Rivista Trimestrale di SCIENZA dell'AMMINISTRAZIONE
Studi di teoria e ricerca sociale
4/2023

# Quality of Institutions and Environmental Quality in the International Scientific Literature

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**Abstract**

This paper aims to provide a reasoned review of the most recent international scientific literature on the relationship between the quality of institutions and the quality of the environment. In this respect, the literature analysed does not agree either as regards the choice of institutional quality indicators, or as regards the environmental indicators, or as regards the nature of the relationship between the two aspects. The paper, trying to bring order to the large number of studies published on the subject, is structured in nine paragraphs: the introduction; the second one which clarifies what we mean by "institutional quality" and the indicators we use to study it; the third, fourth, and fifth focus on the role played by specific quality indicators, such as democracy, corruption and the rule of law, in determining the quality of the environment in different countries or regions of the world. The sixth paragraph looks at the so-called "environmental Kutznet curve", describing the relationship between the economic growth of a country and its environmental degradation. The seventh focuses on the role of another important economic variable, foreign investments, and the eight shows the relationship between institutional quality and energy choices. In the ninth we try to formulate some conclusions.

*Keywords:* scientific review, indicators, quality of institutions, environmental quality, review

**Riassunto.** *Qualità delle istituzioni e qualità dell'ambiente nella letteratura scientifica internazionale*

Il presente contributo intende fornire una rassegna ragionata della più recente letteratura scientifica internazionale sul rapporto tra la qualità delle istituzioni e la qualità dell'ambiente. A tale riguardo, la letteratura analizzata non concorda né sulla scelta degli indicatori di qualità istituzionale, né sugli indicatori ambientali, né sulla natura della relazione tra i due aspetti. Il paper, cercando di mettere ordine nel gran numero di studi pubblicati sull'argomento, è strutturato in quattro paragrafi: l'introduzione; il secondo paragrafo, che chiarisce cosa si intenda per "qualità istituzionale" e gli indicatori adottati per studiarla; il terzo, il quarto e il quinto si concentrano sul ruolo svolto da specifici indicatori di qualità, come la democrazia, la corruzione e lo stato di diritto, nel determinare la qualità dell'ambiente in diversi paesi o regioni del mondo. Il sesto paragrafo esamina la cosiddetta "curva di Kutznet ambientale", descrivendo il rapporto tra la crescita economica di un paese e il suo degrado ambientale. Il settimo si concentra sul ruolo di un'altra importante variabile economica, gli investimenti esteri, e l'ottavo mostra il rapporto tra qualità istituzionale e scelte energetiche. Nella nona proviamo a formulare alcune conclusioni.

*Parole chiave*: rassegna scientifica, indicatori, qualità delle istituzioni, qualità dell'ambiente

## 1. Introduction

This paper aims to provide a review of the most recent international scientific literature on the relationship between the quality of institutions and the quality of the environment. Although indicators not directly related to environmental policy and resource management are often adopted to represent the quality of institutions (such as the political stability or the level of corruption), however, given their importance, they will inevitably influence all

major policy paths in a country, including the ones related to the environment (Abreu, Soares and Silva, 2022).

The international scientific literature does not agree neither as regards the choice of institutional quality indicators, nor as regards the environmental indicators, nor as regards the nature of the relationship between the two aspects (direct or inverse, linear or non-linear, etc.); different proxies for institutions and environmental quality have been proposed, and outcomes remain contradictory (Esty and Porter, 2005).

In an attempt to bring order to the large number of studies published on the subject, this paper is structured in nine sections: the second one clarifies what is meant – for the purposes of this paper – by "institutional quality"; the following three focus on the role played by specific quality indicators, such as democracy, corruption and the rule of law, in determining the quality of the environment in different countries or regions of the world. The sixth paragraph looks at one of the main mechanisms through which institutions can influence the quality of the environment: the so-called "environmental Kutznet curve", describing the relationship between the economic growth of a country and its environmental degradation. The seventh focuses on the role of another important economic variable, foreign investments, and the eight shows the relationship between institutional quality and energy choices. In the ninth we try to formulate some conclusions.

## 2. What do we mean by quality of institutions?

The relationship between governance indicators and environmental quality is being increasingly studied in recent years (Azam, Liu and Ahmad, 2021) but already at the end of the last century Ostrom (1998) stated that institutional quality reflects the governments' structure and effectiveness which is formulated through their designed policies and takes place in the environmental regulatory framework. In the same years, Lovei and Weiss

(1998) showed that the administrative and institutional settings enable and support environmental policies, not only at the policymaking level but also at the implementation and monitoring level; Arrow *et al.* (1995) and Kaufmann *et al.* (1998) recognized the need of inclusion of policy variables in order to describe the income-environment relationship throughout the growth process and the role of institutions. About then years later, among others, Iacobuta and Gagea (2010) argued that the main obstacle to sustainable development is not insufficient resources, but inadequate institutional operation.

Although at the international level the literature still does not agree regarding the choice of indicators of institutional quality (cfr. Simionescu, Neagu and Gavurova, 2022), in this paper we will take as a main reference the Worldwide Governance Indicators developed by the World Bank, very often used (e.g. Álvarez *et al.*, 2018; Berdiev, Goel and Saunoris, 2020; Halkos and Tzemeres, 2013; Muhammad *et al.*, 2021). The indicators are:

- government effectiveness (quality of public services and policies);
- political stability and absence of violence;
- voice and accountability (citizens' recognized freedoms);
- control of corruption as public power used for personal benefits;
- regulatory quality as policies to support private environment;
- rule of law as confidence in the rules that function in society.

