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Tourism's Influence on Economic Growth and Environment in Saudi: Present and Future

Abda Emam [1,2,*] and Hassan Ali-Dinar [3]

[1] Department of Agribusiness and Consumer Sciences, College of Agricultural and Food Sciences, King Faisal University, Al-Ahsa 31982, Saudi Arabia
[2] Department of Agricultural Economics, Faculty of Agricultural Studies, Sudan University of Science and Technology, Khartoum P.O. Box 13317, Sudan
[3] Date Palm Research Center, King Faisal University, P.O. Box 400, Al-Ahsa 31982, Saudi Arabia; hdinar@kfu.edu.sa
* Correspondence: aaeali@kfu.edu.sa; Tel.: +966-537358953 or +249-912945646

Abstract: Reports from the World Tourism Organization indicate that tourism activity has been increasingly booming; this sector is essential for economic growth and may affect the environment. Tourism is one of the key strategic sectors for planned growth in Saudi Arabia's Vision 2030. This study is designed to evaluate the long-termning association between tourist arrivals, growth domestic product (GDP), and CO_2 emissions in the Kingdom of Saudi Arabia (KSA). The data related to these variables were assessed for the period 2010 to 2020. The autoregressive distributed lag (ARDL) bounds results revealed that there are long-established relations between tourist arrivals and growth domestic product and tourist arrivals and CO_2 emissions. The dynamic ordinary least squares (DOLS) and fully modified ordinary least squares (FMOLS) model outcomes were compatible with the outcomes of the ARDL model. In reference to the Granger causality test, tourist arrivals cause (affect) the GDP. Such a result confirms the conception that tourism encourages economic growth. No causality runs from tourist arrivals towards CO_2 accumulation. This result may reflect the governmental effort to reduce CO_2 accumulation and/or to perform tourism activities in a sustainable way. The results predicted that the growth rate of tourist arrivals, GDP, and CO_2 accumulation equal 0.0023, 0.048, and 0.0169, respectively, during the forecast period (2021–2030), which appeared to be increasing for tourist arrivals and GDP and decreasing for CO_2 accumulation. The study recommended that, to increase economic growth, tourist arrivals should be increased alongside performing tourism activities in a sustainable way. These findings point to the benefits of governance in ensuring effective policies to decarbonize the environment, and policy proposals are put forward accordingly.

Keywords: economic development; CO_2 emission; Granger causality; Saudi; tourist arrivals

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1. Introduction

Worldwide, climate change is a key issue impacting the environment [1]. The level of carbon dioxide (CO_2) emissions drives global warming [2]. The emissions of CO_2 come from different economic and social activities, among which are tourism activities. The tourism sector plays a vital role in job creation, increasing income levels, foreign exchange reserves, and (accordingly) economic growth [3].

This study is consistent with the United Nations Sustainable Development Goals (UN-SDGs 7, 8, 11, 12, and 13) [4]. These goals range from access to cleanliness and responsible energy consumption to sustainable economic growth and climate change mitigation. These goals are consistent with the sustainability goals of the Kingdom of Saudi Arabia.

Due to its vital role in the economy, tourism has been the subject of a huge body of research, highlighting its impact [5–8]. Correspondingly, sustainability is considered as a strategic part of tourism. The World Trade Organization (WTO) states that sustainable tourism is a "development that meets the needs of present tourists and host regions while

protecting and enhancing opportunity for the future" [5,9]. Several writers have considered it as a method to fulfill the requirements of the investors, considering social, environmental, and economic effects [5,10].

Tourism is consideredto be as one of the main strategic sectors for planned growth in Saudi's Vision 2030. In 2019, Saudi Arabia witnessed a strong boost in the tourism sector, involving openness to entertainment and theatrical events, or events related to international football, golf, boxing, car racing, and tennis [4]. The KSA assumes tourism will form about 10% of the nation's GDP by 2030. In addition, building an innovative tourism economy will create an abundance of job opportunities (a minimum of one million new jobs) for youth in the KSA [11]. The total contributions from tourism to GDP in the world and in the KSA were equal to 6.1% and 6.5%, respectively, in 2021 [12]. In addition, the total contributions of tourism to job creation in the world and in the KSA were equal to 287 MN (=one in eleven jobs) and 1.30 MN, 10.0% of total jobs, respectively, in 2021 [12]. Due to CO_2 emissions, the tourism industry has a negative impact on the environment [13]. High energy consumption comes from transportation, agricultural production, and food processing.

Tourism and economic growth are closely related and interacting pillars. Referring to the World Tourism Organization (WTO) reports, tourism activity is crucial for job creation and economic growth [14]. Several studies have weighed the association between tourism and economic growth. In reference to the tourism economic literature, previous studies have mostly concentrated on the impact of tourism on economic growth [15], poverty [16], and job creation [17].

Four hypotheses have described the association between economic growth and tourism: the tourism-led growth hypothesis declares a positive effect of tourism on economic growth [18]; there is a hypothesis that states that tourism is motivated by economic growth [19]; there is a hypothesis that states that bidirectional causality exists between economic development and tourism [20]; finally, there is a hypothesis that states that no causal connection exists between economic growth and tourism [18].

With regard to tourism and the environment (CO_2), the influence of tourism significantly differs, ranging from promoting sociocultural values to prompting environmental degradation [21]. The connection between tourism and CO_2 emissions is composite [22].

Among economic sectors, international tourism is characterized by continuous growth; from 2010, it become one of the globe's leading and quickest-growing sectors [23]. An important factor contributing to economic growth is the availability of energy that supports several economic sectors. Energies such as electricity are frequently generated from burning fossil fuels that contribute to CO_2 emissions (environmental contamination) [24]. Tourism is considered to be an energy-intensive sector. The rapid development of the tourism sector necessitates key investments in other sectors, including transportation and infrastructure [25].

Within the tourism sector, CO_2 emissions are classified into indirect and direct emissions [26]. The production of intermediate goods in this industry and final energy consumption represent indirect and direct CO_2 emissions, respectively. Concerning the consequence of tourism events on the environment, researchers have stated two contrasting viewpoints. Certain studies determined that the tourism sector contributes to CO_2 emissions and, accordingly, global warming [14,27–32]. Other studies have illustrated an opposing association between tourism and the environment (CO_2 emissions), concluding that tourism activities must be run in a sustainable manner [14,33,34].

In addition, several studies highlight the relation between tourism and CO_2 emissions in North Africa [35,36] and the Middle East [37]. Other studies at the country level have used energy consumption as a variable in their analyses to identify such a relationship in North Africa [38], Cyprus [39], and Singapore [40]. Simon Kuznets [41] used a U-form curve to describe the relationship between income inequality and income per capita. Grossman and Krueger [42] exploited the idea of the U-form curve in the association between economic development and environmental degradation (the Environmental Kuznets Curve (EKC) hypothesis).

Also, many studies have confirmed that tourism increases CO_2 emission at the country level, e.g., such studies have been conducted for France [43], Turkey [44], and Cyprus [39]. In reference to tourism-related EKC panel analyses, countries in the European Union have been illustrated to have a statistically significant and negative effect on CO_2 accumulation [45].

Many studies have confirmed that tourism has considerably harmful effects on the environment due to CO_2 emissions [28,30]. Another study determined that the size of energy structure, tourist production, and tourist traffic influence CO_2 emissions [46]. Tourism transportation is the most prolific cause of pollution [47,48]. Also, tourism accommodations are playing a vital role in carbon emission accumulation [22,49,50].

