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Tourism Development and Environmental Sustainability in the European Union: Moderating Role of Institutional Governance

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Abstract: This study examines the dynamic effects of tourism and institutional governance along with other variables on CO2 emission (COE) in the 15 selected European Union (EU) economies over the period 1995–2018. The novel empirical evidence of this study is twofold. First, countries' bloc effect is controlled based on the entry and exit information of EU countries, and second, in order to capture and better apprehend the aspects of institutional quality meaningful for carbon-neutral tourism in sample countries, interaction effects of tourism receipts and index of institutional quality are examined. For the robust results, non-linear autoregressive distributed lag (ARDL), fixed effects, and generalized method of moment-based models are estimated, wherein the results of the non-linear ARDL approach reveal that there are no asymmetric effects of tourism and institutional quality, which intrinsically affect pollution. Specifically, the findings reveal that tourism development and trade openness can reduce COE. Also, there is evidence of the existence of an environmental Kuznets curve in the region. Though institutional quality alone has been found to have an unfavorable impact on the environment, the interaction term of tourism and institutional quality into the framework reveals a significant and negative impact on COE in the selected region. Therefore, it is suggested that the EU economies should develop effective strategies to improve their present institutional governance framework in such a manner that will help to promote tourism, green purchase intentions of tourists, economic development, trade liberalization, and environmental quality.

Keywords: environmental degradation, tourism, institutional quality, green purchase

1. Introduction

Tourism is the world's largest service sector industry, and its growth is positively linked with the growth of overall economies. Several researchers have tested the Tourism-Led Economic Growth hypothesis and reported that tourism has encouraging spillover effects on economic growth through different channels [1–5].

Despite the positive spillovers of the tourism industry, it has also caused environmental degradation in terms of an increase in CO2 emission (COE) [6–9]. These findings imply different mechanisms through which tourism causes a rise in emissions, such as economic activity induced by tourism may lead to an increase in COE. However, some studies show that well-governed tourism may have better environmental outcomes [10, 11]. Hence, it is imperative to comprehend the role governance quality plays in moderating the tourism–COE relationship.

Ghalia et al. [12] have found that better institutions foster tourism and other economic benefits. Also, it has been noted that the quality of institutional governance in destination regions remains a vital determinant of tourism arrivals [13–15]. It has been found that tourist visit is greatly influenced by acuities of political instability and violence. Social unrest, civil wars, and human rights violations alter tourists' behavior [16].

It has been documented that improvement in institutional governance causes a rise in environmental pollution [17, 18]. While Usman et al. [19] found that tourism causes environmental damage, however, institutional quality has favorable effects on tourism and environmental quality in the European Union (EU). Likewise, other studies also claimed that institutional quality plays a momentous role in pollution mitigation [20, 21].

Considering the arguments endorsed by the existing work, it is somewhat clear that there is a lack of evidence for the role of institutional quality in the standard Kuznets framework extended with tourism and other economic variables including trade and foreign direct investment (FDI). Hence, the present study will try to cover the gap by using the extended version of the standard Kuznets framework.

The study introduces the interaction term of both tourism and institutional quality into the framework after testing for the potential asymmetric effects of both these variables by using a non-linear autoregressive distributed lag (ARDL) approach. There could be asymmetric effects of tourism and institutional quality on the reduction of pollution. Also, the existing studies ignore the

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possible co-existence of an interaction term between tourism and composite measure of institutional quality. We have taken a simple average of six indicators of governance, namely (1) control of corruption; (2) effectiveness of government; (3) political stability and absence of violence; (4) regulatory quality; (5) rule of law; and (6) voice and accountability in order to capture the effectiveness of governance in moderating the connection between tourism and COE in the selected EU countries. The measurement scales and sources of the indicators are provided in Section 3.1.

The significance and sign of this interaction term will have pivotal bearings for the environmental, economic, and tourism policies for the selected 15 EU economies. The rationale of sample selection is provided in Section 3.1. The novel empirical evidence of this study is twofold. First, the bloc effect is controlled, and second, to capture and better understand the aspects of institutional quality meaningful for carbon-neutral tourism in the selected EU countries, the interaction effects of tourism receipts and the index of institutional governance are examined.

The rest of the study is organized in the following way. Section 2 discusses some very relevant literature on the topic selected. Section 3 elaborates on the econometric models and data description. Sections 4 and 5 contain the results and discussion, respectively, and Section 5 has the conclusion and policy recommendations of the study.

2. Literature Review

The present section divides the sub-sections related to tourism and pollution, institutional governance/quality and pollution, and institutional governance and tourism. The section provides some major studies on the topic. It is nonetheless stated that there is a dearth of studies on the dynamic association among tourism, institutional quality/governance, and environmental pollution simultaneously in one model. Thus, this study attempts to cover the caveat by developing a framework from the following selected state-of-the-art literary contributions on the topic.

2.1. Tourism and environmental pollution

Several studies have investigated the connection between tourism and institutions nexus in a robust empirical manner. This section aims to present the review of these studies in two categories, panel data and time-series-based findings, respectively. Azam et al. [22] examined the impact of tourism on pollution in Thailand, Malaysia, and Singapore. The results revealed that tourism causes an increase in pollution in Malaysia. However, a negative relationship was found between tourism and pollution in Singapore and Thailand. Likewise, Lee and Brahmasrene [23] analyzed the empirical association between tourism, FDI, and COE in the EU economies for the period 1988–2009. The empirical results of the study illustrate that tourism receipts have a negative effect on COE. Similarly, Dogan and Aslan [24] have explored the tourism–COE relationship by incorporating heterogeneity and cross-sectional dependence for EU economies. The study shows that tourism is associated with a fall in COE. Moreover, Nepal et al. [25] also found that an increase in tourism activities worsens environmental quality in Nepal.