These indicators are often adopted by authors in different combinations. For example, Gani (2012) identified five dimensions of good governance (political stability, government effectiveness, regulatory quality, rule of law, and corruption control), and these were employed by Mavragani, Nikolaou and Tsagarakis (2016), for a panel of 73 countries (including all G20 and EU countries), showing that each of these indicators had a positive impact on environmental quality. Also Abreu, Soares and Silva (2022) use them to analyse their impact on environmental quality in Brazil and, while not finding a clear correlation between the quality of governance and CO2 emissions, however, the authors highlight some elements to pay attention to: the political interference on environmental management, the

low government effectiveness levels, the lack of political independence.

## 3. Specific aspects in quality of institutions (I): democracy and environmental quality

Some studies (i.e. Simionescu, Neagu and Gavurova, 2022) take into consideration the impact on environmental quality, not so much of the quality of institutions in general, but specifically of democracy. The positive effect of democracy on environmental quality, for example, is underlined by Barret and Graddy (2000), Bernauer and Koubi (2009), Congleton (1992), Dasgupta and Cien (2016), Li and Reuveny (2006), Neumayer (2002), Ward (2008). Specifically, democracy has a positive impact on environmental quality by providing political rights and freedom of information that enhance general public awareness regarding the optimal use of the natural resource (Bernauer, Böhmelt and Koubi, 2012; Elliott and Wolanski, 2015). Arminen and Menegaki (2019) found that the improvement of national democracy is conducive to reducing per capita carbon dioxide. Markwardt and Farzanegan (2012) found that democratic institution eases the contradiction between environment and economic growth in MENA countries. In particular, Bhattacharya, Awaworyi Churchill and Paramati (2017) found that economic freedom and renewable energy reduce environmental pollution. Lastly, Adams and Klobodu (2017) found that bureaucratic quality and democracy hold an important role in controlling air pollution. Others, however, come to different conclusions. IQAir (2020) denied that democratic governments have better executed environmental regulations, Midlarsky (1998) found that there is no uniform relationship between democracy and the environment. In his study, among others, three indicators (deforestation, CO2 emissions, and soil erosion by water) demonstrated significant negative relationships between democracy and environmental preservation. These findings suggest that «there are varying degrees of democracy worldwide, and many Third World, only partially developed, democratic polities have

relatively large agrarian constituencies to satisfy, thus leading to significant degrees of deforestation, as for example in Brazil» (p. 358). Moreover, Lundstrom and Carlsson (2003) have concluded that democracy has no role in CO2 emissions, most probably because this is a global environmental problem and hence subject to free-riding by the individual countries.

## 4. Specific aspects in quality of institutions (II): corruption and environmental quality

There is also no agreement on the role of corruption, which appears to negatively affect environmental quality according to several authors including Bali Swain, Kambhampati and Karimu (2020), Berdiev, Goel and Saunoris (2020), Biswas, Farzanegan and Thum (2012), Cole (2007), Damania, Fredriksson and List (2003), Goel, Herrala and Mazhar (2013), Ozturk and Al-Mulali (2015), Pelegrini and Gerlagh (2006), Wang, Danish Zhang and Wang (2018), Wang, Zhao and Chen (2020), Welsch (2004). More specifically, some studies have shown that corruption weakens environmental regulations and policies, such as CO2 emissions control (Simionescu, Neagu and Gavurova, 2022), thereby leading to environmental degradation including air and water pollution (Fredriksson, Vollebergh and Dijkgraaf, 2004; Habib *et al.*, 2020); others underline how corruption can indirectly affect pollution by affecting income distribution and economic growth rate (Leitão, 2010). Zhou, Wang and Chen (2020) analyzed the effects of China's 2013 anti-corruption campaign on air pollution levels and found that anti-corruption campaign has reduced the air pollution by 20.3%. But others do not fully confirm this negative correlation. E.g., Akhbari (2019) considered the impact of control of corruption on CO2 emission in 61 countries, between 2003 and 2016: carbon emission is not affected by the corruption levels in developed countries and decrease in corruption does not have a significant effect on carbon emission levels while it has in developing countries. In the study conducted by Sulemana and Kpienbaareh (2020) in 48 sub-Saharan African countries and 34 OECD countries during

1996-2014, it emerges that corruption related negatively to air pollution, but not to carbon emissions, which are mainly from daily activities such as energy generation, transportation, industrial production of chemical and petroleum products, and agricultural activities (Solomon *et al.*, 2007).