The value of this study has emerged from the controversial results of previous studies that examined the impact of tourism on the environment (CO_2 emissions) and economic growth. The paper highlights studies that examine the impact of tourism on CO_2 emissions in various countries; there is a limited focus on the KSA in this context. Also, the ARDL bounds, DOLS, FMOLS, and Granger causality are appropriate for application in addressing this gap. Hence, the study's objective is to test the effect of tourist arrivals on CO_2 emissions and economic growth in the KSA. Further, the study enriches the existing body of research on this issue.

The main objective of the study is to discover the effect of tourist arrivals on the GDP and CO_2 emissions in the KSA. The specific objectives of this study include the following, accounting for the variables (tourist arrival, GDP, and CO_2 emission) under study:

1. Disclosing the relationship between the variables using visual analysis (graph).
2. Determine the extent of long- and short-term relationships between the variables.
3. Identify the causality direction among the variables.
4. Discover the magnitude of the growth rates for the variables in the forecast period.

The study hypothesizes that tourist arrivals have a positive effect on the GDP and a negative effect on CO_2 emissions:

1. There is integration between these factors.
2. There are existing long- and short-term relationships between these factors.
3. There is bidirectional causality between these factors.
4. The growth rates of the variables in the forecast period are higher than those in the study period.

The present study is composed of four sections: introduction, research methods, results, and discussion. The final section presents our conclusions and recommendations.

2. Materials and Methods

2.1. Data Description

The data, along with their explanations and information, are presented in Table 1. To illustrate the relationship between the study variables—tourism, GDP, and environment—the data were collected from 2010 to 2020.

Table 1. Variables description.

Variable	Unit	Sources
Carbon dioxide (CO_2)	Ton	"https://countryeconomy.com/energy-and-environment/co2-emissions/saudi-arabia (accessed on 17 March 2023)"
Annual Growth Domestic Product (GDP)	Million USD	" https://countryeconomy.com/gdp/saudi-arabia (accessed on 18 March 2023)"
Tourism arrival/ year (Tou)	Person	"https://countryeconomy.com/trade/international-tourism/saudi-arabia (accessed on 20 March 2023)"

2.2. Analysis Methods

2.2.1. Descriptive and Graphical Analysis (for Testing Hypothesis 1)

The data under study were subjected to descriptive and graphical analyses to test their cointegration in a visual analysis.

2.2.2. Cointegration Tests (for Testing Hypothesis 2)

Refs. [51,52] presented the following equation to examine the unit root for the variables of the study.

$$\Delta X_t = C_{t1} + b_1 X_{t-1} + E_{t1} \quad (1)$$

$$\Delta X_t = C_{t2} + B_t + b_2 X_{t-1} + E_{t2} \quad (2)$$

where the ADF coefficients to be estimated are b_1 and b_2, the trend is B, C is the constant, the error term is E, and the time selected is t. Accepting the null hypothesis (H_0) means that the series is stationary. The chain variables will be stationary if the t-statistics of the ADF coefficients are bigger than the t-critical values.

1. The autoregressive distributed lag (ARDL) bounds test was used to assess the long-term connotations among the series. It can be characterized as being effective for minor remarks in time–series data and can be applied regardless of the series order (i.e., it can be applied in I (1) and I (0), by not I (2)). The acceptance of the null hypnosis signifies that there is no long-term connection (null hypothesis: $b_3 = b_4 = 0$ against alternative hypothesis $b_3 \neq b_4 \neq 0$ in Equation (3)). Likewise, a comparable assessment can be practiced for the Y series (null hypnosis: $b_5 = b_6 = 0$ against alternative hypothesis $b_5 \neq b_6 \neq 0$ in Equation (4)). This was applied using the following equations [52,53]:

$$\Delta X_t = C_1 + \sum_{t-1}^{p} a_1 \Delta Y_{t-1} + b_3 X_{t-1} + b_4 Y_{t-1} + e_1 \quad (3)$$

$$\Delta Y_t = C_2 + \sum_{t-1}^{p} a_2 \Delta X_{t-1} + b_5 Y_{t-1} + b_6 X_{t-1} + e_2 \quad (4)$$

where a_1, a_2—coefficients of the difference of lag-independent variables; b_3, b_5—coefficients of lag dependent variable; b_4, b_6—coefficients of lag-independent variable, respectively; e_1, e_2—error terms.

To examine the steadiness of the ARDL model estimates, the cumulative sum (CUSUM) method was used [54]. If the residual is sited inside the 5% critical margins, the valued coefficients steadily signify a 5% level of significance. Equations (3) and (4) have upper and lower bounds with critical F-values; this confirms the joined order 1(1) and 1(0) of the series, respectively [53].

Ref. [55] recorded that, to support the results of ARDL statistics, the dynamic ordinary least squares (DOLS) can be used in addition to fully modified ordinary least squares (FMOLS). The DOLS and FMOLS model outcomes stretch the realistic estimations of long-term relations among the series.

2. Error correction model (ECM) testing of short-term relations: The ECM test is run to weigh the quickness factor of the short-term connotation among the variables [56]. It applies after the detection of a long-term connotation among the variables. Equations (5) and (6) represent the ECM model [52]:

$$\Delta(\mathrm{X}) = \Delta b_7 \mathrm{X}_{-1} + \Delta b_8 \mathrm{Y}_{-1} + b_9 U_{t-1} + V_1 \quad (5)$$

$$\Delta(\mathrm{Y}) = \Delta b_{10} \mathrm{Y}_{-1} + \Delta b_{11} \mathrm{X}_{-1} + b_{12} U_{t-1} + V_2 \quad (6)$$

where b_7 and b_{10}—coefficients of difference of lag dependent variable; b_8 and b_{11}—coefficients of difference of lag-independent variable; b_9 and b_{12}—speed of adjustment (requisite be

negative and significant to fixed model instability); U_{t-1}—error correction term; V_1 and V_2—error terms.

Residual diagnostics tests were used to check ECM viability, as follows: the Breusch–Pagan–Godfrey test was used for heteroskedasticity—the null hypothesis is accepted when the *p*-value is higher than 0.05, demonstrating that the residual is homoscedasticity. A normality test was conducted—if the Jarque–Bera statistic's probability is higher than 0.05, then the residual is normally scattered.

2.2.3. Granger Causality (for Testing Hypothesis 3)

Granger causality can be determined using Equations (7) and (8) [57]:

$$X_t = \beta_0 + \sum_{j-1}^{n} \beta_{1j} X_{t-j} + \sum_{h-1}^{m} \beta_{2h} Y_{t-h} + e_{1t} \quad (7)$$

$$Y_t = \alpha_0 + \sum_{s-1}^{k} \alpha_{1s} Y_{t-s} + \sum_{i-1}^{m} \alpha_{2i} X_{t-m} + e_{2t} \quad (8)$$

From Equations (7) and (8), it is supposed that the e_{1t} and e_{2t} are unlinked, as e (ε1t, ε2t) = 0 = e(ε2tε2s) ….s ≠ t. Four possible results can be drawn from the equations, as follows:

- If the coefficient $\beta_{2h} \neq 0$ and is statistically significant, then $Y \rightarrow$ Granger causes $\rightarrow X$ [57,58].
- If $\alpha_{2i} \neq 0$ and is statistically significant, then X causes a variable for Y [57,59,60].
- The significance of α_{2i} and β_{2h} ($\neq$0) affirms the joint reliance of X and Y.
- If α_{2i} and $\beta_{2h} = 0$, then Y and X will be autonomous.

2.2.4. Forecasting Test (for Testing Hypothesis 4)

A forecasting test was run on tourism. The growth rates were calculated for the period 2021 to 2030 (predicting periods). The growth rate was computed using the following equation [61]:

$$W_t = T_t - T_{t-1} \div T_{t-1} \quad (9)$$

where W_t denotes the growth rate in two successive years. T signifies tourist arrivals and t denotes the year. The growth rate of the variable for the years from 2010 to 2020 and for the years from 2021 to 2030 is calculated by the following equation [61]:

$$R_{t\ldots m} = (R_t + R_{t+1} \ldots + R_m))/m \quad (10)$$

where $R_{t\ldots m}$ and m denote the growth rate for a precise period and the number of years, respectively.

