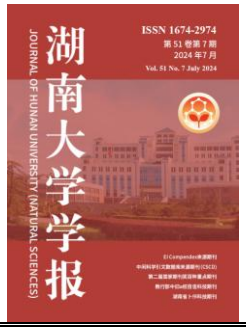

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Tourism Growth Dynamics and Their Impact on the Economy and Carbon Emissions in Asia: A Review of High-Income Countries

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Abstract: Asia, home to 60% of the world's population, is renowned for its stunning landscapes, diverse cultures, rich historical heritage, and delectable cuisine, all of which contribute significantly to the region's booming tourism industry and economic growth. However, the rise in tourism also escalates energy consumption, particularly fossil fuel use, leading to long-term increases in surface temperatures due to carbon dioxide (CO2) emissions. This study empirically examines the impact of tourism growth dynamics on the economy and carbon emissions in 10 high-income Asian countries using panel data analysis. The period from 2009 to 2019 was chosen to capture the normal state of the global tourism sector. Employing a more efficient panel econometric technique, seemingly unrelated regression (SUR), which is applicable when there is correlation among the error terms in the models used, the study achieves its objectives. The first equation indicates that tourism positively and significantly affects the economy. Meanwhile, the second equation reveals that tourism significantly contributes to increased CO2 emissions in high-income Asian countries. Although tourism generally boosts the economy, the travel characteristics of Asia necessitate greater focus on environmental quality mitigation and adaptation before sustainable tourism can be established.

Keywords: tourism, economy, carbon emissions, high income, seemingly unrelated regression.

旅游业增长动态及其对亚洲经济和碳排放的影响：高收入国家的回顾

摘要：亚洲拥有世界 60%的人口，以其壮丽的风景、多元的文化、丰富的历史遗产和美味的美食而闻名，所有这些都为该地区蓬勃发展的旅游业和经济增长做出了重大贡献。然而，旅游业的兴起也增加了能源消耗，特别是化石燃料的使用，导致地表温度因二氧化碳(CO2)排放而长期升高。本研究使用面板数据分析，实证检验了旅游业增长动态对 10 个高收入亚洲国家的经济和碳排放的影响。选择 2009 年至 2019 年期间来捕捉全球旅游业的正常状态。采用更有效的面板计量经济学技术，看似不相关的回归(SUR)，当所用模型中的误差项之间存在相关性时适用，该研究实现了其目标。第一个方程表明旅游业对经济产生了积极而显着的影响。同时，第二个方程表明旅游业对高收入亚洲国家的二氧化碳排放量增加有显著贡献。尽管旅游业通常能够促进经济发展，但亚洲的旅游特点要求在建立可持续旅游业之前更加注重环境质量的缓解和适应。

关键词：旅游业、经济、碳排放、高收入、看似不相关的回归。

1. Introduction

Tourism has evolved into a crucial and integral component of development plans, aiding both developed and developing countries in their growth and contributing positively to the expansion of the global economy [1-3]. In other words, international tourism is viewed as a tool for achieving social and economic improvements as well as the redistribution of power and wealth necessary for such advancements. Tourism impacts the economy through various channels, including increased income, foreign exchange reserves, and job creation [4]. The travel and tourism industry is the largest service sector in international trade [5]. According to the World Travel and Tourism Council's 2019 report, this industry contributed approximately 10.4% of the global GDP, or US$8.9 trillion, to the global economy in 2019 and employed around 330 million people worldwide, which is approximately one in ten jobs.

The process of globalization has had a significant impact on the Triple-T fields of Transportation, Telecommunications, and Travel/Tourism, enabling long-distance travel, such as inter-country and intercontinental trips, to be conducted with high levels of safety, comfort, and quality. The advent of this technology has given rise to the phenomenon of "long-distance mass travel," which in turn has made global mass tourism a rapidly expanding industry. This has led to a dramatic increase in global population mobility, effectively following an exponential trend [6].

The rapid mobilization of tourists around the world is closely linked to technological advancements, particularly in transportation. Although the tourism industry has thus far proven beneficial to the economy, it has also intentionally inflicted negative environmental impacts such as increased carbon emissions from visitors' energy use for accommodation, transportation, and recreation [57]. It is estimated that 75% of the sector's emissions are related to transportation (with 50% from air travel), 22% from accommodation, and the remaining 4% from tourism-related activities.