## 5. Specific aspects in quality of institutions (III): the rule of law and environmental quality

According to others, the quality of governance plays an important role in mitigating the environmental consequences of economic growth thank to an increasing environmental policy stringency (e.g., Chen, Hao and Zhou, 2022; Grossman and Krueger, 1995; Kirkpatrick and Parker, 2005; Ronaghi, Reed and Saghaian, 2020; Xue *et al.*, 2021; Yang and Khan, 2021). According to Deacon (1999), governments determine the implementation of the regulation of treatment of natural resources. Dutt (2009) examined the environment-income relationship in 124 countries, exploring the possible role played by factors such as accountability of government, quality of policy services, index of corruption, political liberties and civil rights. Bhattarai and Hammig (2004) examined the existence of EKC including the rule of law along with institutional indicators like corruption, bureaucracy and civil rights. The study confirms the hypothesis of the importance of governance factors. Other studies have shown that the rule of law plays a crucial role in environmental protection and sustainable development (Castiglione, Infante and Smirnova, 2012; Lau, Choong and Eng, 2014; Wu, 2017). The rule of law, in turn, includes other indicators such as the property rights (Kerekes, 2011), the contract enforceability and the efficiency of bureaucracy (Culas, 2007). In the study of how the enactment of regulations and laws dealing with climate change affects CO2 emissions, Stef and Jabeur (2020) used 4 sub-indicators of WGI to measure institutional quality: rule of law, regulatory quality, control of

corruption and government effectiveness. Among others, Dinda (2004) argued that institutions affect the income–environment relationship through the effectiveness of the exercised policy. Salman *et al.* (2019) incorporated the factors of institutional efficiency and energy consumption in the examination of the relationship between economic growth and CO2 emissions in Indonesia, South-Corea and Thailand. Using "law and order" as an institutional indicator, they found that the quality of local institutions is important to lessening environmental degradation in these areas. Al-Mulali and Ozturk (2015) probed the effect of political stability on ecological footprints along with other variables of trade, energy use, and urbanization in 14 MENA.

## 6. The role of the EKC in shaping the institutional quality effects

Numerous studies deal with the impact of the quality of institutions on environmental quality taking into account the Environmental Kuznets curve (EKC). According to the EKC hypothesis, up to certain per capita income levels of a country, income growth causes pollution growth, because of the natural resource extraction and the increase in waste generation. But, after a certain point, economy's structural changes, environmental-friendly technologies and stringent environmental measures reduce adverse effect of income. Chen, Hao and Zhou's study (2022) shows that the reduction effect of institutional quality on pollution exists significantly in high-income countries and common law countries. When EKC appears, institutional quality can become an important means to lessen the contradiction between environment and economy; the improvement of institutional quality is conducive to alleviating the environmental deterioration during the process of economic growth.

Liu *et al.* (2020) found that the quality of political institutions is a key element of environmental quality, and an increase in voice and accountability and political stability

decreases CO2 emissions in five countries (China, India, Japan Russia, and the USA). The reason behind may be that in the strong political system, higher political stability leads to an expansion of economic activities, and, consequently, CO2 emissions decrease according to the EKC hypothesis. Usman and Jahanger (2021) found evidence in support of validation of the EKC model in a panel of 93 countries from 1990 to 2016, and they lighted on that the environmental quality expressed through the ecological footprint was deteriorated by the low level of institutional quality in terms of political instability, judiciary, group regions, and the voice of accountability that directly influence the institutes. These results have been confirmed, among others, by Asongu and Odhiambo (2020), Danish *et al.* (2019), Hassan *et al.* (2020). Charfeddine and Mrabet (2017) employed an EKC model and used the ecological footprint as an environmental proxy in 15 Middle East and North Africa (MENA) countries: their results revealed that energy consumption and (low) institutional quality (represented by political rights and civilian freedom) increase the ecological footprint in these regions.

## 7. The role of foreign direct investments (FDI) towards environmental quality

Some scholars take into consideration the foreign direct inflows (FDI) and many studies hold that their impact on the environment depends on the level of environmental regulation and institutional quality (Cheng, Li and Liu, 2020; Ullah *et al.*, 2022; Walter and Ugelow, 1979; Zhang *et al.*, 2020). Tamazian and Rao (2010), in a study on 24 economies in transition over 1993–2004, concluded that, without the support of institution, financial liberalization may not be conducive to the improvement of environmental quality. Le and Ozturk (2020) demonstrate that globalization, financial development, and energy consumption increase CO2 emissions in 47 Emerging Market and Developing Economies (EMDEs) between 1990 and 2014. Others confirm that result (i.e Hassan *et al.,* 2020;

Ibrahim and Law 2016): trade openness is harmful to countries with low institutional quality, but it is conducive to the environmental quality of countries with high institutional quality.

Azam, Liu and Ahmad (2021) show that the relationship between FDI and environmental quality is ambigous, depending on whether we consider that the FDI produces negative externality or positive due to clean technological investment. Based on the Porter hypothesis[1], some scholars believe that the entry of foreign-funded enterprises will bring advanced technology and governance concepts of developed countries, and FDI will enhance the environmental awareness and environmental protection capacity of the host region (Birdsall and Wheeler, 1993; Zhao *et al.*, 2020). Moreover, some scholars have confirmed that FDI does not aggravate the environmental problems of host countries; conversely, it promotes the pollution control performance of backward countries (Eskeland and Harrison, 1997; Wang, Zhang and Zhang, 2019). By the contrary, others believe that improvement of institutional quality can attract more trade, investment, activities, which in turn amplify the scale effects on pollution emissions (Le and Ozturk, 2020; Singhania and Saini, 2021).

