердили, що зростання реального валового внутрішнього продукту на душу населення країни позитивно впливає на результативність екологічної політики держави та якість державного управління. Критеріям оцінки якості державного управління було обрано показники «The Worldwide Government Indicators», що характеризують рівень корупції, регуляторну політику, верховенство права, ефективність роботи уряду та інші. Автором доведено позитивний вплив якості функціонування державних інститутів на підвищення рівня ефективності екологічної політики в розвинутих країнах. Отримані результати мають практичне значення для країн, що розвиваються, оскільки для даної вибірки країн всі змінні якості державного управління знизили рівень ефективності екологічної політики держави, за винятком індикатора ефективності роботи уряду, який мав позитивний і статистично значимий вплив.

Ключові слова: панельні дані, розвиток, індекс екологічної ефективності, державні інститути, GMM модель.