Zaman et al. [26] evaluated the effect of tourism-related transportation spending on COE in the transition economies for the period 1995–2013. The findings of the panel data analysis reveal that international tourism-led transportation spending has positive effects on COE. Likewise, Akadiri et al. [27] studied the linkages between tourism and COE for 16 small island developing economies. The results showed that tourism causes a rise in COE. Koçak et al. [28], Chishti et al. [29], and Paramati et al. [30] reported similar findings, claiming that tourism is associated with increasing COE. Chishti et al. [29] have found the asymmetric effects of tourism development on the environmental quality of South Asian countries. The study found that in the long run positive shock in tourism improves the environmental outcomes in Nepal and Sri Lanka. Though, it deteriorates the environment in Pakistan, Bangladesh, and India. Whereas negative tourism shock leads to a rise in COE in South Asia.

De Vita et al. [31] have explored the impact of tourism development on COE in the case of Turkey. The study utilized the data from 1960 to 2009 and employed a dynamic ordinary least squares model to estimate the long-run connectedness among tourism, energy consumption, and COE. They conclude that tourism development leads to a rise in COE in the long run. It is also reported that the positive effects of tourism on COE are established through the channel of energy use and GDP. Similar findings reported by Eyuboglu and Uzar [32] in Turkey pointed out that tourism causes an increase in COE both in the short and long run. It is inferred that the scale effect of tourist arrivals is harmful to environmental quality because of potentially weaker concerns with the quality of the environment. A study by Katircioglu [33] analyzed the effects of tourism on COE in the case of Turkey. The study indicates that an increase in tourism activities has a considerably increasing impact on COE. The impact mechanism of tourism on COE is established with the increase in tourism-induced energy consumption. Likewise, Sharif et al. [34] employed the annual data for the period 1972–2013 to examine the interconnection between tourism arrivals and COE in the context of Pakistan. The findings show that tourism arrivals are associated with a surge in carbon dioxide emissions. On the other hand, Naradda Gamage et al. [35] based on an empirical analysis reported that the tourism sector can play a momentous role in enhancing the quality of the environment and economic development in Sri Lanka subject to improvements in renewable energy production, whereas mixed evidence was found by Sghaier et al. [36]. This study claimed that there is a notable linkage between COE and tourism in Tunisia and Egypt, while no relationship was found for Morocco. Hence, it is revealed the literature consensus on the direction of the tourism–COE relationship both in developed and developing countries. This fact motivates further investigation in terms of more robust econometric evidence.

2.2. Institutional governance and environmental pollution

Haseeb and Azam [17] found that improvement in institutional governance causes a rise in environmental pollution. The study explored the link between institutional governance and COE for sub-samples of low-, middle-, and high-income nations. Similar findings were presented by Hassan et al. [18]. It is also found that different thresholds of governance have potentially different implications for environmental pollution [37]. This study reveals that before a certain threshold of governance, a rise in GDP per capita (GDPC) leads to an upsurge in pollution emissions in selected Asian countries, however, when the governance passes the threshold value, a further increase in the GDPC ensures improvements in environmental quality. Moreover, it is pertinent to note that institutional quality is found to be the robust driver of economic growth [38], which in turn has potential effects on environmental quality in both advanced and developing economies.

Usman et al. [19] analyzed the linkages between institutional quality, environmental pollution, and tourism in 28 EU countries. The results show that tourism causes environmental damage; however, institutional quality has favorable effects on tourism and environmental quality. Similarly, Ulucak [21] reported that better quality of institutions has negative impacts on COE. The study was based on data from 18 Asia Pacific Economic Cooperation economies. Likewise, other studies also claimed that institutional governance plays a momentous role in pollution mitigation [20, 21, 37].

2.3. Institutional governance and tourism

Ghalia et al. [12] examined the effects of institutional governance on tourism for 131 tourism destination economies. The results indicate that better institutions foster tourism and other economic benefits. Similarly, some other studies indicate that institutional governance of destination countries is a vital determinant of tourism arrivals [13–15]. Similarly, Perles-Ribes et al. [16] found that tourist visit is greatly influenced by perceptions of political instability. Social unrest, civil wars, and violations of human rights alter the behavior of tourists.

The whole body of literature presented here provides mixed evidence of whether tourism improves or worsens the environmental quality. Moreover, the moderating role of institutional governance in a tourism–environment relationship is missing. The present study is aimed at providing an empirical examination of the relationship between tourism, institutional governance, and COE. In order to provide a convenient way to view the literature included in this study, Table 1 presents the summary of selected studies from the literature divided into two parts, i.e., panel data and time-series-based studies.

3. Materials and Methods

This study is aimed to investigate the effects of institutional governance and tourism on COE. Following the Nawaz and Rahman [39], we have constructed an econometric model as given below:

$$CO_{2,it} = \beta_0 + \beta_1 Iqi_{it} + \beta_2 Tour_{it} + \beta_3 GDC_{it} + \beta_4 GDCSq_{it} + \beta_5 Pg_{it} + \beta_6 Iqi * Tour_{it} + \beta_7 FDI_{it} + \varepsilon_{it} \quad (1)$$

Equation (1) shows that COE in selected EU countries depends upon institutional governance (Iqi_{it}), international tourism ($Tour_{it}$), GDPC (GDC_{it}), and its square (GDXSq), population