## 8. Quality of institutions and energy choices

Finally, not many studies link the quality of institutions to energy choices, and they mainly focus on developed countries. Christoforidis and Katrakilidis (2021) demonstrate the inefficient integration of renewable energy forms in 29 OECD countries and the concomitant essential role of institutions on environmental sustainability (reducing the ecological footprint). Wirth (2014) analysed the emergence of community-based energy projects in Italy, suggesting that 'community spirit', a cooperative tradition, and the norms

[1] For the Porter hypothesis, institutional quality is an important factor determining technological progress: institutional quality can reduce the pollution by supporting technological progress (Coccia, 2020).

of locality and responsibility are central drivers behind the emergence and constitution of biogas cooperatives. Cadoret and Padovano (2016) for 26 EU countries have concluded that higher governance tends to improve energy efficiency and more stringent environmental policies.

Cifor *et al.* (2015) studied the policy and institutional challenges of grid integration of renewable energy in the western United States, whereas Chang and Wang (2017) focused on China, showing that the Chinese Government is unable to provide institutional support for the development of marine renewable energy, because of the lack of specific legal basis and legal protection for developers. The sustainability of the bioenergy industry was examined by Alsaleh, Abdul-Rahim and Abdulwakil (2021) in selected European countries during 1996–2018. They revealed that this industry can significantly grow as a result of improving the quality of governance indicators.

Few studies connect the quality of institutions to energy consumption in developing countries: the one conducted by Azam, Liu and Ahmad (2021) in 66 countries shows a positive impact of the former on the latter, illustrating how their industrialisation is linked to the use of fossil fuels. Sarkodie and Adams (2018) show that structural adjustment in disaggregate and aggregate energy consumption, economic growth, and political institutional quality play a critical role in environmental quality. Evidence from their study in South Africa reveals that political institutional quality plays a huge role in the social, governance and economic readiness to mitigate climate change and its impact. Sohail *et al.* (2021) explore the structural changes that link economic growth and institutional quality as they relate to CO2 emission and energy consumption in Pakistan. The result summarizes that institutional quality has a positive and significant impact on CO2 emissions. Also, finding shows economic growth reduce CO2 emissions over time, which validated the EKC existence for CO2 emissions.

## 9. Conclusion

This paper represents a review of the most recent international scientific literature on the relationship between the quality of institutions and the quality of the environment. In fact, there are many recent studies on this subject, but they do not agree either on the choice of institutional quality indicators, or on the environmental aspects to be monitored, or on the results achieved.

On one hand, as far as institutional quality is concerned, the indicators proposed by the World Bank, known as the Worldwide Governance Indicators, are mostly adopted; as regards environmental impacts, on the other hand, air pollution and CO2 emissions are by far the most monitored aspects, although studies of the effects on the conservation of forests and other natural resources do exist.

From the point of view of the results achieved, the vast majority of studies undoubtedly show a direct positive correlation between the quality of institutions and environmental quality, whereby the higher quality of institutions contributes to the achievement of better environmental performance by a country. However, some analyses show that, for specific indicators, no correlation is found (e.g. between the level of corruption and CO2 emissions); moreover, the role of foreign direct investments, which can lead to economic growth and therefore to increased pressure on the environment, is controversial if institutions do not intervene to straighten this trend.

In general terms, the majority of the findings on the topic regard developing countries, while it could be interesting to deepen the most controversial correlations also in western countries. In this respect, we note the need to conduct such a study in Italy, where at the moment there are no publications about it.

Moreover, the need for further research emerges in the literature to go deeper into the analysis of the relationships between specific indicators of institutional quality and specific environmental aspects. Till now, scientific literature working on that topic is the economic

one, but other disciplines, such as the legal, political and sociological ones, should face the matter, including their perspective in conducting research and interpretating results. Studies characterized by a stronger interdisciplinary approach are needed in order to better understand the mechanisms, the dynamics, the ways through which the relationship between institutional quality and environmental quality takes shape; for example could be interesting to highlight the role of human development in forging this relationship (Baumann, 2021; Stryzhak, 2019).

**Reference List**

Abreu M., Soares I., Silva S. (2022). Governance quality and environmental policy on emergent, resource-rich economies: The case of Brazil. *Energy Reports*, 8, 3: 70. DOI: 10.1016/j.egyr.2022.01.041.

Adams S., Klobodu E.K.M. (2017). Urbanization, democracy, bureaucratic quality, and environmental degradation. *Journal of Policy Modeling*, 39, 6: 1035. DOI: 10.1016/j.jpolmod.2017.04.006.

Akhbari R., Nejati M. (2019). The effect of corruption on carbon emissions in developed and developing countries: Empirical investigation of a claim. *Heliyon*, 5, 9: e02516. DOI: 10.1016/j.heliyon.2019.e02516.

Al-Mulali U., Ozturk I. (2015). The effect of energy consumption, urbanization, trade openness, industrial output, and the political stability on the environmental degradation in the MENA (middle east and north African) region. *Energy*, 84: 382. DOI: 10.1016/j.energy.2015.03.004.

Ali H.S., Zeqiraj V. Lin, W. L. Law, S. H. Yusop, Z. Bare, U.A.A., Chin L. (2019). Does quality institutions promote environmental quality? *Environmental Science and Pollution Research International*, 26, 11: 10446. DOI: 10.1007/s11356-019-04670-9.