Geographically, the United Nations divides Asia into six regions: Northern Asia, Southern Asia, Eastern Asia, Western Asia, South-eastern Asia, and Central Asia. With 60% of the world's population residing in this region, tourism has emerged as a major driver of employment and economic growth in many countries in this region, particularly in East, Southeast, and South Asia [7]. Modernization and rapid economic growth have made Asia a significant contributor to the rise in carbon emissions, accounting for 53% of the global emissions [8]. Since the Djerba Declaration on tourism and climate change in 2003, 8% of the world's greenhouse gas emissions have been attributed to tourism [9].

The main objective of this paper is to test the hypothesis that tourism has a positive effect on the economy and CO2 emissions of 10 high-income Asian countries. The contributions of this study to the literature are as follows: First, the sample countries, which include popular high-income tourist destinations in Western, Eastern, and Southeastern Asia, enhance and advance previous research by adopting an econometric technique rarely used in the literature on tourism CO2 emissions, SUR [10]. This technique is more efficient when there is a correlation between errors in the regression models because the parameters are estimated using the generalized least squares (GLS).

Tourism development is usually accompanied by the emergence of externalities in tourist destination areas' economic and environmental fields. Therefore, understanding the impact and its relationships is essential. A nation's economy benefits from tourism in several ways, including increased foreign exchange, job creation, and revenue. However, in the process, it turns out that tourism also harms the environment and contributes to climate change because of the CO2 emissions it produces. As a result, we divide our literature assessment into two sections: Tourism and Economic Growth and Tourism and CO2 Emissions.

Increased community and government income is one of the positive impacts of tourism industry activities, where spending and income in this sector encourage growth and development in other sectors. As one of the fundamental aspects of tourism is its relationship with other sectors, the development and improvement of tourism impact development in other areas [11].

Tourism is an integral part of economic growth. According to Robert Solow's neoclassical growth theory, the determinants of economic growth include labor, capital, and technological factors [12]. This model posits that technological development is the primary factor enabling a country to achieve economic growth. Tourism is also an effective source of employment and income. Given the substantial contribution of global tourism to GDP and employment, as well as its role as a major source of income and employment for many countries or destinations, Jenkins [13] identifies several reasons to emphasize tourism attraction as a development option: 1) tourism as a means of redistributing wealth; 2) the absence of trade barriers in tourism; 3) the utilization of natural infrastructure provided for free.

The association between tourism and economic expansion has been extensively studied in the literature.

To determine the causal relationship between tourism and economic growth, Paramati et al. [14] categorized the literature into four groups: a) tourism drives economic growth; b) the economy drives tourism growth; c) there is a feedback relationship between tourism and economic growth; and d) there is no causal relationship between tourism and economic growth.

Tourism-driven economic growth demonstrates how the dynamics of the tourism industry positively influence economic growth, indicating a sustained positive correlation between increased tourism and economic expansion. This relationship has been confirmed in numerous studies, including [14] in developed and developing countries, [15] in Malaysia, [16] in Tunisia, [17] in Jordan, [18] in the European Union, [19] in the Middle East and North Africa, [20] in 144 countries, [21] in Cyprus, and [22] in Spain.

Economic growth drives tourism, suggesting that an expanding economy can boost tourism earnings. Accelerated economic expansion, infrastructure development, education, and security can attract more foreign visitors. Empirical support for this view has been provided by studies such as [23] in South Korea, [24] in the United States, and [25] in Croatia.

The mutually beneficial relationship, or feedback cycle, between tourism and economic expansion implies that both influence each other. Studies supporting this include [26] in 19 island nations, [27] in Albania, Croatia, and Greece, [28] in Turkey, and [29] in Mediterranean countries. Conversely, some studies, such as [30] in Turkey, [31] in Brazil, and [32] in Greece, suggest a non-causal link, indicating that tourism does not affect economic growth and vice versa.

Sustainable tourism must be the foundation of the development of the tourism industry because the primary resource is the natural environment. Additionally, there is pressure on governments to support sustainability and take positive actions because of increasing concerns about environmental damage from tourists, residents, and businesses. For sustainable tourism development, it is essential to recognize the causative factors and impacts as the tourism industry inevitably affects the economic, social, and environmental aspects of tourist destinations.