3. Results and Discussion

The study aimed to disclose the relationships between tourism, economic growth (GDP), and the environment (CO_2). Accordingly, the study comprises two parts: the cointegration association between tourism and GDP and the cointegration association between tourism and CO_2. Also, the Granger causality test and a forecasting analysis were conducted.

3.1. Descriptive Statistics

The probabilities derived through the Jarque–Bera statistics are higher than 0.05 for all series except the one with the tourism variable, indicating the presence of a normal distribution (Table 2). So, the data were transformed into a logarithmic form. Figure 1 shows a graphical analysis of the cointegration. It appears that the variables under study move up and down together, leading to a conclusion that the variables might be cointegrated.

Table 2. Descriptive statistics of the variables.

	CO_2	GDP	TOU
Mean	564.99	704,524.6	14,957,983
Median	574.92	703,368.0	16,109,000
Maximum	611.42	816,578.0	18,260,000
Minimum	487.01	528,207.0	4,138,178
Std. Dev.	40.32	81,456.75	4,180,961
Jarque–Bera	1.03	0.73	7.77
Probability	0.60	0.70	0.021
Observations	11	11	11

Source: Data were collected (from the sources mentioned in Table 1) and calculated.

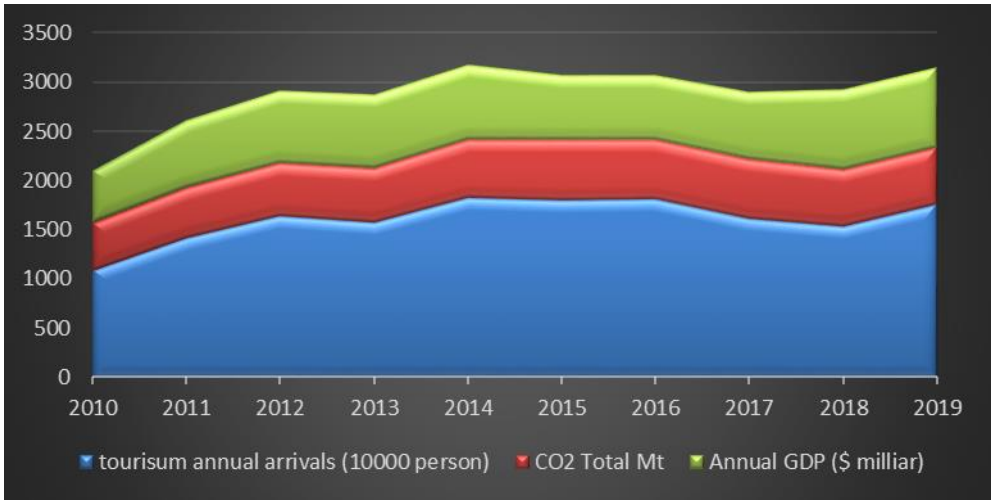


Figure 1. Graphical presentation of the variables under study. Source: Data were collected (from the sources mentioned in Table 1) and visualized by the authors.

3.2. Part One: Co-Integration Test Analysis Results (Tourism and GDP)

3.2.1. The Results of the Unit Root Tests

The ADF statistics of GDP and tourism are significant (1% level), concluding the stationarity of the series (Table 3). Since the stationarity order is dissimilar (1(0) and 1(1)), the ARDL model was used to evaluate the relation.

Table 3. Results of unit root test.

	$LogCO_2$	LogGDP	Logtou
Intercept (at level)	−2.76 *	2.83 *	−1.28
Intercept and trend (at level)	−0.91	−2.95	−0.67
Stationarity (at level)	Stationary	Stationary	Non stationary
Intercept (at first difference)	−1.57	−2.18	−1.24
Intercept and trend (first difference)	−2.38	−1.96	−3.90 *
Stationarity (first difference)	Non stationary	Non stationary	Stationary

Source: Data were collected (from sources mentioned in Table 1) and calculated. * 1% level of significance. CO_2—carbon dioxide; GDP—annual GDP; tou—tourism arrival/year; Log—logarithm.

3.2.2. Results of ARDL Tests: Tourism and GDP

The ARDL model viability and residual diagnostics tests results reflect the respective feasibility of the findings. The following tests were used: serial correlation LM test (Breusch–Godfrey); the Breusch–Pagan–Godfrey heteroskedasticity test; the Jarque–Bera test. The findings of these tests indicated no serial correlation, no heteroskedasticity, and residual normal distribution, respectively (Table 4). Similarly, A CUSUM test was used to assess the steadiness diagnosis [62]. From Figure 2, we can see that the test presented the steadiness of the cumulative sum of the recursive residuals, reflecting the power of the model.

Table 4. Results of ARDL tests (tourism and GDP).

Model	
LGDP (as Dependent Variable) Choice ARDL Model (2, 2)	
Independent V.	Coefficient
LGDP(−1)	0.53 (0.15)
LGDP(−2)	−0.49 (018)
LTOU	−0.05 (0.30)
LTOU(−1)	−0.79 (0.08)
LTOU(−2)	0.49 (0.04)
C	8.17 (0.04)
R-squared 0.92 Adj. R-squared 0.7	
F-statistics 6.85 Prob. 0.07	
Jarque–Bera test: 1.24 Prob. 0.54 Serial correlation LM test: Breusch–Godfrey 0.26 Prob. 0.81	
Breusch–Pagan–Godfrey heteroskedasticity test: 0.09 Prob. 0.98	

Source: Data were collected (from sources mentioned in Table 1) and calculated. LM—Lagrange multiplier. Numbers within ( ) are probabilities.

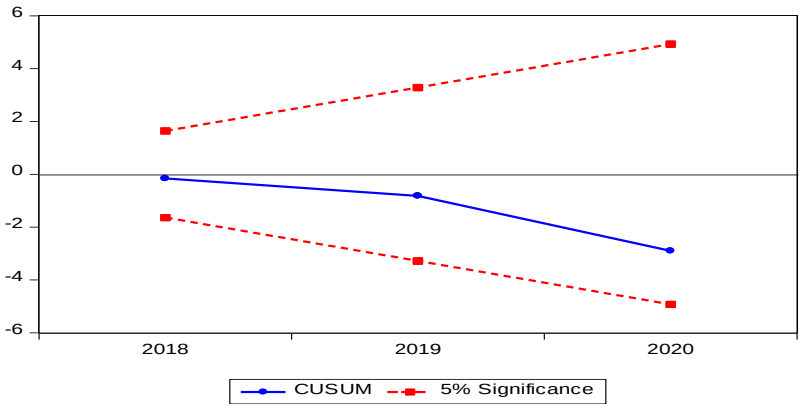


Figure 2. Stability diagnostic (LGDP is dependent variable). Source: drawn by author.

Table 5 shows the results of the bound test. The bound test was applied to the F-test for the GDP coefficient (one lag period) and tourist arrivals (as the independent variable), deriving a result of 9.77. The F-statistic is bigger than the upper bound of the critical F-statistic (5.58) at 1%, indicating the presence of the long-term relationship among GDP and tourist arrivals during the study period. The results are synchronized with those of a previous study [63]. The outcomes of [63] showed that tourism, financial development, government governance policies, economic growth, and foreign direct investments are positive and significant causes leading to increased CO_2 emissions in Africa.

Table 5. The bounds test results: ARDL (GDP as dependent variable).