Alsaleh M., Abdul-Rahim A.S., Abdulwakil M.M. (2021). The Importance of Worldwide Governance Indicators for Transitions toward Sustainable Bioenergy Industry. *Journal of Environmental Management*, 294: 112960. DOI: 10.1016/j.jenvman.2021.112960.

Álvarez I.C., Barbero J., Rodríguez-Pose A., Zofío J.L. (2018). Does institutional quality matter for trade? institutional conditions in a sectoral trade framework. *World Development*, 103: 72. DOI: 10.1016/j.worlddev.2017.10.010.

Arminen H., Menegaki A.N. (2019). Corruption, climate and the energy-environment-growth nexus. *Energy Economics*, 80: 621. DOI: 10.1016/j.eneco.2019.02.009.

Asongu S., Odhiambo N. (2019). *Governance, CO2 emissions and inclusive human development in Sub-saharan Africa*. St. Louis: Federal Reserve Bank of St Louis.

Azam M., Liu L., Ahmad N. (2021). Impact of institutional quality on environment and energy consumption: Evidence from developing world. *Environment, Development and Sustainability*, 23, 2: 1646. DOI: 10.1007/s10668-020-00644-x.

Bali Swain R., Kambhampati U.S., Karimu A. (2020). Regulation, governance and the role of the informal sector in influencing environmental quality? *Ecological Economics*, 173. DOI: 10.1016/j.ecolecon.2020.106649.

Barret S., Graddy K. (2000). Freedom, growth, and the environment. *Environment and Development Economics*, 5, 4: 433. DOI: 10.1017/S1355770X00000267.

Baumann F. (2021). The next frontier-human development and the anthropocene: UNDP human development report 2020. *Environment: Science and Policy for Sustainable Development,* 63, 3: 34. DOI: 10.1080/00139157.2021.1898908.

Berdiev A.N., Goel, R. K., Saunoris J.W. (2020). The path from ethnic inequality to development: The intermediary role of institutional quality. *World Development*, 130. DOI: 10.1016/j.worlddev.2020.104925.

Bernauer T., Böhmelt T., Koubi V. (2012). Environmental changes and violent conflict. *Environmental Research Letters*, 7, 1. DOI: 10.1088/1748-9326/7/1/015601.

Bernauer T., Koubi V. (2009). Effects of political institutions on air quality. *Ecological*

*Economics*, 68, 5: 1355. DOI: 10.1016/j.ecolecon.2008.09.003.

Bhattacharya M., Awaworyi Churchill S., Paramati S.R. (2017). The dynamic impact of renewable energy and institutions on economic output and CO2 emissions across regions. *Renewable Energy*, 111: 157. DOI: 10.1016/j.renene.2017.03.102.

Bhattarai M., Hammig M. (2004). Governance, economic policy, and the environmental kuznets curve for natural tropical forests. *Environment and Development Economics*, 9, 3: 367. DOI: 10.1017/S1355770X03001293.

Birdsall N., Wheeler D. (1993). Trade policy and industrial pollution in latin america: Where are the pollution havens? *The Journal of Environment & Development*, 2, 1: 137. DOI: 10.1177/107049659300200107.

Biswas A.K., Farzanegan M.R., Thum M. (2012). Pollution, shadow economy and corruption: Theory and evidence. *Ecological Economics*, 75, 1: 114. DOI: 10.1016/j.ecolecon.2012.01.007.

Cadoret I., Padovano F. (2016). The political drivers of renewable energies policies. *Energy Economics*, 56: 261. DOI: 10.1016/j.eneco.2016.03.003.

Castiglione C., Infante D., Smirnova J. (2012). Rule of law and the environmental Kuznets curve: Evidence for carbon emissions. *International Journal of Sustainable Economy*, 4, 3: 254. DOI: 10.1504/IJSE.2012.047932.

Chang Y., Wang N. (2017). Legal system for the development of marine renewable energy in china. *Renewable & Sustainable Energy Reviews*, 75: 192. DOI: 10.1016/j.rser.2016.10.063.

Charfeddine L., Mrabet Z. (2017). The impact of economic development and social-political factors on ecological footprint: A panel data analysis for 15 MENA countries. *Renewable & Sustainable Energy Reviews,* 76: 138. DOI: 10.1016/j.rser.2017.03.031.

Chen Z., Hao X., Zhou M. (2022). Does institutional quality affect air pollution? *Environmental Science and Pollution Research International*, 29, 19: 28317. DOI: 10.1007/s11356-021-17934-0.

Cheng Z., Li L., Liu J. (2020). The impact of foreign direct investment on urban PM 2.5 pollution in China. *Journal of Environmental Management*, 265: 110532. DOI: 10.1016/j.jenvman.2020.110532.

Christoforidis T., Katrakilidis C. (2021). The dynamic role of institutional quality, renewable and non-renewable energy on the ecological footprint of OECD countries: Do institutions and renewables function as leverage points for environmental sustainability? *Environmental Science and Pollution Research International,* 28, 38: 53888. DOI: 10.1007/s11356-021-13877-8.

Cifor A., Denholm P., Ela E., Hodge B., Reed A. (2015). The policy and institutional challenges of grid integration of renewable energy in the western united states. *Utilities Policy*, 33: 34. DOI: 10.1016/j.jup.2014.11.001.