Since the late 20th century, the international community has been facing the threat of global warming [33]. Global warming is largely driven by greenhouse gases, with 60% attributed to CO2 emissions [34, 35]. According to a report from Nature Climate, global tourism contributed approximately 8% of global greenhouse gas emissions. While tourism development contributes positively to the economy, it negatively impacts other sectors. Various studies have indicated that the expansion of the tourism industry creates negative externalities, leading to increased atmospheric pollution [21, 56]. The increase in global temperatures is a long-term effect of increased greenhouse gas volumes in the atmosphere.

Transportation plays a direct role in tourism activities and heavily relies on infrastructure services, including roads, railways, airports, and ports. The development of such infrastructure inevitably impacts the environment and ecology. The amount of carbon emissions generated by the tourism sector is a crucial indicator for analyzing the industry's environmental impact. Tourism and related activities contribute significantly to CO2 emissions [14, 36]. Gössling and Hall [37] demonstrated that the impact of global environmental changes has experienced a significant shift, particularly climate change, which has substantially affected various natural tourist destinations such as mountain regions, coastal areas, and lakes. Additionally, tourists often prefer to use private vehicles, which exacerbates environmental damage [58].

Martín-Cejas and Sánchez [38] reported that environmental changes can occur due to the construction of hotels and tourist attractions in regions such as Lanzarote, Spain. Scholars, such as Becken and Patterson [39], Gössling et al. [40], and Kelly et al. [41], have paid considerable attention to this topic. Both direct and indirect CO2 emissions from tourism have been evaluated by researchers [42-45]. Studies have examined the relationship between tourism and environmental degradation [46-53]. The findings indicate that tourism development positively influences carbon emissions.

2. Materials and Methods

This research aims to evaluate the impact of tourism on economic growth and CO2 emissions in high-income Asian nations. Due to their ease of access, high security, and developed infrastructure, high-income countries are indeed preferred as tourist destinations, notably Brunei Darussalam, Bahrain, Hong Kong, Japan, South Korea, Singapore, Saudi Arabia, Kuwait, Cyprus, and Israel. The following countries are both high-income countries and major tourist destinations in Southeast Asia, East Asia, and West Asia. Central and South Asia were excluded from the analysis because most of the countries are in the middle-income range. The datasets for these nations were acquired from the World Bank for the study period between 2009 and 2019. The study period was restricted to 2019 to examine the impact of tourism-related factors and other variables before the global lockdown resulting from the COVID-19 pandemic.

We developed two models by applying existing theoretical approaches to achieve the research objectives. The first is the neo-classical growth model. This equation assumes a neoclassical production function to investigate the relationship between economic output, capital, labor, technology, and tourism. This model intends to determine tourism's impact on economic production while accounting for

other potential growth parameters such as capital, labor, and technology.

$$GDPit = f\,(TR_{it}, LF_{it}, GFCF_{it}, Ti_{it}, vi) \quad (1)$$

GDP is economic output at constant prices, TR is international tourism receipts, LF is total labor force, GFCF is nominal gross fixed capital formation, and IT is total Internet users.

Second, we apply Ehrlich and Holdren's IPAT (1970) (Impact, Population, Affluence, and Technology) model to analyze how tourism affects CO2 emissions to identify the drivers of environmental impact. Dietz and Rosa refined this basic model (1994, 1997) into the STIRPAT (Stochastic Estimate of Impact by Regression on Population, Affluence, and Technology) model, as shown in the equation below:

$$CO2_{it} = f\,(POP_{it}, TR_{it}, IND_{it}, SRV_{it}, TI_{it}\, vi) \quad (2)$$

2.1. Estimation Technique

To examine the impact of tourism on the economy and CO2 emissions, we employed panel data analysis combined with a SUR approach. It is often found that the errors between different regression models are correlated, so estimation using OLS becomes inefficient. One way to overcome this problem is the SUR method, which estimates parameters using the GLS.