Table 1
Tabular summary of extant literature

Author (s)	Country	Time	Methods	Result
		Panel data evidence		
Lee and Brahmasrene [23]	EU	1988–2009	Panel cointegration	Tourism leads to a fall in pollution
Dogan and Aslan [24]	EU	1995–2011	FMOLS, DOLS	Tourism leads to a fall in pollution
Zaman et al. [26]	OECD, Non-OECD, EU	2005–2013	Panel 2SLS	Tourism leads to an increase in pollution
Akadiri et al. [27]	16 small island developing economies	1995–2014	Panel Granger causality test	Tourism causes a rise in pollution
Chishti et al. [29]	5 SAARC countries	1980–2018	NARDL	Tourism leads to an increase in pollution in Bangladesh and Pakistan but falls in Sri Lanka and Nepal
Koçak et al. [28]	10 most visited countries	1995–2014	CUP-FM, CUP-BC	Tourism leads to a rise in pollution
Paramati et al. [6]	26 developed and developing countries	1995–2012	FMOLS	Tourism leads to a fall in pollution
Paramati et al. [30]	EU	1990–2013	Panel ARDL	Tourism leads to a rise in pollution
		Time-series evidence		
Nepal et al. [25]	Nepal	1975–2014	ARDL	Tourism leads to a fall in COE
De Vita et al. [31]	Turkey	1960–2009	DOLS	Tourism aggravates the COE
Eyuboglu and Uzar [32]	Turkey	1960–2014	ARDL	Tourism development degrades the environment
Katircioglu [33]	Singapore	1971–2010	DOLS	Tourism leads to a rise in pollution
Sharif et al. [34]	Pakistan	1972–2013	FMOLS, DOLS	Tourism leads to a rise in COE
Naradda Gamage et al. [35]	Sri Lanka	1974–2013	DOLS	Tourism leads to a rise in pollution
Sghaier et al. [36]	Tunisia, Egypt, Morocco	1980–2014	ARDL	Tourism promotes environmental quality
Hassan et al. [18]	Pakistan	1984–2014	ARDL	Tourism leads to a rise in pollution emissions

Table 2
Summary of the variables

Variable	Measurement	Acronyms	Transformation	Source
COE	Metric tons per capita	COE	Natural log.	WDI
Tourism	Total tourism receipts in US$	ITR	Natural log.	WDI
Institutional governance	Average of six WG indices	IQI	Natural log.	WGI
GDP per capita	Constant 2020 US$	GDPC	Natural log.	WDI
Trade openness	Trade volume (%age of GDP)	TO	Natural log.	WDI
FDI	FDI inflows (%age of GDP)	FDI	Natural log.	WDI
Population	Growth rate	PG	–	WDI

growth (Pg_{it}), the interaction term of institutional governance and tourism ($Iqi * Tour_{it}$),) FDI, and the error term. This equation provides long-run estimates; however, to get short-run coefficients, we have presented the above model in ARDL representation in Equation (2) as suggested by Pesaran et al. [40].

$$\begin{aligned}\Delta CO_{2,it} = {} & \beta_0 + \sum_{k=1}^{p} \theta_k \Delta CO_{2,it-k} + \sum_{k=1}^{p} \pi_k \Delta IG_{it-k} \\ & + \sum_{k=1}^{p} \delta_k \Delta Tour_{it-k} + \sum_{k=1}^{p} \gamma_k \Delta GDC_{it-k} \\ & + \sum_{k=1}^{p} \varphi_k \Delta EC_{it-k} + \alpha_1 CO_{2,it-1} + \alpha_2 IG_{it-1} \\ & + \alpha_3 Tour_{it-1} + \alpha_4 GDC_{it-1} + \alpha_5 EC_{it-1} + \varepsilon_{it} \end{aligned} \quad (2)$$

We have applied the generalized method of moment (GMM) (Table 5) after finding the results of non-linear ARDL (Appendix, Table A.1) which revealed that there is no evidence of non-linear/asymmetric effects for the tourism and institutional qualities on COE, ceteris paribus.

3.1. Data

To empirically estimate the nexus between tourism, institutional governance, and COE, we employ the panel data of 15 EU countries (Table A.3), over the period 1995–2018. The rationale behind selecting 15 EU countries is to control the time-variant entry and exit of some countries into and from the EU. Moreover, in order to control the sample in terms of bloc effect, we have included only those countries which are active members of the EU throughout 1995–2018. The source of the entry and exit information is provided in the subscript of Table A.3. Our dependent variable is COE to proxy environmental pollution. The data on COE and other macroeconomic variables are obtained from the World development indicators [41]. The data on institutional governance are taken from the Worldwide governance indicators (WGI) database published by the World Bank. WGI provides six indicators of institutional governance, which are measured on 0 to 100 and −2.5 to 2.5 scale. To avoid the logarithm of negative values, we use the indicators measured in percent ranks (0–100). 0 corresponds to the lowest rank of governance and 100 to the highest rank.

The detailed description of labeling, definition, measurement, transformation, and sources of modelled variables is given in Table 2. The institutional governance index is constructed by taking a simple average of six indices enlisted in Section 1. The control of corruption index measures the level by which public power is used for personal gains. The second index captures the quality of civil servants, public service delivery, and their independence from political influence. The political stability index measures the likelihood of political instability, politic-induced violence, and terrorism. The regulatory quality index captures the degree to which government can devise and implement sound policies. Rule of law measures the level to which economic agents have confidence in law enforcement. Finally, the last index captures the degree of freedom of expression, association, and the general public's participation in the selection of their government. The composite index of these indices can better capture all aspects of institutional governance quality to effectively understand how these institutional aspects matter for environmental sustainability.

4. Empirical Results

This study empirically examines the empirical connection between tourism, institutional quality, and COE with other related variables. It is clear from descriptive statistics of the variables that CO2 is closely associated with GDP and trade openness as shown by their mean values and low standard deviations (Table 3). Likely, tourism and institutional quality have also shown a close association with CO2 considering their mean values, ceteris paribus.