Coccia M. (2020). Effects of the institutional change based on democratization on origin and diffusion of technological innovation. *CocciaLab Working Paper*, No. 44. DOI: 10.48550/arxiv.2001.08432.

Cole M.A. (2007). Corruption, income and the environment: An empirical analysis. *Ecological Economics*, 62, 3-4: 637. DOI: 10.1016/j.ecolecon.2006.08.003.

Congleton R.D. (1992). Political institutions and pollution control. *The Review of Economics and Statistics,* 74, 3: 412. DOI: 10.2307/2109485.

Culas R.J. (2007). Deforestation and the environmental kuznets curve: An institutional perspective. *Ecological Economics*, 61, 2-3: 429. DOI: 10.1016/j.ecolecon.2006.03.014.

Damania R., Fredriksson P.G., List J.A. (2003). Trade liberalization, corruption, and environmental policy formation: Theory and evidence. *Journal of Environmental Economics and Management*, 46, 3: 490. DOI: 10.1016/S0095-0696(03)00025-1.

Danish Baloch M.A., Wang B. (2019). Analyzing the role of governance in CO2 emissions mitigation: The BRICS experience. *Structural Change and Economic Dynamics*, 51: 119. DOI: 10.1016/j.strueco.2019.08.007.

Dasgupta S., De Cian, E. (2016). *Institutions and the environment: Existing evidence and*

*future directions*. Fondazione ENI Enrico Mattei, Nota di Lavoro 41.2016. DOI: 10.22004/ag.econ.240747.

Deacon R. (1999). The political economy of environment-development relationships: A preliminary framework. UC Santa Barbara, Department of Economics, Departmental Working Papers. Retrieved from: https://escholarship.org/content/qt8h33b5c0/qt8h33b5c0.pdf?t=krnjf6 (21/12/2023).

Dutt K. (2009). Governance, institutions and the environment-income relationship: A cross-country study. *Environment, Development and Sustainability*, 11, 4: 705. DOI: 10.1007/s10668-007-9138-8.

Egbetokun S., Osabuohien E., Akinbobola T., Onanuga O.T., Gershon O., Okafor V. (2020). Environmental pollution, economic growth and institutional quality: Exploring the nexus in Nigeria. *Management of Environmental Quality*, 31, 1: 18. DOI: 10.1108/MEQ-02-2019-0050.

Elliott M., Wolanski E. (2015). Editorial-climate change impacts on rural poverty in low-elevation coastal zones, Edward B. Barbier. *Estuarine, Coastal and Shelf Science*, 165: ii. DOI: 10.1016/S0272-7714(15)00287-5.

Eskeland G.S., Harrison A.E. (1997). *Moving to greener pastures? Multinationals and the pollution-haven hypothesis*. New York: World Bank Publications.

Fredriksson P.G., Vollebergh H.R.J., Dijkgraaf E. (2004). Corruption and energy efficiency in OECD countries: Theory and evidence. *Journal of Environmental Economics and Management*, 47, 2: 207. DOI: 10.1016/j.jeem.2003.08.001.

Gani A. (2012). The relationship between good governance and carbon dioxide emissions: Evidence from developing economies. *Journal of Economic Development*, 37, 1: 77. DOI: 10.35866/caujed.2012.37.1.004.

Goel R. K., Herrala R., Mazhar U. (2013). Institutional quality and environmental pollution: MENA countries versus the rest of the world. *Economic Systems*, 37, 4: 508. DOI: 10.1016/j.ecosys.2013.04.002.

Grossman G.M., Krueger A.B. (1995). Economic growth and the environment. *The Quarterly Journal of Economics*, 110, 2: 353. DOI: 10.2307/2118443.

Habib S., Abdelmonen S., Khaled M. (2020). The effect of corruption on the environmental quality in african countries: A panel quantile regression analysis. *Journal of the Knowledge Economy*, 11, 2: 788. DOI: 10.1007/s13132-018-0571-8.

Halkos G.E., Tzeremes N.G. (2013). Carbon dioxide emissions and governance: A nonparametric analysis for the G-20. *Energy Economics*, 40: 110. DOI: 10.1016/j.eneco.2013.06.010.

Hassan S.T., Danish Khan S.U., Xia E., Fatima H. (2020). Role of institutions in correcting environmental pollution: An empirical investigation. *Sustainable Cities and Society*, 53. DOI: 10.1016/j.scs.2019.101901.

Ibrahim M.H., Law S.H. (2016). Institutional quality and CO2 emission-trade relations: Evidence from sub-saharan Africa. *The South African Journal of Economics*, 84, 2: 323. DOI: 10.1111/saje.12095.

IQAir (2020). *World Air Quality Report: Region & City PM2.5*. Goldach: IQ Air. Retrieved from: https://www.iqair.com/world-most-polluted-cities/world-air-quality-report-2019-en.pdf (22/12/2020).

Kaufmann R.K., Davidsdottir B., Garnham S., Pauly P. (1998). The determinants of atmospheric SO 2 concentrations: Reconsidering the environmental Kuznets curve. *Ecological Economics*, 25, 2: 209. DOI: 10.1016/S0921-8009(97)00181-X.