The SUR model with $\boldsymbol{M}$ dependent variables is as follows:

$$\boldsymbol{Yi} = \boldsymbol{Xi\beta i} + \boldsymbol{\varepsilon}\ ; = \mathbf{1},\mathbf{2}, \ldots, \boldsymbol{M} \quad (3)$$

Alternatively, it can be written in matrix form as follows:

$$\begin{bmatrix} Y_1 \\ Y_2 \\ \vdots \\ Y_M \end{bmatrix} = \begin{bmatrix} X_1 & 0 & \cdots & 0 \\ 0 & X_2 & \cdots & 0 \\ \vdots & \vdots & \ddots & \vdots \\ 0 & 0 & \cdots & X_M \end{bmatrix} \begin{bmatrix} \beta_1 \\ \beta_2 \\ \vdots \\ \beta_M \end{bmatrix} + \begin{bmatrix} \varepsilon_1 \\ \varepsilon_2 \\ \vdots \\ \varepsilon_M \end{bmatrix}$$

In this equation, $\boldsymbol{M}$ represents the number of dependent variables, $\boldsymbol{N}$ represents the number of observations, and $\boldsymbol{Y}$ represents the dependent variable observation vector ($MN \times 1$), $\boldsymbol{X}$ denotes the independent variable matrix of size ($MN \times k$), $\boldsymbol{\beta}$ denotes the independent variable coefficient vector of size ($k \times 1$), and ε denotes the error vector of size ($MN \times 1$).

2.2. Contemporaneous Correlation Test

Contemporaneous correlation measures the relationship between the errors of $\boldsymbol{M}$ different equations simultaneously [59]. The SUR test can be performed if the errors between different equations are correlated, or, in other words, there is a contemporaneous correlation between the components of $\boldsymbol{\varepsilon}$. Testing for the correlation of richness can be performed using the Lagrange multiplier test statistic, with the following hypothesis:

H0: sij = 0 (There is no contemporaneous correlation.)

H1: At least one *sij* ≠ 0 (There is a contemporaneous correlation.)

The formula used for the Lagrange multiplier test is:

$$\lambda = n \sum_{i=2}^{p} \sum_{j=1,}^{i-1} r_{ij}^2$$

where $r_{ij}^2 = \frac{\sigma_{ij}^2}{\sigma_{ii}\sigma_{jj}}$ states the correlation between the i-th equation and the j-th equation. The free-degree distribution of the Lagrange multiplier test is $X^2\left(p\left(\frac{p-1}{2}\right), \alpha\right)$ so that if $\lambda > X^2$ at the 5% significance level; then, we reject the hypothesis *H*0 so that the conclusion is that there is a contemporaneous correlation.

In testing this SUR model, a contemporaneous correlation is needed. The contemporaneous correlation measures the relationship between the errors of $\boldsymbol{M}$ different equations simultaneously. The SUR test can be performed if the errors between different equations are correlated, or, in other words, there is a contemporaneous correlation between the components of $\boldsymbol{\varepsilon}$i.

2.3. Nature of Data and Measurement

The variables utilized in this study were measured as follows: CO2 emissions per capita are presented in metric tons; GDP represents the nominal GDP value at constant prices in US dollars; GFCF stands for gross fixed capital formation in current US dollars. TR is the total revenue from international tourism in US dollars; IND is the industry value added as a proportion of GDP; POP is the total population in millions, SER is the value added of the service sector as a percentage of GDP, and IT is the number of internet users in the population. The time series data provided are from the World Development Indicator (2023), a World Bank-provided online database.

The challenge of the data series' distributional nature was circumvented by transforming the nominal data into logarithmic form to normalize the data series into comparable measurements. Furthermore, the calculated coefficients can be recognized as elasticities; thus, the recommended method is to convert the data to a logarithmic format.

3. Results and Discussion

In this section, we explain the results obtained using the econometric techniques and the underlying reasons. First, we present the descriptive statistical analysis results. Then, we use the least squares method to obtain the residuals from each equation and subsequently use these residuals in the regression equations to estimate the variance-covariance matrix. Next, we perform the Lagrange multiplier test to detect autocorrelation. If there is evidence of autocorrelation between the residuals of different equations, we interpret the model using the SUR method to examine the impact of tourism on the economy and CO2 emissions in high-income Asian countries. The empirical results of this model are presented and discussed in the following section.

3.1. Descriptive Statistics

The number of observations in this study is 110, consisting of 10 cross-sectional units (countries) and 11 time series units from 2009 to 2019. According to Table 1, containing the findings of the descriptive statistical analysis, the average GDP variable has a value of 26.01592. The maximum value of this variable is 29.15332, and the minimum value is 23.25775. The standard deviation value is 1.792554.