Dependent V.	Independent V.	F-statistic of bound test
LGDP	LTOU	9.77 *
Significance	Lower Bound	Upper Bound
1%	4.94	5.58
5%	3.62	4.16
10%	3.02	3.51

Source: Data were collected (from sources mentioned in Table 1) and calculated. Note: * means significance at 1% level.

Long-Term Endorsement

DOLS and FMOLS models were applied to support the outcomes of the ARDL valuations (Table 6). The results of DOLS and FMOLS indicate that a long-term relationship was observed between GDP and tourist arrivals. Several former studies run DOLS and FMOLS to reinforce the outcomes of the ARDL model [52,64,65].

Table 6. Results of robustness test.

FMOLS Model		**DOLS Model**	
LGDP (as a Dependent Variable)		**LGDP (as a Dependent Variable)**	
Independent V.	Coefficient	Independent V.	Coefficient
LTOU	0.81 *	LTOU	−0.88 *
C	78.26	C	12.19 *
R-squared 0.92 Adj. R-squared 0.91		R-squared 0.81 Adj. R-squared 0.70	

Source: Data were collected (from sources mentioned in Table 1) and calculated. * 1% level of significance.

The results of DOLS and FMOLS are compatible with those of the ARDL assessment (Table 7). A long-term relationship was noticed among GDP and tourist arrivals.

Table 7. Long-term relationship confirmation.

Dependent–independent	DOLS	FMOLS	ARDL
LGDP–LTOU	0.88 *	0.81 *	9.77 *

Source: Tables 5 and 6. * Significance level at 1%; LGDP—GDP; LTOU—tourist arrivals; DOLS—dynamic ordinary least squares; FMOLS—fully modified ordinary least squares; ARDL—autoregressive distributed lag L-logarithm.

Results of Short-Term Tests: ECM Tests

To support the outcomes of the ARDL model (long-term connotation), an ECM was conducted to assess short-term association among the series. Lag 1 was selected (Table 8), which is essential for performing ECM. From Table 9, the coefficient of the alteration factor for GDP (dependent variable) verified the negative sign (−0.84) and the significant value (critical t-value = −5.75), leading to the conclusion that the model has the power to correct the variability of its prior period. Similarly, the outcomes suggest that the adjustment parameter coefficients for tourist arrivals (dependent variable) was negative (−2.63) and statistically insignificant (critical t-value = −1.38). This indicates the powerlessness of the model to accurately predict the changeability that took place in the past. The model suitability tests were applied. The Jarque–Bera statistic equals = 7.44 with Prob. = 0.11, indicating that the residual has a normal distribution. The LM statistic (lag 1) equals 6.31, with Prob. = 0.18, signifying no serial correlation. Chi-sq. equals 18.93 with Prob. = 0.40, demonstrating no heteroskedasticity. These outcomes for the model's suitability led us to accept the null hypothesis; this is a result of the normal distribution of the residuals, the lack of a serial correlation among the residuals, and no heteroskedasticity.

Table 8. Lag selection results.

Lag	LogL	LR	FPE	AIC	SC	HQ
0	19.67	NA *	6.77×10^{-5}	−3.93	−3.88	−4.02
1	32.97	7.35	2.75×10^{-5} *	−5.11 *	−4.89 *	−5.58 *

Source: Data were collected (from sources mentioned in Table 1) and calculated. * Significance level at 1%. Nore: lag order was selected by the criterion; logL—log lag variable; LR—sequential modified likelihood ratio (LR) test statistic (each test at 5% level); FPE—final prediction error; AIC—Akaike information criterion; SC—Schwarz information criterion; HQ—Hannan–Quinn information criterion; NA—not available.

Table 9. Results of ECM.

Error Correction	D(LGDP)	D(LTOU)
CointEq1	−0.84 [−5.75]	−2.63 [−1.38]
D(LGDP(−1))	0.42 [3.37]	1.72 [1.06]
D(LTOU(−1))	−0.42 [−3.73]	−1.44 [−0.98]
C	0.0035 [0.58]	−0.06 [−0.77]
ECM residual serial correlation LM tests: Lags LM-Stat Prob. 1 6.31 0.18 VEC residual heteroskedasticity tests: Chi-sq 18.93 Prob. 0.40		
Jarque–Bera statistic 7.44 Prob. = 0.11		

Source: Data were collected (from sources mentioned in Table 1) and calculated. Numbers in [] represent critical t-values.

3.2.3. The Results of Granger Causality Test: (GDP and Tourist Arrivals)

The F-statistics of the Granger causality test equal 7.02, with probabilities equal to 0.04 (Table 10), meaning that the causality (unidirectional) goes in the direction of tourist arrivals → GDP. This outcome corroborates the findings of earlier studies [18,65]. Studies have shown that tourism has a casual power on economic growth (unidirectional).

Table 10. Granger causality tests results.

Null Hypothesis	F-Statistic	Prob.
LTOU–LGDP	7.02	0.04
LGDP–LTOU	0.73	0.54

Source: Data were collected (from sources mentioned in Table 1) and calculated. Where; Null Hypothesis means no Granger causality.

3.3. Part Two: Co-Integration Results (Tourism and CO_2)

3.3.1. Results of ARDL Tests: Tourism and CO_2

The ARDL tests outcomes are found in Table 11. Residual diagnostics tests were used to evaluate the ARDL model fitness. The residual diagnostics indicators showed no serial correlation and no heteroskedasticity, and the residual was normally distributed. Similarly, to assess the model stability, a CUSUM test was applied [62]. Figure 3 shows the steadiness of the cumulative sum of the recursive residuals, representing the strength of the model.

Table 11. Results of ARDL tests (tourism and CO_2).

Model 1	
L CO_2 (as a Dependent Variable) Chosen ARDL Model (1, 1)	
Independent V.	Coefficient
L CO_2 (−1)	0.35 (0.15)
LTOU	0.02 (0.25)

Table 11. *Cont.*

Model 1	
L CO_2 (as a Dependent Variable) Chosen ARDL Model (1, 1)	
LTOU(−1)	0.19 (0.12)
C	0.29 (0.51)
R-squared 0.88 Adj. R-squared 0.83 F-statistics 6.85 Prob. 0.07	
Jarque–Bera test: 0.34 Prob. 0.84 Serial correlation LM test: Breusch–Godfrey 0.65 Prob. 0.57	
Breusch–Pagan–Godfrey heteroskedasticity test: 1.02 Prob. 0.45	

Source: Data were collected (from sources mentioned in Table 1) and calculated. LM—Lagrange multiplier. Numbers in ( ) are probabilities.

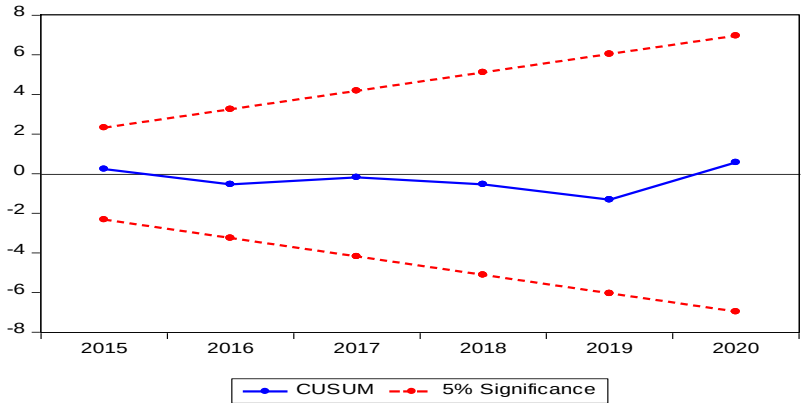


Figure 3. Stability diagnostic (LCO_2—dependent variable). Source: drawn by authors.