Table 3
Descriptive statistics

	Mean	Std. dev.	Minimum	Maximum
CO2	2.1307	0.3529	1.3600	3.2118
GDP	10.6298	0.3631	9.8014	11.6259
TO	4.4521	0.5133	3.6138	6.0122
FDI	1.1299	1.5017	−6.5229	4.4612
IQI	0.3146	1.0000	−3.1273	0.9662
PG	0.5417	0.5709	−1.8537	2.8909
ITR	23.3386	0.9776	21.2143	25.1208

Likely, correlations among the selected variables also reveal linear associations among tourism, institutional quality, and COE with other variables of the models (Table 4). These close associations are indicative of potential long-run relationships among the variables at hand therein can provide guidelines for pollution control in the region. The value of the coefficient of correlation between COE and institutional quality is 0.3105, which indicates that these two variables are positively related. This association needs to be properly investigated in terms of the econometric model because various studies argue that the institutional quality of developed countries has favorable environmental implications. The correlation between tourism and COE is −0.4559. These linear associations motivate this study to assess the tourism-institutions-pollution nexus in the selected EU region.

Table 4
Matrix of correlations

	CO2	GDP	TO	FDI	IQI	ITR	PG
CO2	1.0000						
GDP	0.6179	1.0000					
TO	0.6191	0.7418	1.0000				
FDI	0.4362	0.4362	0.6428	1.0000			
IQI	0.3105	0.5953	0.4161	0.4158	1.0000		
ITR	−0.4559	−0.3517	−0.5200	−0.3032	−0.3561	1.0000	
PG	0.4075	0.5589	0.5009	0.3431	0.2899	−0.1874	1.0000

Therefore, to find accurate and precise estimates, the study provides three different models estimated with a GMM (Table 5), non-linear ARDL approach (Table A.1), and fixed effects methods (Table A.2). It is mentioned earlier that our findings failed to find significant asymmetric effects of the tourism and institutional qualities on the reduction of emissions (Table A.1). Therefore, we focused on the GMM and fixed effect model-based estimates for further interpretations.

The result of GMM-based estimates has three different models, wherein models (1) and (2) have no interaction term of institutional quality and tourism. In order to check for robustness, model 1 excludes population growth and the interaction of IQI and ITR. Model 2 only excludes the interaction terms, and finally, model 3 includes all the variables of Equation (1) (Table 5).

The GMM results of model 1 show that FDI having positive and trade openness having negative coefficients are statistically insignificant. International tourism receipts are found to have a significant negative impact on COE in the selected EU countries. Other things remain the same, an increase in tourism is coupled with a decreasing COE. The coefficient of the tourism variable is −0.0819, which indicates that a 1% rise in tourism receipts leads to 0.0819% decrease in COE. The coefficients of GDPC and its squared term are 5.768 and −0.271, respectively. Thus, these coefficients validate the environmental Kuznets curve (EKC) hypothesis in EU countries. The coefficient of IQI is 0.0183, which depicts that an increase in indicators of IQI is positively linked with COE. In model 2, we have included an additional variable of population growth since population can have a potentially positive impact on COE in response to an increase in economic activity and aggregate demand. In this model, both FDI and trade openness have negative but insignificant effects on COE. The coefficient of tourism is −0.0812 indicating that a 1% increase in tourism receipts is associated with 0.0812% decrease in COE. Comparing it with the coefficient of model 1, the sign and magnitude of the association between tourism and COE are robust. Like that of model 1, the coefficients of GDP and its square terms in model 2 also validate the EKC hypothesis. The coefficient of IQI indicates that an increase in institutional quality leads to an increase in COE in the sample countries. Population growth has a positive but insignificant effect on COE in model 2. Finally, in model 3 we have estimated the entire Equation (1) by including the interaction variable of tourism receipts and IQI. In this model, FDI and trade have negative but insignificant effects on COE. The coefficient of tourism is −0.0809, which indicates that tourism has environmental-friendly outcomes in the EU countries. Coefficients of GDP and its square term again validate the existence of an EKC type of relationship. The coefficient of IQI is 0.0527, which reveals that improvements in institutional quality degrade the environmental quality. Moreover, a 1% increase in population growth leads to 0.0368% increase in COE in the sample countries. Finally, the coefficient of the cross-term tourism and institutional quality index is −0.00803. Interestingly, despite the positive effect of institutional quality alone on the COE, for the average value of tourism receipts, an increase in institutional quality produces favorable environmental outcomes in the selected EU countries. Likewise, for the average value of the institutional quality index, an increase in tourism receipts leads to a fall in COE. These results have potentially strong implications for concerned policymakers.

Table 5
The results of GMM

Variables	(1) LCO2	(2) LCO2	(3) LCO2
L.LCO2	0.0862***	0.0841***	0.0843***
	(0.00471)	(0.00491)	(0.00492)
LFDI	0.000446	−0.00252	−0.00557
	(0.00672)	(0.00700)	(0.00719)
LTO	−0.0725	−0.0658	−0.0784*
	(0.0450)	(0.0447)	(0.0453)
LITR	−0.0819***	−0.0812***	−0.0809***
	(0.0146)	(0.0144)	(0.0145)
LGDPC	5.768***	5.509***	5.405***
	(1.279)	(1.278)	(1.282)
LGDPSQ	−0.271***	−0.260***	−0.254***
	(0.0616)	(0.0614)	(0.0616)
IQI	0.0183*	0.0190**	0.0527***
	(0.00940)	(0.00930)	(0.0197)
PG		0.0275	0.0368*
		(0.0207)	(0.0213)
IQI*ITR			−0.00803*
			(0.00414)
Constant	−27.08***	−25.59***	−25.16***
	(6.912)	(6.917)	(6.937)
Observations	246	246	246
Number of id	15	15	15
Sargan test (P-value)	0.21	0.17	0.12

