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Revisiting the Dynamics of Tourism, Economic Growth, and Environmental Pollutants in the Emerging Economies—Sustainable Tourism Policy Implications

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Abstract: Tourism contributions to economic growth and well-being have been widely acknowledged; however, its impacts on the environment demand an integrated approach to policy improvement across institutions in the emerging economies for the development of sustainable tourism practices. This study investigates the causal relationship between tourism, economic growth (GDP, capital investment), energy consumption, and environmental pollutants in developing economies, explicitly focusing on the case of Pakistan. Various econometric procedures and techniques were applied to test the proposed hypotheses. The findings suggest that economic growth support tourism development. Tourists' arrivals have a significant positive impact on energy consumption, capital investment, and CO_2 emissions; besides, environmental pollutant (CO_2) causes negative effects on tourism. The results suggest that a 1 unit increase in tourism increases CO_2 emissions metric tons per capita by 0.26 units in the long-run. A 1 unit increase in capital investment increases CO_2 emissions metric tons per capita by 0.21 units, and a 1 unit increase in energy consumption increases CO_2 emissions metric tons per capita by 0.51 units in the long-run. In the short-run, a 1 unit increase in tourism, capital investment, and energy consumption rises CO_2 emissions metric tons per capita by 0.045, 0.04, and 0.08 units, respectively. Sustainable tourism remains a sole option in developing economies to enhance the competitiveness of tourism as a tool for friendly developments. Thus, tourism policies are needed to be integrated with overall economic, environmental, and energy policies to encourage the shift towards sustainable tourism development to minimize environmental pollution.

Keywords: economic growth; environmental pollutants; capital investment; energy consumption; sustainable tourism; policy implications

1. Introduction

Tourism, as one of the most encouraging drivers of development for the world economy, can play a dynamic role in the evolution of a green economy and inclusive growth [1]. Over the past few

decades, international tourism is considered by policymakers as a tool for development in emerging economies [2]. Literature trends suggest that tourism got considerable attention as a non-consumptive and low impact development alternative in the developing economies [3]. Tourism is recognized as a source of income, employment, and export revenue though present alarms about growing socio-economic discriminations and environmental costs. Globally, exports are considered as a promoter of economic growth [4]. Developing economies, having a low level of industrial development, heavily rely on their agriculture for export earnings [5]. Regardless of the constant efforts of developing economies to enhance their exports, this approach added petite foreign exchange to their balance of payments and proved ineffective in economic development [4]. Tourism is seen as a savior in the developing economies due to its leading capabilities of earning foreign exchange [6]. This notion leads to an unplanned expansion of tourism, which puts enormous pressure on natural resources and results in deforestation, massive urbanization, loss of wetlands, and water and air pollution in these countries [7].

Scholars criticized that the tourism industry has remained harmful to the environment due to its substantial reliance on energy that causes pollution. Energy is needed to facilitate transportation and provide allied amenities at destinations visited. Several scholars have debated the environmental impacts of tourism in detail [8–10]. Tourism development leads to economic growth and indirectly effects climate change through increasing demand for energy consumption. Hence, research suggests that tourism sustainability in developing nations should be analyzed with a focus on energy use and its consequences in the form of CO_2 emissions and other pollutants [11]. It is undeniable that tourism leads to the socio-economic development of emerging economies; however, these developments are achieved at the cost of environmental degradation [12]. Researchers, international organizations, and social activists proposed various concepts and approaches to addressing the vulnerabilities of tourism; however, the most debated and famous concept is sustainable tourism development.

Sustainable tourism development is believed to be the best possible option to minimize the vulnerabilities of tourism-led developments [3]. Existing literature enhances our understanding of sustainable tourism and its relationship to environmental impacts [13]. Sustainable development goals (SDGs) encourage policymakers to use tourism to eliminate poverty, hunger, food security, and improvement of the environment by lowering dependence on non-renewable energy resources. Drafting sustainable tourism policies requires a better understanding of the relationships between host economies, energy usage, level of CO_2 emissions, and its impacts on the natural environment [14]. The research on the relationship between tourism, economic growth, and environmental pollutants is growing; however, a considerable difference of opinion exists among the researchers from country to country and the data set used. Besides, rare studies considered energy consumption (a significant source of pollution) in relation to tourism and environmental pollutants. Empirical studies available on the relationships between tourism, economic, and environmental variables barely provide evidence to guide sustainable tourism policies in the emerging economies [15].