Table 1 Descriptive statistics (Secondary data processed, 2023)

	Mean	Median	Maximum	Minimum	Std. Dev.
LOG(GDP)	26.016	26.375	29.153	23.257	1.79
LOG(TR)	22.398	22.809	24.619	18.185	1.67
LOG(LF)	15.051	15.063	18.050	12.162	1.69
LOG(GFCF)	24.795	24.98	28.030	21.356	1.88
LOG(POP)	78.443	80.902	99.702	38	14.28
TI	12.691	9.9084	27.424	5.5080	6.14
CO_2	15.710	15.758	18.668	12.874	1.72
IND	34.985	28.979	74.812	6.2551	20.15
SRV	61.131	66.845	91.922	27.357	16.22

Using the coefficient of variation (CV = SD/mean.100), which is calculated as the percentage between the standard deviation and the mean, we examined the level of variability and representativeness of the mean for the series under study. Descriptive statistical analysis revealed that the variables GDP, TR, LF, GFCF, Population, CO2, and Services have correlation coefficient values of 6.89, 7.48, 11.28, 7.62, 18.2, 10.95, and 26.53, respectively, which can be considered to have low variation; thus, the average values as stated in the table are said to be reasonably representative and consistent for the data on these variables.

3.2. Contemporaneous Correlation Test

The initial step involves conducting a regression analysis using the least squares method to generate the regression model depicted in Table 2 and represented by the following equation.

Table 2 OLS model estimation (Secondary data processed, 2023)

	Coefficient	Std. Error
Log(GDP)	6.393	0.361
Log(TR)	0.058	0.016
Log(LF)	0.599	0.035
Log(GFCF)	0.377	0.029
TI	-0.00067	0.001
CO_2	-18.84	7.019
Log(POP)	-0.968	0.285
Log(TR)	0.783	0.393
IND	0.426	0.042
SRV	0.169	0.050
TI	0.049	0.018

Log(GDP) = 6.393 + 0.058 Log(TR) + 0.599 Log(LF) + 0.377 Log(GFCF) - 0.0007 TI

CO2 = -18.83 – 0.968 Log(POP) + 0.783 Log(TR) + 0.426 IND + 0.169 SRV + 0.049 TI

After obtaining the linear regression equation using the least squares method, the error in the above equation is used to estimate the covariance variance σij:

$$\begin{bmatrix} 0.0320145 & -0.2448924 \\ -0.2448924 & 6.5029483 \end{bmatrix}$$

Furthermore, the Lagrange Multiplier test can be performed to determine the contemporaneous correlation. By using the formula rumus λ=n∑_(i=2)^p▒∑_(j=1)^(i-1)▒r_ij^2, with r_ij^2=(σ_ij^2)/(σ_ii σ_jj), the value of λ = 31.68 is obtained. H0 states that all covariances are zero, or, in other words, there is no contemporaneous correlation. At a significance level of α = 5%, the decision to reject H0 could be made because the correlation between the errors in each equation was determined because the value of λ is greater than the value of X2 (1;0.05), which is 3.841. This provides a foundation for applying the feasible GLS approach to the SUR model.

3.3. SUR Model

The estimation results using the FGLS method for the SUR model are presented in Table 3. From these results, it is possible to construct the following equation (***, **, and * indicate the statistical significance of 1, 5, and 10 percent, respectively):

Log(GDP) = 6.75 + 0.0548*** Log(TR) + 0.64*** Log(LF) + 0.34*** Log(GFCF) - 0.0007 TI

CO2 = -35.67- 1.2094*** Log(POP) + 1.1649*** Log(TR) + 0.553*** IND + 0.305*** SRV + 0.041*** TI

Table 3 SUR model estimation (Secondary data processed, 2023)

	Coefficient	Std. Error
Log(GDP)	6.7507	0.322
Log(TR)	0.0548	0.016
Log(LF)	0.6412	0.030
Log(GFCF)	0.3407	0.024
TI	-0.0007	0.001
CO_2	-35.677	6.046
Log(POP)	-1.2094	0.261
Log(TR)	1.1649	0.345
IND	0.5529	0.034
SRV	0.3055	0.041
TI	0.0411	0.018

As a result, the coefficient estimates from the SUR equation model can be interpreted as long-term elasticities. In this study, all variables with large nominal values, such as GDP, TR, LF, POP, and GFCF,

are converted into natural logarithms before the econometric model is performed. Other variables, such as CO2, are measured in metric tons per capita, whereas the statistics for IND, SRV, and TI are presented as percentages.