Note. Standard errors are provided in parentheses
***, **, * denote the confidence interval of 99%, 95, and 90%, respectively

4.1. Discussion

This section is dedicated to the discussion of the focused variables of this study. We have discussed the outcomes of each focused variable across the three models. In all three models presented in Table 5, it is found that FDI has an insignificant effect on COE in the selected EU countries. The reason for this insignificance can be attributed to the point that these countries are able to attract the FDI, which is potentially carbon neutral. These findings are aligned with the findings of Nawaz and Rahman [42]. Trade openness in all the models is negative but is found to be statistically significant in model 3. Hence, it is confirmed that more liberal trade in the sample countries entails environmental

sustainability. It is also likely that following the globalization of production processes, these countries have shifted the pollution-intensive production stages to other countries. These results are confirmed by Omri [43] but are contradictory with the findings of [44] which provides a sectoral analysis of the UK. Tourism is found to be a robust negative and significant driver of COE across all the models. These coefficients indicate that tourism development is connected with improvements in environmental outcomes in the selected EU economies. The intuition behind the negative relationship can be explained in terms of existing social norms established in EU societies, which turn the tourism receipts into environmental-friendly aspects in the tourism-related sectors. These results are supported by Lee and Brahmasrene [23] and Dogan and Aslan [24]. Both studies were conducted in the case of EU economies. However, Paramati et al. [30] found that tourism development leads to an escalation in pollution emissions in EU countries. As explained in the Results section, the existence of the EKC hypothesis is validated across all the models. This shows that after reaching a certain level of GDPC, a further increase in GDPC leads to better environmental quality. It occurs because of increased investments in energy-efficient technologies and more stringent environmental regulations. These findings are aligned with Khan et al. [37]. As far as the institutional quality variable is concerned, it is uncovered that institutional quality has a positive and significant effect on COE in all the models (1–3). This corroborates the finding of Ulucak [21] who found that institutional quality can have a positive effect on emissions. Improvements in institutional quality are related to numerous other economic variables, such as GDP, investment, and consumer confidence. Because of the cost-effective nature of fossil fuels, countries through the channel of institutional quality rely on these sources of production in order to attain a desired level of economic development, which in turn degrades the environmental quality. Population growth has increasing and statistically significant effects on COE in the sample countries. An increase in population leads to urbanization, a rise in domestic demand, and finally the demand-pull expansion in energy consumption. This leads to an increase in COE.

Finally, the cross-term of tourism and institutional governance index in model (3) confirms that this variable is statistically significant and negative effect on COE. This finding has potentially strong implications for policymakers. This can be interpreted in the following way: keeping tourism at an average value, increase in institutional quality will reduce the COE and keeping the institutional quality at an average value, a rise in tourism will reduce the COE, ceteris paribus. This implies that improvements in both tourism and institutional quality simultaneously can ensure favorable environmental outcomes. This is an important finding considering the positive value of institutional quality alone as an unfavorable determinant of COE earlier. This also implies that focusing on both tourism and institutional quality at the same time will produce a synergistic effect to reduce emissions in the region. The interaction term captures the tourism-related aspects of the institutional quality index. This is why the interaction effect of these two variables is found to be meaningful for the environmental quality of the selected countries of the EU.

5. Conclusion

This study aims to find the dynamic relationship among tourism, institutional quality, trade openness, and COE in the 15 selected EU economies over the period 1995–2018. This is the first study in the tourism-environment literature, which has controlled the sample in order to capture the bloc effect. We have included only those EU countries, which were active part of the EU throughout the period mentioned above. The detailed rationale of sample selection and countries' information on the entry into and exit from the EU countries is provided in Section 3. Non-linear ARDL, fixed effects model, and system GMM techniques were employed on the sample data. The non-linear ARDL approach revealed that there are no asymmetric relationships between tourism and institutional quality on COE. For the robust results, non-linear ARDL, fixed effect, and GMM-based models were estimated, and the results of the models coincided. Hence, the findings of the GMM-based estimation are formally interpreted and discussed. The index of institutional quality is constructed by taking a simple average of six governance indices provided by the World Bank. Tourism development is proxied by international tourism receipts. Environmental sustainability is empirically measured by COE in metric tons per capita. The detailed measurement scales, explanation, and data sources of all the modelled variables are provided in Section 3. Specifically, the findings revealed that FDI and trade openness can reduce pollution provided that both institutional quality and tourism have been included in the empirical analysis. Also, the evidence of EKC is confirmed in the selected sample of the EU.

It has been observed as per the findings that increasing tourism will be helpful to improve the environmental sustainability of the EU region. It is nonetheless somewhat interesting that institutional quality enhancement alone has been found to have unfavorable effects on the environment. However, with the introduction of the cross term of tourism and IQI into the framework, the findings revealed that improving both tourism and institutional quality simultaneously will have important bearings for the environmental sustainability of the selected countries. The novel empirical evidence of this study is twofold. First, the bloc effect is controlled, and second, in order to capture and better comprehend the aspects of institutional quality meaningful for carbon-neutral tourism, the interaction effects of tourism receipts and the index of institutional quality are examined. The major findings of the study are summarized as follows.