Hence, the prime objective of this research is to cover the prevailing literature gap by investigating the case of a developing economy, mainly aiming at Pakistan. The tourism trends in Pakistan reveal upward tendencies [16] though disrupted by political, climatic, and terrorist incidents. Pakistan is famous for its natural, cultural heritage, and adventurous wonders in the world [17]. Due to mismanaged tourism practices, the low level of conservation and environmental policies, deforestation, and the high use of fossil fuels energy, the natural as well as heritage assets in the country is under high stress. Besides, Pakistan is ranked between the top ten utmost affected countries by environmental changes [18]. Therefore, the prevailing critical situation makes it more essential to realize the influences and consequences of travel and tourism on the environment and economy to aware the policymakers about the environmental liabilities of the tourism sector.

This article explores the relationships between tourism, economic growth, and environmental pollutants in a multivariate framework. This researcher builds a theoretical and empirical bridge between tourism and the broader agenda of sustainable development, hence, introduce a solid empirical

foundation for a constructive debate to sustainable tourism development in the developing economies. Gössling [3] identified that previous studies ignored the use of energy and its impacts on the climatic changes in tourism research. It is the first study based on time-series data examining the relationship between tourism, economic growth, and environmental pollutants for Pakistan. The country-specific case comprehensively captures the economic, environmental, and institutional complications. The key findings suggest that expansion in economic growth leads to an increase in tourism activities.

Moreover, development in economic growth, tourism, and energy use lead to a significant degree of CO_2 emissions; henceforth, an increase in environmental pollutants negatively impacts tourists' arrivals. This study aims to answer the following questions:

- Is there any relationship between tourism and economic growth in Pakistan? If so, to what extent does economic expansion respond to tourism growth? Does economic growth lead to environmental pollution?
- Is there any relationship between tourism and capital investment? If so, to what extent does capital investment respond to an increase in tourism activity? Does capital investment lead to environmental pollution?
- Is there any relationship between tourism and energy consumption? If so, to what extent does energy consumption respond to an increase in tourism activity? Does energy consumption lead to environmental pollution?
- Does tourism contribute to CO_2 emissions? If so, to what extent do CO_2 emissions respond to an increase in tourism activity?
- Do CO_2 emissions have any impact on tourism activity? If so, to what extent does tourism respond to CO_2 emissions?
- What policy initiatives should be taken to make tourism environment-friendly and increase the level of sustainability?

The relationship between tourism development, economic growth, and environmental pollution in the developing countries are contradictory; for instance, Naradda Gamage, Hewa Kuruppuge [19], by using time-series data (1973–2013), rejected Environmental Kuznets Curve hypothesis for Sri Lanka; besides, they found that tourism development only degrades the environment in the long-run. Sharif, Afshan [11] found a unidirectional causality between tourist arrivals and CO_2 emissions, running from tourist arrivals to CO_2 emissions in Pakistan. Liu, Kumail [20] used time-series data (1980–2016) of Pakistan and found no relationship between tourism development and environmental quality. Besides, these studies did not provide specific policy implications on how to make tourism sustainable or how to implant the concept of sustainable development in the developing countries.

These studies offer a limited understanding of the relationship between tourism development, economic growth, and environmental pollution, such as they are silent about the reverse causalities. The findings of the current study suggest a bidirectional causality between tourism and CO_2 emissions, indicating that tourism leads to CO_2 emissions; however, CO_2 emissions have a negative impact on tourism development. Additionally, suggesting that economic growth leads to tourism development has no direct effects on environmental pollution. The results of the current study imply bidirectional causality between tourism, energy consumption, and foreign direct investment (FDI). Besides, we provided specific sustainable policy implications for each relationship suggested by the results, detail debate of the results; and policy implications are made in the discussion and conclusion section.

Thus, this study guides policymakers that long-lasting strategies and policies dedicated to promoting quality employment, effective investments, technological innovation, green energy development, and transition towards low CO_2 emissions are essential to attaining sustainable and inclusive tourism growth. Therefore, policymakers should take into consideration the existing and forthcoming socio-economic and ecological impacts, visitors' needs, the industry, and the host community while planning tourism in the emerging economies.