Table 12 documents the outcomes of the bound test. The F-statistic (5.79) is greater than the upper bound of the critical F-statistic (5.58) at 1%, indicating the presence of a long-term relationship between CO_2 and tourist arrivals (independent variable). This result corroborated those of a previous study [66], which revealed that there is a positive relationship between tourism and CO_2 emissions.

Table 12. Results of the bounds test: ARDL.

Dependent V.	Independent V.	F-statistic of bound test
LCO_2	–LTOU	5.79 *
Significance	Lower Bound	Upper Bound
1%	4.94	5.58
5%	3.62	4.16
10%	3.02	3.51

Source: Data were collected (from sources mentioned in Table 1) and calculated. Note: * means a 1% level of significance.

Long-Term Relationship Confirmation

Table 13 shows the outcomes of DOLS and FMOLS for testing the long-term association. From Table 14, the results of FMOLS, DOLS, and ARDL are matched, meaning that a long-term association was observed among CO_2 and tourist arrivals.

Table 13. Results of robustness test.

FMOLS Model		**DOLS Model**	
LCO_2 (as Dependent Variable)		**LCO_2 (as Dependent Variable)**	
Independent V.	Coefficient	Independent V.	Coefficient
LTOU	0.38 (0.000)	LTOU	0.63 (0.001)
C	78.26 (0.22)	C	−1.78 (0.021)
R-squared 0.92 Adj. R-squared 0.91		R-squared 0.93 Adj. R-squared 0.83	

Source: Data were collected (from sources mentioned in Table 1) and calculated. Figures between ( ) are probabilities.

Table 14. Long-term relationship confirmation.

Dependent–independent	ARDL	FMOLS	DOLS
LCO_2–LTOU	5.79 *	0.38 *	0.63 *

Source: Tables 12 and 13. * Significance level at 1%; all indicators are illustrated in Table 7; LCO_2—carbon dioxide.

Results of ECM

Lag 1 was selected (Table 15). The model suitability checks were run (Table 16); the Jarque–Bera statistic was 1.03, with Prob. = 0.91, indicating that the residual is normally distributed. Also, the LM statistic (lag 1) equals 7.21, with Prob. = 0.16, signifying no serial correlation. Chi-sq. equals 21.52, with Prob. = 0.25, demonstrating no heteroskedasticity. These outcomes of model suitability let us to accept the null hypothesis; there was no normal distribution of the residuals, no serial correlation of the residuals, and no heteroskedasticity. From Table 16, the coefficient of the adjustment parameter for CO_2 (as the dependent variable) was positive and insignificant (critical t-value = 1.09), leading us to identify the inability of the model to correct the variability of the prior period. Equally, the outcomes propose that the coefficients of the adjustment parameter for tourist arrivals (as dependent variable) was positive (3.89) and statistically insignificant (critical t-value = 2.44); this indicates that the model was powerless to accurately identify the changeability of the past. The mentioned results conclude that there is a short-term relationship between tourist arrivals and CO_2.

Table 15. Lag selection results.

Lag	**LogL**	**LR**	**FPE**	**AIC**	**SC**	**HQ**
0	25.96	NA	2.85×10^{-5}	−4.79	−4.73	−4.86
1	36.86	15.27 *	7.43×10^{-6} *	−6.17 *	−5.99 *	−6.37 *

Source: Data were collected and calculated. Note: all indicators are illustrated in Table 8; * means 1% level of significance.

Table 16. The results of the ECM test.

Error Correction	**D(LCO_2)**	**D(LTOU)**
CointEq1	0.15 [1.09]	3.89 [2.44]
D(LCO_2(−1))	0.59 [1.12]	14.22 [2.34]
D(LTOU(−1))	0.05 [0.36]	−3.26 [−2.03]
C	−0.0002 [−0.03]	−0.10 [−1.51]
ECM residual serial correlation LM tests: Lags LM-Stat Prob. 1 7.21 0.16		
VEC residual heteroskedasticity tests: Chi-sq 21.52 Prob. 0.25		
Jarque–Bera statistic 1.03 Prob. = 0.91		

Source: Source: Data were collected (from sources mentioned in Table 1) and calculated. Numbers in [ ] represent critical t-values.

3.3.2. Results of Granger Causality Test: (CO_2 and Tourist Arrivals)

From Table 17, we can see that the F-statistics of the Granger causality test are equal to 2.40 and 0.10, with probabilities equal to 0.17 and 0.76, respectively, meaning that there is no causality among CO_2 accumulation and tourist arrivals. These results may be due to the adoption of sustainable tourism activities. Previous studies confirm theories surrounding the sustainability of the relationship between tourist arrivals and CO_2 emissions [14,33,34]. Also, the result may reflect governmental efforts to reduce CO_2 accumulation [52].

Table 17. Granger causality results.

Null Hypothesis	F-Statistic	Prob.
LTOU-LCO2	2.40	0.17
LCO2-LTOU	0.10	0.76

Source: Data were collected (from sources mentioned in Table 1) and calculated. Where; Null Hypothesis means no Granger causality.

3.4. Forecasting Results

Figure 4 displays forecasting graphs of tourist arrivals; the blue and red portions show real tourist arrivals for the years from 2010 to 2020 and the predicted years from 2021 to 2030, respectively. The chart shows strength through diverse forecasting indicators: Alpha, mean square error, Gamma, and Beta are equal to 0.9, 0.92, 0.0, and 0.0, respectively. Equally, the tourist arrival growth rates are equivalent to 0.00019 and 0.0023 for the period 2010 to 2020 and for forecast period 2021 to 2030, respectively, leading to the conclusion that there was a rise in tourist arrivals by (0.0023) during the forecast period.

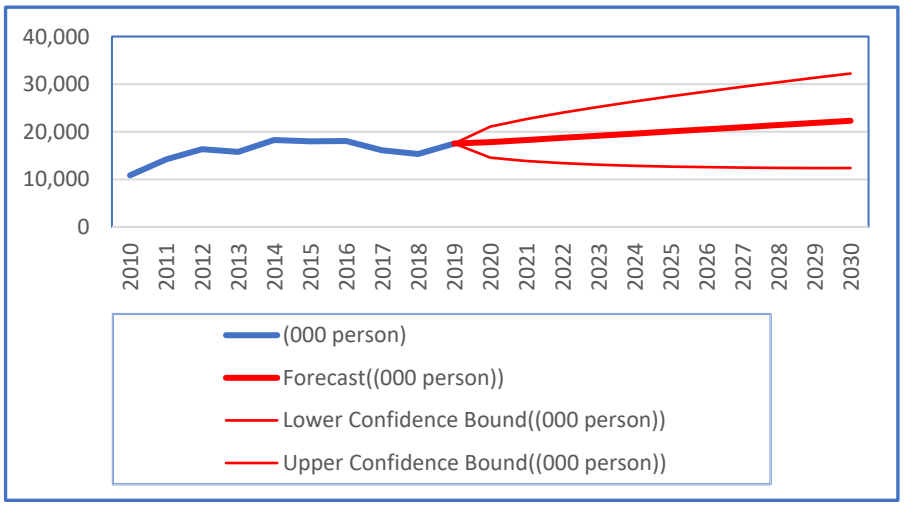


Figure 4. Predictive graph (tourist arrivals). Source: Drawn by author. Number precision pointers: mean square error = 0.92; Alpha = 0.9; Gamma = 0.0; Beta = 0.0.