1) An increase in trade openness entails improvements in environmental quality. Liberal trade policy leads to a fall in COE.
2) Tourism development leads to a fall in COE in selected EU countries.
3) Population growth retards the environmental sustainability by increasing the COE in the sample countries.
4) EKC hypothesis is found to be robust and validated, indicating that there exists an inverted U-shaped relationship between GDPC and COE in the selected countries.
5) IQI is found to be positively associated with COE in the selected EU countries.
6) The interaction variable of tourism receipts and the index of institutional quality is found to be favorable for environmental sustainability in the region. This indicates that for the average value of tourism receipts in the selected countries, improvements in IQI lead to a significant decrease in COE in the selected EU countries.

6. Policy Implications

Based on the empirical findings and concluding remarks of the study, it is suggested that keeping in view the dynamics of local industries and economies, EU countries should promote trade liberalization. Various tariff and non-tariff trade barriers should be decreased or abolished in order to achieve carbon-neutral growth (this policy suggestion is based on conclusion remark 1). The EU countries should devise and implement strategies to encourage and promote the environmental-friendly behavior of tourists. It

can be done through various awareness campaigns through digital and pro-environment and on-site advertisements to encourage the demand for green products (conclusion remark 2). Pollution-enhancing effects of an increase in population can be mitigated by promoting and establishing green industrial zones, smart cities, and encouraging green purchase intentions among the public (conclusion remark 3). The selected countries should devise pro-growth policies, such as finding optimal industrial growth through participation in global value chains. Such policies can improve economic growth which will in turn improve environmental quality (concluding statement 4). Positive effects of institutional quality on COE indicate that the dominant aspect of their existing governance structure relies on fossil fuel-based energy sources to achieve the desired levels of economic growth. Hence, these countries should focus on establishing a strong SDGs-based institutional framework to ensure the targets of net zero emissions by 2050 (conclusion remark 5). Finally, effective strategies should be implemented to entirely decouple the pollution emissions and tourism development through robust policies and changes in the governance structure. This should be accomplished by introducing region-wise tourism-led emission targets and compliance must be ensured through the institutional hierarchy of the governments (conclusion remark 6). Due to the non-availability of data on tourism-led region-wise environmental footprints, this study could not consider this aspect of the problem. Future studies can adopt this feature of the tourism and environmental sustainability agenda.

Ethical Statement

This study does not contain any studies with human or animal subjects performed by any of the authors.

Conflicts of Interest

The authors declare that they have no conflicts of interest in this work.

Data Availability Statement

Data available on request from the corresponding author upon reasonable request.

Author Contribution Statement

Ahmad Nawaz: Conceptualization, Methodology, Software, Formal analysis, Investigation, Resources, Writing – original draft, Supervision, Project administration. **Muhammad Shakeel:** Validation, Data curation, Writing – review & editing, Visualization.

References

[1] Ahmad, N., & Ma, X. (2021). How does tourism development affect environmental pollution? *Tourism Economics*, *28*(6), 1453–1479. https://doi.org/10.1177/13548166211000480

[2] Ahmad, W., Majeed, T., & Andlib, Z. (2020). Tourism led growth hypothesis: Empirical evidence from five south Asian countries. *Bulletin of Business and Economics*, *9*(1), 51–59.

[3] Eeckels, B., Filis, G., & Leon, C. (2012). Tourism income and economic growth in Greece: Empirical evidence from their cyclical components. *Tourism Economics, 18*(4), 817–834. https://doi.org/10.5367/te.2012.0148

[4] Robaina, M., Madaleno, M., Silva, S., Eusébio, C., Carneiro, M., Gama, C., . . . , & Monteiro, A. (2020). The relationship between tourism and air quality in five European countries. *Economic Analysis and Policy*, *67*, 261–272. https://doi.org/10.1016/j.eap.2020.07.012

[5] Schubert, S. F., Brida, J. G., & Risso, W. A. (2011). The impacts of international tourism demand on economic growth of small economies dependent on tourism. *Tourism Management*, *32*(2), 377–385. https://doi.org/10.1016/j.tourman.2010.03.007

[6] Paramati, S. R., Alam, M. S., & Chen, F. (2017). The effects of tourism on economic growth and COE: A comparison between developed and developing economies. *Journal of Travel Research*, *56*(6), 712–724. https://doi.org/10.1177/0047287516667848

[7] Raza, S. A., Sharif, A., Wong, W. K., & Karim, M. Z. A. (2017). Tourism development and environmental degradation in the United States: Evidence from wavelet-based analysis. *Current Issues in Tourism*, *20*(16), 1768–1790. https://doi.org/10.1080/13683500.2016.1192587

[8] Shi, H., Li, X., Zhang, H., Liu, X., Li, T., & Zhong, Z. (2020). Global difference in the relationships between tourism, economic growth, COE, and primary energy consumption. *Current Issues in Tourism*, *23*(9), 1122–1137. https://doi.org/10.1080/13683500.2019.1588864

[9] Solarin, S. A. (2014). Tourist arrivals and macroeconomic determinants of COE in Malaysia. *Anatolia*, *25*(2), 228–241. https://doi.org/10.1080/13032917.2013.868364

[10] Lean, H. H., Chong, S. H., & Hooy, C. W. (2014). Tourism and economic growth: Comparing Malaysia and Singapore. *International Journal of Economics & Management*, *8*(1), 139–157.