Hypothesis 1: Tourism Positively Affects the Economy of High-Income Asian Countries

The first equation shows that a 1% increase in tourism will increase GDP by 0.05% in high-income Asian countries. The estimation results indicate that tourism, labor force, and GFCF contribute positively and significantly to the economy in Asia. In contrast, technology has a negative but insignificant influence on the economy in Asia.

The results highlight the importance of tourism in driving the economy in Asia, especially in high-income countries. The growth of tourism in Asia, particularly in Western, Eastern, and South-eastern Asia, is due to the advancement of infrastructure, the implementation of proactive tourism policies, unique cultural and historical exhibitions, ease of access, and a strong economy that encourages travel and attracts foreign investment. Additionally, achieving security and stability in these countries has created a climate conducive to tourism. The findings of this study confirm the body of research showing that foreign travel accelerates economic expansion across entire countries. This is primarily because tourism has a significant impact on raising income levels and creating jobs.

Hypothesis 2: Tourism Positively Affects CO2 Emissions in High-Income Asian Countries

According to Equation 2, in high-income Asian Countries, a 1% increase in tourism will result in a 1.165% rise in CO2 emissions. There is an ongoing discussion about whether the current economic system has implemented sufficient policies to support sustainable tourism, reflecting the growing concern among stakeholders, governments, and the general public about environmental degradation caused by tourism activities.

The estimation results suggest that the major industries supporting tourism, including industrialization, the service sector, and the use of technology, contribute significantly to the rise in CO2 emissions in high-income Asian countries. Tourism has been linked to an increase in greenhouse gas emissions, particularly CO2, which plays a major role in climate change [54]. Travelers' arrivals in a region tend to promote GDP growth but can also lead to environmental damage, including higher CO2 emissions from transportation [55]. The acceleration of environmental deterioration is a direct result of the economic prosperity generated by tourism. This is mainly because an increasing number of people's wants are being satisfied through development projects and increased consumption, both of which raise pollution and waste levels.

Existing literature shows that the main contributors to CO2 emissions in the tourism sector are as follows:

1. *Transportation:* using airplanes, cars, cruise ships, and other vehicles to reach tourist destinations.
2. *Energy demand:* Tourism infrastructure, such as hotels, resorts, and shopping centers, requires energy from fossil fuels.
3. *Construction:* The development of new tourist destinations or the expansion of tourism infrastructure can result in land use changes, disruption of natural ecosystems, and carbon release.

However, population has an inverse effect on CO2 emissions in Asia. This trend can be attributed to several factors: slowing population growth, declining birth rates, and differences in demographic patterns. Countries with rapid urbanization and high economic development tend to experience these trends, which can reduce per capita energy consumption and CO2 emissions in the long run.

4. Conclusions

This study uses a multivariate framework on panel datasets from high-income Asian countries to evaluate the impact of tourism dynamics on the economy and carbon emissions. The datasets include annual GDP, CO2 emissions, tourism, labor force, capital investments, internet technology usage, population, and the value added by the industrial and service sectors from 2009 to 2019. The findings of this study are crucial for understanding the relationships between tourism, the economy, CO2 emissions, and other control variables. Specifically, the results indicate that the economies of high-income Asian countries are significantly influenced by tourism. Furthermore, the findings reveal that the tourism sector contributes positively to the increase in CO2 emissions in high-income Asian countries, particularly in Western, Eastern, and Southeast Asia.

Ultimately, the results of this study provide important policymaking insights. Policymakers in these regions need to develop environmentally friendly tourism, which involves investing in sustainable transportation, such as efficient public transport, and using renewable and efficient energy technologies in accommodations and tourism facilities. Additionally, it is essential to promote eco-friendly tourism and ensure that destination planning focuses on sustainability. Strict environmental policies and rigorous oversight of tourism industry operations should be implemented. Education and awareness regarding environmental responsibility should be a vital part of tourist experiences, and international collaboration and support for research and innovation can bolster these efforts. By doing so, countries can mitigate the environmental impact of tourism while maintaining sustainable economic growth and preserving the beauty

of their tourist destinations.

The study period is limited to 2019, which restricts the assessment of how the tourism industry impacts economic and environmental growth. To obtain more in-depth and comprehensive results, comparisons between normal conditions and the COVID-19 pandemic period could be made. This provides a contrast between two opposing conditions in terms of economic growth and environmental impact. From this analysis, better economic and environmental mitigation policies can be developed to address the prevailing conditions.

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