Figure 5 shows the forecasting graphs of GDP; the blue and red portions show the real GDP for the years from 2010 to 2020 and the predicted years from 2021 to 2030, respectively. The chart shows strength through the used of diverse forecasting pointers: Alpha, mean square error, Gamma, and Beta are equal to 0.9, 0.87, 0.0, and 0.0, respectively. Equally, the tourist arrival growth rates are equivalent to 0.016 and 0.0.019 for the period 2010 to 2020 and for forecast period 2021 to 2030, respectively, leading to the conclusion that there was a rise in GDP by (0.019) during the predicted period.

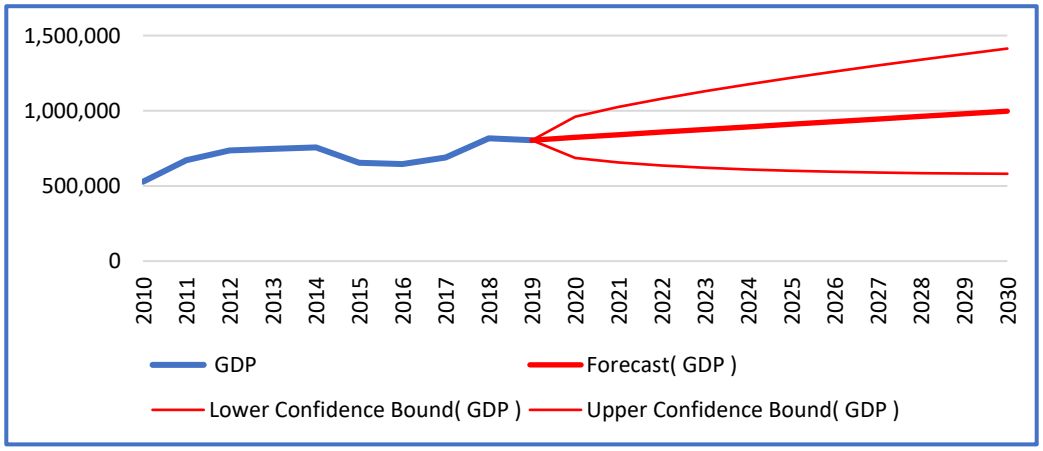


Figure 5. Predicting graph (GDP). Source: drawn by author. Number precision pointers: mean square error = 0.87; Alpha = 0.9; Gamma = 0.0; Beta = 0.0.

Figure 6 illustrates the forecasting graphs of CO_2; the blue and red portions show real CO_2 for the years from 2010 to 2020 and the predicted years from 2021 to 2030, respectively. The chart shows strength through the used of diverse forecasting pointers: Alpha, mean square error, Gamma, and Beta are equal to 1.00, 0.86, 0.0, and 0.0, respectively. Equally, the CO_2 growth rates are equivalent to 0.0197 and 0.0169 for the period 2010 to 2020 and for forecast period 2021 to 2030, respectively, leading to the conclusion that there was a decrease in CO_2 by (0.0169) during the forecast period.

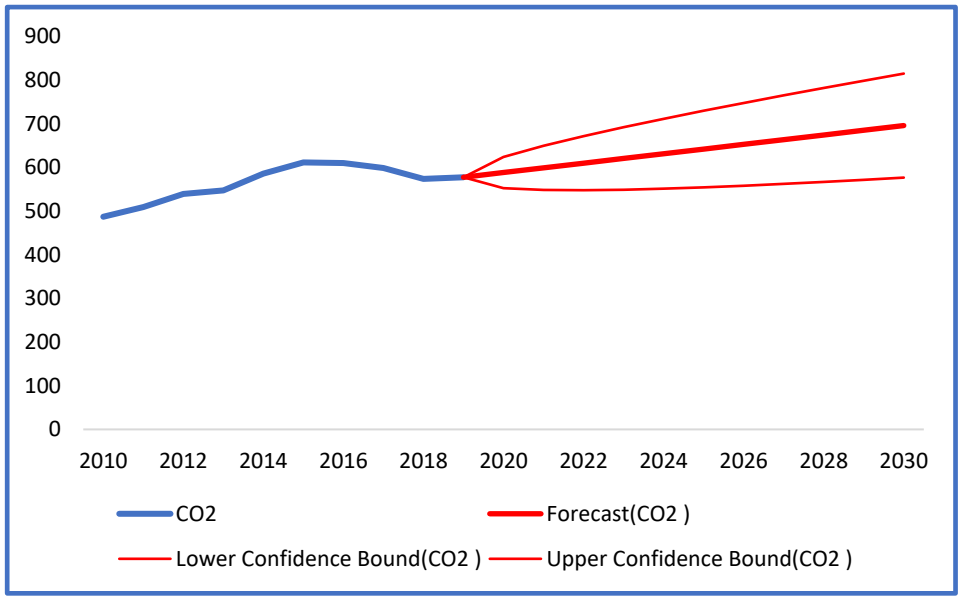


Figure 6. Predicting graph (CO_2). Source: drawn by author. Number precision pointers: mean square error = 0.86; alpha = 1.00; Gamma = 0.0; Beta = 0.0.

Table 18 shows the growth rate of tourism arrivals, the growth domestic product, and CO_2. The growth rates are increasing for tourism arrivals and growth domestic product from 2010–2020 to 2021–2030; meanwhile, those for CO_2 decrease during the forecasting period, leading to the conclusion that tourism activities should be conducted in a sustainable way. Also, the result of the decreasing growth rate of CO_2 may reflect a continuation in governmental efforts towards reducing CO_2 emissions. Previous studies have illustrated efforts to reduce CO_2 emissions [52].

Table 18. Growth rates of the variables.

Growth Rate / Variables	2010–2020	2021–2030 (Forecast Period)
Tourism arrivals	0.00019	0.0023
GDP	0.040	0.048
CO_2	0.0197	0.0169

Source: Data were collected (from sources mentioned in Table 1) and calculated.

4. Conclusions and Recommendations

The study assesses the association between tourism, economic growth (GDP), and the environment (CO_2 emission) in the KSA. Data were gathered from numerous sources for the period from 2010 to 2020. The outcomes from the ARDL bounds test indicated that there are long-term relationships between tourist arrivals and GDP and between tourist arrivals and CO_2 emissions. The DOLS and FMOLS model outcomes corroborated the outcomes of the ARDL model. With reference to the Granger causality test, tourist arrivals caused an increase in the GDP; this result supports the hypothesis of "tourism-led economic growth". No causality was found for the impact of tourist arrivals on CO_2 accumulation. This result may reflect governmental efforts in reducing CO_2 accumulation and/or the conducting of tourism activities in a sustainable way. The present study makes the following recommendations: economic growth that is compatible with the safety of the environment (reduction in CO_2 emissions) should be pursued; tourist arrivals should be increased in combination with performing tourism activities in sustainable way. The results predict that the growth rates of tourist arrivals, GDP, and CO_2 accumulation are 0.0023, 0.048, and 0.0169, respectively, during the forecast period (2021–2030); these growth rates appeared to increase for tourist arrivals and GDP and to decrease for CO_2 accumulation. The study recommended that, to increase economic growth, tourist arrivals should be increased in combination with the sustainable conduction of tourism activities. These findings highlight the benefits of governance in ensuring effective policies for decarbonizing the environment; policy proposals are put forward accordingly.