[11] Lean, H. H., & Tang, C. F. (2010). Is the tourism-led growth hypothesis stable for Malaysia? A note. *International Journal of Tourism Research*, *12*(4), 375–378. https://doi.org/10.1002/jtr.759

[12] Ghalia, T., Fidrmuc, J., Samargandi, N., & Sohag, K. (2019). Institutional quality, political risk and tourism. *Tourism Management Perspectives*, *32*, 100576. https://doi.org/10.1016/j.tmp.2019.100576

[13] Chaudhry, I. S., Nazar, R., Ali, S., Meo, M. S., & Faheem, M. (2022). Impact of environmental quality, real exchange rate and institutional performance on tourism receipts in East-Asia and Pacific region. *Current Issues in Tourism*, *25*(4), 611–631. https://doi.org/10.1080/13683500.2021.1894101

[14] Meo, M., Nathaniel, S., Shaikh, G., & Kumar, A. (2021). Energy consumption, institutional quality and tourist arrival in Pakistan: Is the nexus (a) symmetric amidst structural breaks? *Journal of Public Affairs*, *21*(2), e2213. https://doi.org/10.1002/pa.2213

[15] Sari, V. K., & Cahyadin, M. (2021). Dynamic tourism in ASEAN countries: Do institutional indicators matter? *Jurnal Ekonomi & Studi Pembangunan*, *22*(2), 201–212. https://doi.org/10.18196/jesp.v22i2.11282

[16] Perles-Ribes, J. F., Ramón-Rodríguez, A. B., Such-Devesa, M. J., & Moreno-Izquierdo, L. (2019). Effects of political instability in consolidated destinations: The case of Catalonia (Spain). *Tourism Management*, *70*, 134–139. https://doi.org/10.1016/j.tourman.2018.08.001

[17] Haseeb, M., & Azam, M. (2021). Dynamic nexus among tourism, corruption, democracy and environmental degradation: A panel data investigation. *Environment, Development and Sustainability*, *23*(4), 5557–5575. https://doi.org/10.1007/s10668-020-00832-9

[18] Hassan, S. T., Khan, S. U. D., Xia, E., & Fatima, H. (2020). Role of institutions in correcting environmental pollution: An empirical investigation. *Sustainable Cities and Society*, *53*, 101901. https://doi.org/10.1016/j.scs.2019.101901

[19] Usman, O., Elsalih, O., & Koshadh, O. (2020). Environmental performance and tourism development in EU-28 Countries: The role of institutional quality. *Current Issues in Tourism*, *23*(17), 2103–2108. https://doi.org/10.1080/13683500.2019.1635092

[20] Dasgupta, S., & De Cian, E. (2018). The influence of institutions, governance, and public opinion on the environment: Synthesized findings from applied econometrics studies. *Energy Research & Social Science*, *43*, 77–95. https://doi.org/10.1016/j.erss.2018.05.023

[21] Ulucak, R. (2020). The pathway toward pollution mitigation: Does institutional quality make a difference? *Business Strategy and the Environment*, *29*(8), 3571–3583. https://doi.org/10.1002/bse.2597

[22] Azam, M., Mahmudul Alam, M., & Haroon Hafeez, M. (2018). Effect of tourism on environmental pollution: Further evidence from Malaysia, Singapore and Thailand. *Journal of Cleaner Production*, *190*, 330–338. https://doi.org/10.1016/j.jclepro.2018.04.168

[23] Lee, J. W., & Brahmasrene, T. (2013). Investigating the influence of tourism on economic growth and carbon emissions: Evidence from panel analysis of the European Union. *Tourism Management*, *38*, 69–76. https://doi.org/10.1016/j.tourman.2013.02.016

[24] Dogan, E., & Aslan, A. (2017). Exploring the relationship among COE, real GDP, energy consumption and tourism in the EU and candidate countries: Evidence from panel models robust to heterogeneity and cross-sectional dependence. *Renewable and Sustainable Energy Reviews*, *77*, 239–245. https://doi.org/10.1016/j.rser.2017.03.111

[25] Nepal, R., Indra al Irsyad, M., & Nepal, S. K. (2019). Tourist arrivals, energy consumption and pollutant emissions in a developing economy–implications for sustainable tourism. *Tourism Management*, *72*, 145–154. https://doi.org/10.1016/j.tourman.2018.08.025

[26] Zaman, K., Shahbaz, M., Loganathan, N., & Raza, S. A. (2016). Tourism development, energy consumption and environmental Kuznets curve: Trivariate analysis in the panel of developed and developing countries. *Tourism Management*, *54*, 275–283. https://doi.org/10.1016/j.tourman.2015.12.001

[27] Akadiri, S. S., Lasisi, T. T., Uzuner, G., & Akadiri, A. C. (2020). Examining the causal impacts of tourism, globalization, economic growth and carbon emissions in tourism island territories: Bootstrap panel Granger causality analysis. *Current Issues in Tourism*, *23*(4), 470–484. https://doi.org/10.1080/13683500.2018.1539067

[28] Koçak, E., Ulucak, R., & Ulucak, Z. Ş. (2019). The impact of tourism developments on COE: An advanced panel data estimation. *Tourism Management Perspectives*, *33*, 100611. https://doi.org/10.1016/j.tmp.2019.100611

[29] Chishti, M. Z., Ullah, S., Ozturk, I., & Usman, A. (2020). Examining the asymmetric effects of globalization and tourism on pollution emissions in South Asia. *Environmental Science and Pollution Research*, *27*, 27721–27737. https://doi.org/10.1007/s11356-020-09057-9

[30] Paramati, S. R., Alam, M. S., & Lau, C. K. M. (2018). The effect of tourism investment on tourism development and COE: Empirical evidence from the EU nations. *Journal of Sustainable Tourism*, *26*(9), 1587–1607. https://doi.org/10.1080/09669582.2018.1489398

[31] De Vita, G., Katircioglu, S., Altinay, L., Fethi, S., & Mercan, M. (2015). Revisiting the environmental Kuznets curve hypothesis in a tourism development context. *Environmental Science and Pollution Research*, *22*(21), 16652–16663. https://doi.org/10.1007/s11356-015-4861-4