Kerekes C.B. (2011). Property rights and environmental quality: A cross-country study. *The Cato Journal*, 31, 2: 315.

Lau L., Choong C., Eng Y. (2014). Carbon dioxide emission, institutional quality, and economic growth: Empirical evidence in Malaysia. *Renewable Energy*, 68: 276. DOI: 10.1016/j.renene.2014.02.013.

Le H.P., Ozturk I. (2020). The impacts of globalization, financial development, government expenditures, and institutional quality on CO2 emissions in the presence of

environmental Kuznets curve. *Environmental Science and Pollution Research International*, 27, 18: 22680. DOI: 10.1007/s11356-020-08812-2.

Leitao A. (2010). Corruption and the environmental Kuznets curve: Empirical evidence for sulfur. *Ecological Economics*, 69, 11: 2191. DOI: 10.1016/j.ecolecon.2010.06.004.

Li Q., Reuveny R. (2006). Democracy and environmental degradation. *International Studies Quarterly*, 50, 4: 935. DOI: 10.1111/j.1468-2478.2006.00432.x.

Liu X., Latif K., Latif Z., Li N. (2020). Relationship between economic growth and CO2 emissions: Does governance matter? *Environmental Science and Pollution Research International*, 27, 14: 17221. DOI: 10.1007/s11356-020-08142-3.

Lovei M., Weiss C. (1998). *Environmental Management and Institutions in OECD Countries*. Washington DC: The World Bank.

Lundström S., Carlsson F. (2003). *The effects of economic and political freedom on CO2 emissions*. Working Papers in Economics 29, Department of Economics, .Göteborg University. Retrived from: https://gupea.ub.gu.se/bitstream/handle/2077/2807/gunwpe0029v3.pdf (21/12/2023).

Markwardt G., Farzanegan M.R. (2012). *Pollution, economic development and democracy: Evidence from the MENA countries*. MAGKS Papers on Economics 201227, Philipps-Universität Marburg, Faculty of Business Administration and Economics, Department of Economics (Volkswirtschaftliche Abteilung). Retrieved from: https://www.uni-marburg.de/en/fb02/research-groups/economics/macroeconomics/research/magks-joint-discussion-papers-in-economics/papers/2012-papers/27-2012_farzanegan.pdf (22/12/2023)

Mavragani A., Nikolaou I.E., Tsagarakis K.P. (2016). Open economy, institutional quality, and environmental performance: A macroeconomic approach. *Sustainability*, 8, 7: 601. DOI: 10.3390/su8070601.

Midlarsky M.I. (1998). Democracy and the environment: An empirical assessment. *Journal of Peace Research*, 35, 3: 341. DOI: 10.1177/0022343398035003005.

Muhammad F., Khan A., Razzaq N., Karim R. (2021). Influence of tourism, governance,

and foreign direct investment on energy consumption and CO2 emissions: A panel analysis of muslim countries. *Environmental Science and Pollution Research International,* 28, 1: 416. DOI: 10.1007/s11356-020-10502-y.

Neumayer E. (2002). Do democracies exhibit stronger international environmental commitment? A cross-country analysis. *Journal of Peace Research*, 39, 2: 139. DOI: 10.1177/0022343302039002001.

Ostrom E. (1998). A behavioral approach to the rational choice theory of collective action: Presidential address, american political science association, 1997. *The American Political Science Review*, 92, 1: 22. DOI: 10.2307/2585925.

Ozturk I., Al-Mulali U. (2015). Investigating the validity of the environmental Kuznets curve hypothesis in Cambodia. *Ecological Indicators*, 57: 324. DOI: 10.1016/j.ecolind.2015.05.018.

Parker D., Kirkpatrick C. (2005). Privatization in developing countries: A review of the evidence and the policy lessons. *Journal of Development Studies*, 41, 4: 513. DOI: 10.1080/00220380500092499.

Pellegrini L., Gerlagh R. (2006). Corruption, democracy, and environmental policy: An empirical contribution to the debate. *The Journal of Environment & Development*, 15, 3: 332. DOI: 10.1177/1070496506290960.

Ronaghi M., Reed M., Saghaian S. (2020). The impact of economic factors and governance on greenhouse gas emission. *Environmental Economics and Policy Studies*, 22, 2: 153. DOI: 10.1007/s10018-019-00250-w.

Salman M., Long X., Dauda L., Mensah C.N. (2019). The impact of institutional quality on economic growth and carbon emissions: Evidence from Indonesia, South Korea and Thailand. *Journal of Cleaner Production*, 241: 118331. DOI: 10.1016/ j.jclepro.2019.118331.

Sarkodie S.A., Adams S. (2018). Renewable energy, nuclear energy, and environmental pollution: Accounting for political institutional quality in South Africa. *The Science of the*

*Total Environment,* 643: 1590. DOI: 10.1016/j.scitotenv.2018.06.320.

Simionescu M., Neagu O., Gavurova B. (2022). The role of quality of governance in reducing pollution in Romania: An ARDL and nonparametric bayesian approach. *Frontiers in Environmental Science,* 10, April 21. DOI: 10.3389/fenvs.2022.892243.

Singhania M., Saini N. (2021). Demystifying pollution haven hypothesis: Role of FDI. *Journal of Business Research*, 123: 516. DOI: 10.1016/j.jbusres.2020.10.007.