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References

1. Tiba, S.; Anis, O. Literature survey on the relationships between energy, environment and economic Growth. *Renew. Sustain. Energy Rev.* **2017**, *69*, 1129–1146. [CrossRef]
2. Talbi, B. CO_2 emissions reduction in road transport sector in Tunisia. *Renew. Sustain. Energy Rev.* **2017**, *69*, 232–238. [CrossRef]
3. Balli, E. The Nexus between tourism, environmental degradation and economic Growth. *Ege Acad. Rev.* **2021**, *21*, 149–161. [CrossRef]

4. Agboola, M.O.; Bekun, F.V.; Balsalobre-Lorente, D. Implications of social isolation in combating COVID-19 outbreak in Kingdom of Saudi Arabia: Its consequences on the carbon emissions reduction. *Sustainability* **2021**, *13*, 9476. [CrossRef]
5. León-Gómez, A.; Ruiz-Palomo, D.; Fernández-Gámez, M.A.; García-Revilla, M.R. Sustainable tourism development and economic growth: Bibliometric review and analysis. *Sustainability* **2021**, *13*, 2270. [CrossRef]
6. Trupp, A.; Dolezal, C. Tourism and the sustainable development goals in Southeast Asia. *Austrian J. S. East Asian Stud.* **2020**, *13*, 1–16. [CrossRef]
7. Farzanegan, M.R.; Gholipour, H.F.; Feizi, M.; Nunkoo, R.; Andargoli, A.E. International tourism and outbreak of coronavirus (COVID-19): A cross-country analysis. *J. Travel Res.* **2020**, *60*, 687–692. [CrossRef]
8. Niñerola, A.; Sánchez-Rebull, M.-V.; Hernández-Lara, A.-B. Tourism research on sustainability: A bibliometric analysis. *Sustainability* **2019**, *11*, 1377. [CrossRef]
9. World Tourism Organisation. *Indicators of Sustainable Development for Tourism Destinations. A Guidebook*; World Tourism Organisation: Madrid, Spain, 2004. Available online: https://tourisk.com/wp-content/uploads/2017/10/Indicators-for-Tourism-Development.pdf (accessed on 4 April 2023).
10. Liu, C.; Zhang, R.; Wang, M.; Xu, J. Measurement and prediction of regional tourism sustainability: An analysis of the Yangtze river economic zone, China. *Sustainability* **2018**, *10*, 1321. [CrossRef]
11. KSA Vision 2030. Strategic Objectives and Vision Realization Programs, Saudi Vision 2030. 2019. Available online: https://www.my.gov.sa/wps/portal/snp/content/saudivision/?lang=en (accessed on 12 November 2023).
12. Salma, S. Share of Travel and Tourism Contribution to GDP in Saudi Arabia 2015–2032. 2022. Available online: https://www.statista.com/statistics/750388/saudi-arabia-total-contribution-of-travel-and-tourism-to-to-gdp/ (accessed on 13 January 2024).
13. Shi, H.; Li, X.; Zhang, H.; Liu, X.; Li, T.; Zhong, Z. Global difference in the relationships between tourism, economic growth, CO_2 emissions, and primary energy consumption. *Curr. Issues Tour.* **2020**, *23*, 1122–1137. [CrossRef]
14. Leitão, N.C.; Lorente, D.B. The linkage between economic growth, renewable energy, tourism, CO_2 emissions, and international trade: The evidence for the European Union. *Energies* **2020**, *13*, 4838. [CrossRef]
15. Eyuboglu, S.; Eyuboglu, K. Tourism development and economic growth: An asymmetric panel causality test. *Curr. Issues Tour.* **2020**, *23*, 659–665. [CrossRef]
16. Mahadevan, R.; Suardi, S. Panel evidence on the impact of tourism growth on poverty, poverty gap and income inequality. *Curr. Issues Tour.* **2019**, *22*, 253–264. [CrossRef]
17. Zurub, H.H.; Ionescu, A.; Constantin, V.D. Measuring the economic impact of tourism in European emerging markets. *Procedia Econ. Financ.* **2015**, *32*, 95–102. [CrossRef]
18. Wu, T.P.; Wu, H.C. Tourism and economic growth in Asia: A bootstrap multivariate panel Granger causality. *Int. J. Tour. Res.* **2019**, *21*, 87–96. [CrossRef]
19. Sik, C.; Dogru, T.; Turk, E.S. A nexus of linear and non-linear relationships between tourism demand, renewable energy consumption, and economic growth: Theory and evidence. *Int. J. Tour. Res.* **2018**, *20*, 38–49. [CrossRef]
20. Akadiri, S.S.; Alola, A.A.; Uzuner, G. Economic policy uncertainty and tourism: Evidence from the heterogeneous panel. *Curr. Issues Tour.* **2020**, *23*, 2507–2514. [CrossRef]
21. Ahmad, F.; Draz, M.U.; Su, L.; Rauf, A. Taking the bad with the good: The nexus between tourism and environmental degradation in the lower middle-income Southeast Asian economies. *J. Clean. Prod.* **2019**, *233*, 1240–1249. [CrossRef]
22. Ștefănică, M.; Sandu, C.B.; Butnaru, G.I.; Haller, A.P. The nexus between tourism activities and environmental degradation: Romanian tourists' opinions. *Sustainability* **2021**, *13*, 9210. [CrossRef]
23. Majumdar, S.; Paris, C.M. Environmental impact of urbanization, bank credits, and energy use in the UAE—A tourism-induced EKC model. *Sustainability* **2022**, *14*, 7834. [CrossRef]
24. Rahman, M.M. Environmental degradation: The role of electricity consumption, economic growth and globalisation. *J. Environ. Manag.* **2020**, *253*, 109742. [CrossRef] [PubMed]
25. Kyrylov, Y.; Hranovska, V.; Boiko, V.; Kwilinski, A.; Boiko, L. International tourism development in the context of increasing globalization risks: On the example of Ukraine's integration into the global tourism industry. *J. Risk Financ. Manag.* **2020**, *13*, 303. [CrossRef]
26. Rauf, A.; Ozturk, I.; Ahmad, F.; Shehzad, K.; Chandiao, A.A.; Irfan, M.; Abid, S.; Jinkai, L. Do tourism development, energy consumption and transportation demolish sustainable environments? Evidence from Chinese provinces. *Sustainability* **2021**, *13*, 12361. [CrossRef]
27. Chen, L.; Thapa, B.; Yan, W. The relationship between tourism, carbon dioxide emissions, and economic growth in the Yangtze River Delta, China. *Sustainability* **2018**, *10*, 2118. [CrossRef]
28. Satrovic, E.; Adedoyin, F.F. The role of energy transition and international tourism in mitigating environmental deg-radation: Evidence from SEE countries. *Energies* **2023**, *16*, 1002. [CrossRef]
29. Nepal, R.; Al Irsyad, M.I.; Nepal, S.K. Tourist arrivals, energy consumption and pollutant emissions in a developing economy–implications for sustainable tourism. *Tour. Manag.* **2019**, *72*, 145–154. [CrossRef]
30. Sharif, A.; Afshan, S.; Nisha, N. Impact of tourism on CO_2 emission: Evidence from Pakistan. *Asia Pac. J. Tour. Res.* **2017**, *22*, 408–421. [CrossRef]
31. Işik, C.; Kasımatı, E.; Ongan, S. Analyzing the causalities between economic growth, financial development, international trade, tourism expenditure and/on the CO_2 emissions in Greece. *Energy Sources Part B Econ. Plan. Policy* **2017**, *12*, 665–673. [CrossRef]