2. Theoretical Design and Literature Review

A review of the literature suggests that few investigations have been conducted for researching the relationship of tourism with economic growth and environmental pollutants in developing economies such as Pakistan, India, and Bangladesh. In this part, we will focus on the previous scholarship that established relationships between tourism, economic development, capital investment, energy usage, and CO_2 emissions based on econometrics techniques of time-series data. Before moving forward to discuss literature trends on the relationship between tourism, economic growth, and pollutants, we would define sustainable tourism and causal relationship to set an overall theoretical paradigm for this article.

2.1. Sustainable Tourism

Tourism is a mix of human behavior and the multi-trillion industry that provides products and services. Tourism utilizes nature and culture as products that create social and environmental impacts, and sometimes contribute to the conservation process [21]. Tourism is appreciated for its economic contributions but, at the same time, criticized for its negative impacts on the environment [22]. The researchers believe that mass tourism is mainly responsible for the environmental degradation of destinations [23]. Trends suggest that mass tourism is a product-led industry that does not care about the environment [24]. Many regions of the world have experienced severe and radical changes to the environment due to unplanned tourism development [25]. Tourism activities associated with ecosystems have created diverse impacts on the ecology and host community [24]. Mass tourism is massively abused for the degradation of ecosystems, such as damages to the landscapes, cultural assets, and disposal of solid waste. This disorganization resulted in the disruption of biological processes, loss of local resources, threatened socio-economic benefits, and posed a risk to public health [26].

In addressing the vulnerabilities of tourism, alternative tourism approaches were developed, where sustainable tourism development appears as the impetus to improve the worst impacts on the environment. State-level and international organizations regard sustainable tourism development as an instrument for fighting poverty, enhancing responsible production and consumption, safeguarding the environment and its inhabitants, providing equal employment opportunities, and improving peace [27]. Due to the policy significance of sustainable tourism, the United Nations (UN) officially celebrated 2017 as "UN International Year of Sustainable Tourism for Development" [27]. Besides, tourism has been linked to 17 sustainable development goals (SDGs).

Bruntland Commission has defined sustainable development as "development that meets the needs of the present without compromising the ability of future generations to meet their own needs" [28]. World Tourism Organization (WTO) acknowledged the above and defined sustainable tourist development as "Tourism which meets the needs of present tourists and host regions while protecting and enhancing opportunity for the future" [29]. Besides, there are four recommended viewpoints to interpret sustainability in terms of tourism [30], i.e., sectoral (such as economic sustainability), ecological (such as environmental sustainability), long-term viability (such as destination competitiveness), and strategy (considering tourism as a way of sustainable development). Bramwell, Richards [31] discussed seven aspects of sustainable tourism, i.e., economic, political, social, managerial, cultural, environmental, and governmental. Moreover, Butler [32] defined sustainable tourism as

> *"tourism which is developed and maintained in an area (community, environment) in such a manner and at such a scale that it remains viable over an infinite period and does not degrade or alter the environment (human and physical) in which it exists to such a degree that it prohibits the successful development and well-being of other activities and processes."*

These definitions are tourism-centric and encompass the adaptive paradigm [33]. On the one hand, focusing on sustainable tourism as an economic activity and considering tourism as a more extensive element of sustainable development policy, and on the other hand, comprising a set of comprehensive principles which legitimize different pathways of development according to circumstances.

The introduction of the sustainable development approach has the potential to alter the nature of tourism more than any other concept. However, the application of this approach requires fundamental changes in specific elements of tourism at various levels, such as policy statements, marketing shifts in the industry, legislation, and of course, a change in the tourists' behavior. This concept is attractive for those who have concerns about the environmental abuses of tourism because of the governing principles of sustainable tourism that are in line with the basic tenets of responsible resource and environmental management [32]. Sustainable tourism is an umbrella term and includes a broad range of sub-categories, themes, and concepts such as responsible tourism, green tourism, agro-tourism, slow tourism, eco-tourism, community tourism, geo-tourism, volunteer tourism, environmentally-friendly tourism, soft tourism, alternative tourism, and solidarity tourism. The research trends suggest that various organizations and scholars defined the paradigm and principles of sustainable tourism; however, the tenets structured by World Wildlife Fund (WWF) are considered the golden principles and provide a logical base for debate [34,35]. These principles are explained in terms of economic, ecology, community and research paradigms such as resources sustainability, minimizing waste and overconsumption, maintaining biodiversity, integration of tourism planning with overall economic and environmental policies, support for local communities, consultation with stakeholders, responsible marketing of tourism, training of staff and focus on the research for sustainable tourism development.