Sohail M.T., Ullah S., Majeed M.T., Usman A., Andlib Z. (2021). The shadow economy in South Asia: Dynamic effects on clean energy consumption and environmental pollution. *Environmental Science and Pollution Research International,* 28, 23: 29265. DOI: 10.1007/s11356-021-12690-7.

Solomon S., Qin D., Manning M., Chen Z., Marquis M., Averyt K.B. (eds.), *Climate change 2007: the physical science basis. Contribution of working group I to the fourth assessment report of the intergovernmental panel on climate change*. Cambridge: Cambridge University Press.

Stef N., Ben Jabeur S. (2020). Climate change legislations and environmental degradation. *Environmental & Resource Economics*, 77, 4: 839. DOI: 10.1007/s10640-020-00520-2.

Stern D. (2017). The Environmental Kuznets Curve. *Oxford Research Encyclopedia of Environmental Science*. Retrieved from https://oxfordre.com/environmentalscience/view/10.1093/acrefore/9780199389414.001.0001/acrefore-9780199389414-e-401 (29/12/2022).

Stryzhak O. (2019). Institutional system of human development and institutional environment: Relationship features. *SHS Web of Conferences*, 67: 06049. DOI: 10.1051/shsconf/20196706049.

Sulemana I., Kpienbaareh, D. (2020). Corruption and air pollution: A comparative study of african and OECD countries. *Air Quality, Atmosphere and Health*, 13, 12: 1421. DOI: 10.1007/s11869-020-00896-6.

Tamazian A., Bhaskara Rao B. (2010). Do economic, financial and institutional developments matter for environmental degradation? Evidence from transitional

economies. *Energy Economics*, 32, 1: 137. DOI: 10.1016/j.eneco.2009.04.004.

Ullah A., Zhao X., Kamal M., Zheng J. (2022). Environmental regulations and inward FDI in China: Fresh evidence from the asymmetric autoregressive distributed lag approach. *International Journal of Finance and Economics*, 27, 1: 1340. DOI: 10.1002/ijfe.2218.

Usman M., Jahanger A. (2021). Heterogeneous effects of remittances and institutional quality in reducing environmental deficit in the presence of EKC hypothesis: A global study with the application of panel quantile regression. *Environmental Science and Pollution Research International*, 28: 37292. DOI: 10.1007/s11356-021-13216-x.

Walter I., Ugelow J.L. (1979). Environmental policies in developing countries. *AMBIO: A Journal of the Human Environment*, 8, 2/3: 102.

Wang S., Zhao D., Chen H. (2020). Government corruption, resource misallocation, and ecological efficiency. *Energy Economics*, 85: 104573. DOI: 10.1016/j.eneco.2019.104573.

Wang X., Zhang C., Zhang Z. (2019). Pollution haven or porter? The impact of environmental regulation on location choices of pollution-intensive firms in China. *Journal of Environmental Management*, 248: 109248. DOI: 10.1016/j.jenvman.2019.07.019.

Wang Z., Danish Zhang B., Wang B. (2018). The moderating role of corruption between economic growth and CO2 emissions: Evidence from BRICS economies. *Energy*, 148: 506. DOI: 10.1016/j.energy.2018.01.167.

Ward H. (2008). Liberal democracy and sustainability. *Environmental Politics*, 17, 3: 386. DOI: 10.1080/09644010802055626.

Welsch H. (2004). Corruption, growth, and the environment: A cross-country analysis. *Environment and Development Economics*, 9, 5: 663. DOI: 10.1017/S1355770X04001500.

Wirth S. (2014). Communities matter: Institutional preconditions for community renewable energy. *Energy Policy*, 70: 236. DOI: 10.1016/j.enpol.2014.03.021.

Wu W. (2017). Institutional quality and air pollution: International evidence. *International Journal of Business & Economics*, 16, 1: 49. Retrieved from: https://ijbe.fcu.edu.tw/assets/ijbe/past_issue/No.16-1/pdf/vol_16-1-4.pdf (22/12/2023).

Xue L., Haseeb M., Mahmood H., Alkhateeb T.T.Y., Murshed M. (2021). Renewable energy use and ecological footprints mitigation: Evidence from selected south asian economies. *Sustainability*, 13, 4: 1613. DOI: 10.3390/su13041613.

Yang Y., Khan A. (2021). Exploring the role of finance, natural resources, and governance on the environment and economic growth in south asian countries. *Environmental Science and Pollution Research International*, 28, 36: 50447. DOI: 10.1007/s11356-021-14208-7.

Zhang W., Li G., Uddin M.K., Guo S. (2020). Environmental regulation, foreign investment behavior, and carbon emissions for 30 provinces in China. *Journal of Cleaner Production*, 248: 119208. DOI: 10.1016/j.jclepro.2019.119208.

Zhao X., Liu C., Sun C., Yang M. (2020). Does stringent environmental regulation lead to a carbon haven effect? evidence from carbon-intensive industries in China. *Energy Economics*, 86: 104631. DOI: 10.1016/j.eneco.2019.104631.

Zhou M., Wang B., Chen Z. (2020). Has the anti-corruption campaign decreased air pollution in China? *Energy Economics*, 91: 104878. DOI: 10.1016/j.eneco.2020.104878.