32. Shakouri, B.; Khoshnevis Yazdi, S.; Ghorchebigi, E. Does tourism development promote CO_2 emissions? *Anatolia* **2017**, *28*, 444–452. [CrossRef]
33. Balsalobre-Lorente, D.; Gokmenoglu, K.K.; Taspinar, N.; Cantos-Cantos, J.M. An approach to the pollution haven and pollution halo hypotheses in MINT countries. *Environ. Sci. Pollut. Res.* **2019**, *26*, 23010–23026. [CrossRef]
34. Jebli, M.B.M.; Youssef, S.B.S.; Apergis, N. The dynamic linkage between renewable energy, tourism, CO_2 emissions, economic growth, foreign direct investment, and trade. *Lat. Am. Econ. Rev.* **2019**, *28*, 2. [CrossRef]
35. Ozturk, I.; Aslan, A.; Altinoz, B. Investigating the Nexus between CO_2 Emissions, Economic Growth, Energy Consumption and Pilgrimage Tourism in Saudi Arabia. *Econ. Res. Ekon. Istraživanja* **2021**, *35*, 3083–3098. [CrossRef]
36. Ghobadi, G.J.; Verdian, M.S. The Environmental Effects of Tourism Development in Noushahr. *Open J. Ecol.* **2016**, *6*, 529–536. [CrossRef]
37. El Menyari, Y. The Effects of International Tourism, Electricity Consumption, and Economic Growth on CO_2 Emissions in North Africa. *Environ. Sci. Pollut. Res.* **2021**, *28*, 44028–44038. [CrossRef] [PubMed]
38. Sekrafi, H. International Tourism, Growth and Environmental Quality: The Case of Three North African Countries. *Eur. J. Volunt. Community-Based Proj.* **2021**, *1*, 22–36. [CrossRef]
39. Katirciŏglu, S.T.; Feridun, M.; Kilinc, C. Estimating Tourism-Induced Energy Consumption and CO_2 Emissions: The Case of Cyprus. Renew. Sustain. *Energy Rev.* **2014**, *29*, 634–640. [CrossRef]
40. Katirciŏglu, S.T. Testing the Tourism-Induced EKC Hypothesis: The Case of Singapore. *Econ. Model.* **2014**, *41*, 383–391. [CrossRef]
41. Kuznets, S. Economic Growth and Income Inequality. *Am. Econ. Rev.* **1955**, *45*, 1–28.
42. Grossman, G.M.; Krueger, A.B. Economic Growth and the Environment. *Q. J. Econ.* **1995**, *110*, 353–377. [CrossRef]
43. Bella, G. Estimating the Tourism Induced Environmental Kuznets Curve in France. *J. Sustain. Tour.* **2018**, *26*, 2043–2052. [CrossRef]
44. Katircioglu, S.T. International Tourism, Energy Consumption, and Environmental Pollution: The Case of Turkey. *Renew. Sustain. Energy Rev.* **2014**, *36*, 180–187. [CrossRef]
45. Lee, J.W.; Brahmasrene, T. Investigating the Influence of Tourism on Economic Growth and Carbon Emissions: Evidence from Panel Analysis of the European Union. *Tour. Manag.* **2013**, *38*, 69–76. [CrossRef]
46. Tang, C.; Zhong, L.; Ng, P. Factors that influence the tourism industry's carbon emissions: A tourism area life cycle model perspective. *Energy Policy* **2017**, *109*, 704–718. [CrossRef]
47. Gössling, S.; Lund-Durlacher, D. Tourist accommodation, climate change and mitigation: An assessment for Austria. *J. Outdoor Recreat. Tour.* **2021**, *34*, 100367. [CrossRef]
48. Neger, C.; Prettenthaler, F.; Gössling, S.; Damm, A. Carbon intensity of tourism in Austria: Estimates and policy implications. *J. Outdoor Recreat. Tour.* **2021**, *33*, 100331. [CrossRef]
49. Li, L.; Li, J.; Tang, L.; Wang, S. Balancing tourism's economic benefit and CO_2 emissions: An insight from input–output and tourism satellite account analysis. *Sustainability* **2019**, *11*, 1052. [CrossRef]
50. Nagaj, R.; Žuromskaitė, B. Tourism in the Era of Covid-19 and Its Impact on the Environment. *Energies* **2021**, *14*, 2000. [CrossRef]
51. Dickey, D.A.; Fuller, W.A. Distribution of the estimators for autoregressive time series with a unit root. *J. Am. Stat. Assoc.* **1979**, *74*, 427–431. [CrossRef]
52. Emam, A. Present and Future: Does agriculture affect economic Growth and environment in the Kingdom of Saudi Arabia? *J. Agric. Econ. Czech Acad. Agric. Sci.* **2022**, *68*, 361–370. [CrossRef]
53. Pesaran, M.H.; Pesaran, B. *Working with Microfit 4.0: Interactive Econometric Analysis*; Oxford University Press: Oxford, UK, 1997. Available online: https://cir.nii.ac.jp/crid/1130282270030044416 (accessed on 28 May 2023).
54. Pesaran, M.H.; Shin, Y.; Smith, R.J. Bounds testing approaches to the analysis of level relationships. *J. Appl. Econom.* **2001**, *16*, 289–326. [CrossRef]
55. Ahmad, N.; Du, L.; Lu, J.; Wang, J.; Li, H.Z.; Hashmi, M.Z. Modelling the CO_2 emissions and economic growth in Croatia: Is there any environmental Kuznets curve? *Energy* **2017**, *123*, 164–172. [CrossRef]
56. Venujayakanth, B.; Dudhat, A.S.; Swaminathan, B.; Ardeshana, N.J. Price integration analysis of major groundnut domestic markets in India. *Econ. Aff.* **2017**, *62*, 233–241. [CrossRef]
57. Ivascu, L.; Sarfraz, M.; Mohsin, M.; Naseem, S.; Ozturk, I. The causes of occupational accidents and injuries in Romanian firms: An application of the Johansen cointegration and Granger causality test. *Int. J. Environ. Res. Public Health* **2021**, *18*, 7634. [CrossRef]
58. Belloumi, M. Energy consumption and GDP in Tunisia: Cointegration and causality analysis. *Energy Policy* **2009**, *37*, 2745–2753. [CrossRef]
59. Ali, M.B. Co integrating relation between macroeconomic variables and stock return: Evidence from Dhaka Stock Exchange (DSE). *IJESPG Int. J. Eng. Econ. Soc. Politic Gov.* **2023**, *1*, 1–14. [CrossRef]
60. Mohsin, M.; Naiwen, L.; Zia-UR-Rehman, M.; Naseem, S.; Baig, S.A. The volatility of bank stock prices and macroeconomic fundamentals in the Pakistani context: An application of GARCH and EGARCH models. *Oeconomia Copernic.* **2020**, *11*, 609–636. Available online: https://www.ceeol.com/search/article-detail?id=992262 (accessed on 9 December 2023). [CrossRef]
61. Emam, A. Saudi fertilizers and their impact on global food security: Present and future. *Sustainability* **2023**, *15*, 7614. [CrossRef]
62. Zhai, X.; Geng, Z.; Zhang, X. Two-stage dynamic test of the determinants of the long-run decline of China's monetary velocity. *Chin. Econ.* **2013**, *46*, 23–40. [CrossRef]

63. Agyeman, F.O.; Zhiqiang, M.; Li, M.; Sampene, A.K.; Dapaah, M.F.; Kedjanyi, E.A.G.; Buabeng, P.; Li, Y.; Hakro, S.; Heydari, M. Probing the effect of governance of tourism development, economic growth, and foreign direct investment on carbon dioxide emissions in Africa: The African experience. *Energies* **2022**, *15*, 4530. [CrossRef]
64. Doğan, N. The impact of agriculture on CO_2 emissions in China. *Panoeconomicus* **2019**, *66*, 257–271. [CrossRef]
65. Naseem, S. The role of tourism in economic growth: Empirical evidence from Saudi Arabia. *Economies* **2021**, *9*, 117. [CrossRef]
66. Qureshi, M.I.; Hassan, M.A.; Hishan, S.S.; Rasli, A.M.; Zaman, K. Dynamic linkages between sustainable tourism, energy, health and wealth: Evidence from top 80 international tourist destination cities in 37 countries. *J. Clean. Prod.* **2017**, *158*, 143–155. [CrossRef]

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