[32] Eyuboglu, K., & Uzar, U. (2019). The impact of tourism on CO2 emission in Turkey. *Current Issues in Tourism*, *23*(13), 1631–1645. https://doi.org/10.1080/13683500.2019.1636006

[33] Katircioglu, S. T. (2014). International tourism, energy consumption, and environmental pollution: The case of Turkey. *Renewable and Sustainable Energy Reviews*, *36*, 180–187. https://doi.org/10.1016/j.rser.2014.04.058

[34] Sharif, A., Afshan, S., & Nisha, N. (2017). Impact of tourism on CO2 emission: Evidence from Pakistan. *Asia Pacific Journal of Tourism Research*, *22*(4), 408–421. https://doi.org/10.1080/10941665.2016.1273960

[35] Naradda Gamage, S. K., Hewa Kuruppuge, R., & Haq, I. U. (2017). Energy consumption, tourism development, and environmental degradation in Sri Lanka. *Energy Sources, Part B: Economics, Planning, and Policy*, *12*(10), 910–916. https://doi.org/10.1080/15567249.2017.1324533

[36] Sghaier, A., Guizani, A., Jabeur, S. B., & Nurunnabi, M. (2019). Tourism development, energy consumption and environmental quality in Tunisia, Egypt and Morocco: A trivariate analysis. *GeoJournal*, *84*(3), 593–609. https://doi.org/10.1007/s10708-018-9878-z

[37] Khan, Q. R., Xinshu, M., Qamri, G. M., & Nawaz, A. (2023). From COVID to conflict: Understanding the deriving forces of environment and implications for natural resources. *Resources Policy*, *83*, 103700. https://doi.org/10.1016/j.resourpol.2023.103700

[38] Hayat, A. (2019). Foreign direct investments, institutional quality, and economic growth. *The Journal of International Trade & Economic Development*, *28*(5), 561–579. https://doi.org/10.1080/09638199.2018.1564064

[39] Nawaz, A., & Rahman, M. M. (2023a). Global value chains participation and environmental degradation in SAARC economies. *Environment, Development and Sustainability*, *25*(9), 1–23. https://doi.org/10.1007/s10668-023-03265-2

[40] Pesaran, M. H., Shin, Y., & Smith, R. J. (2001). Bounds testing approaches to the analysis of level relationships. *Journal of applied econometrics, 16*(3), 289–326. https://doi.org/10.1002/jae.616

[41] World Bank. (2018). *Worldwide governance indicators database*. Retrieved from: https://databank.worldbank.org/source/worldwide-governance-indicators

[42] Nawaz, A., & Rahman, M. M. (2023b). Renewable energy consumption in Sub-Saharan Africa: The role of human capital, foreign direct investment, financial development, and institutional quality. *Energy Reports*, *10*, 3383–3393. https://doi.org/10.1016/j.egyr.2023.10.025

[43] Omri, A. (2013). COE, energy consumption and economic growth nexus in MENA countries: Evidence from simultaneous equations models. *Energy Economics*, *40*, 657–664. https://doi.org/10.1016/j.eneco.2013.09.003

[44] Apergis, N., Eleftheriou, S., & Payne, J. E. (2013). The relationship between international financial reporting standards, carbon emissions, and R&D expenditures: Evidence from European manufacturing firms. *Ecological Economics*, *88*, 57–66. https://doi.org/10.1016/j.ecolecon.2012.12.024

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Appendix

Table A.1.
Non-linear ARDL

Variables	(1) ECT	(2) SR
ECT		−0.456***
		(0.127)
D.LGDPC		34.71
		(56.64)
D.LGDPCSQ		−1.622
		(2.699)
D.LFDI		0.00266
		(0.00897)
PG	0.497***	−0.297***
	(0.0359)	(0.0741)
IQI	2.394***	−0.913***
	(0.177)	(0.351)
D.LTO		−0.0549
		(0.160)
D.ITR_INC		0.0142
		(0.0399)
D.ITR_DEC		0.0201
		(0.0409)
LGDPC	8.245***	
	(1.526)	
LGDPCSQ	−0.383***	
	(0.0725)	
LTO	−0.151***	
	(0.0290)	
LFDI	−0.0238***	
	(0.00325)	
ditrp_inc	−0.0280***	
	(0.00737)	
ditrp_dec	−0.0474***	
	(0.00871)	
Constant		−18.92***
		(5.227)
Observations	232	232

Table A.2
Fixed effects results

Variables	(1) LCO2	(2) LCO2	(3) LCO2
LGDPC	18.86***	19.42***	19.39***
	(2.980)	(2.975)	(2.941)
LGDPCSQ	−0.874***	−0.905***	−0.899***
	(0.141)	(0.141)	(0.140)
LFDI	0.0112*	0.0126*	0.00953
	(0.00650)	(0.00649)	(0.00653)
IQI	0.0837***	0.0719***	0.149***
	(0.0255)	(0.0260)	(0.0402)
LITR	−0.220***	−0.220***	−0.236***
	(0.0361)	(0.0359)	(0.0360)
LTO	−0.259***	−0.218**	−0.240***
	(0.0853)	(0.0873)	(0.0868)
PG		0.0354*	0.0448**
		(0.0180)	(0.0182)
IQI*ITR			−0.0153**
			(0.00608)
Constant	−93.23***	−95.96***	−95.69***
	(15.75)	(15.71)	(15.53)
Observations	246	246	246
R-squared	0.528	0.536	0.548
Number of id	15	15	15

Table A.3
List of sample countries

Austria	Finland	Greece	Luxemburg	Spain
Belgium	France	Ireland	Netherlands	Sweden
Denmark	Germany	Italy	Portugal	United Kingdom