The rising concept of sustainable tourism development marked a junction point between environmental protection and economic growth [7]. The philosophy of this concept integrates social, cultural, and ecological goals with development. The sustainable tourism development value conservation and community vision at one end and focus on the importance of economic theory on the other end through sustained economic expansion. The trends suggest that advocates of the sustainable tourism development concept call for environmental awareness and consciousness in developing countries. The increase in the developing countries' population has put enormous pressure on natural resources, resulting in the loss of wetlands, massive urbanization, a decrease in agriculture supplies, deforestation, poverty, and inequalities [36]. Developing economies attempted the development of mass tourism for boosting economic growth, which resulted in massive environmental, cultural, and social problems. Research indicates that sustainable tourism development is based on such management approaches and tools that better integrate tourism development and protection of the natural and cultural environment at tourist destinations [37]. The concept of sustainable tourism creates an appropriate fit and balance between tourism-related economic development, environmental protection, local residents' desires and benefits, and tourist needs and satisfaction [37,38].

The concept of sustainable tourism takes into account the three essential dimensions of successful tourism development, i.e., social equity, environmental conservation, and economic efficiency. Thus, the concept of sustainable tourism is not only suitable for the developing economies but also for the developed economies because of resources of each nation are scarce; besides, we cannot sacrifice the future for the present.

2.2. Causal Relationship

The causal relationship in tourism studies is based on the law of causality, which is the essence of all-natural sciences. Causality explains the relationship between cause and effect. Many empirical studies use causality as an analytical tool based on the connection between observed variables to reach generalized findings and conclusions. In social sciences, scholars suggest two schemes of causality, i.e., Aristotelian and Hume. Every phenomenon arises due to some cause. In tourism, for example, a tourism-led growth hypothesis or growth-led tourism hypothesis is based on the concept of causality. The tourism-led growth hypothesis is a direct adaptation of the export-led growth hypothesis [39], where expansion in export contributes to economic growth through various channels such as market competition, human capital, economies of scale, and foreign investments [40]. The typical justification for this hypothesis stands on the strong dynamic nature of tourism as an economic activity.

The growth-led tourism hypothesis proposes that the growth in economic activity may lead to tourism expansion. The justification is based on various mechanisms such as economic growth related to skills and technology accumulation that increase export capacity [41]; second, government policies aimed at achieving high economic growth [42]; and third, private sector initiative for the creation of hotels, roads, airports, recreational parks and ports (physical investments). This firstly creates economic activity and later captures tourism flows, for example, investments in hotels, restaurants, and power projects along the China Pakistan Economic Corridor. Eugenio-Martin, Martín-Morales [43] suggested that variations in economic growth levels are related to the changes in tourism demand levels in developing countries.

The literature on causality is indifferent and still leads the debate among experts regarding its applicability within economic theories or direct application in empirical analyses; however, its importance cannot be ignored as a widely used analytical tool. As a result, policy implications commonly arise on the assumption if there are Granger causal relationships between tourism, economic growth, and other variables based on common senses and theoretical grounds. However, good policy recommendations are based on the scholar's pool of knowledge of how effectively he/she translates the conclusions to policy implications.

2.3. Relationship between Tourism and Economic Growth (GDP)

Tourism development is used as a tool for employment generation, SMEs development, and economic growth in the developing economies [44]. Several developing countries have attempted to enhance economic growth through the export of material goods, but they have often proved less useful due to a lack of competitiveness [4]. Developing economies are using tourism as an export item to remain competitive and earn foreign exchange for balancing their trade deficit [44]. Literature trends indicate unidirectional, bidirectional, and no causal relationship between tourism and economic growth [45]. Scholars support a tourism-led growth (TLG) hypothesis in various South Asian countries; for instance, Ohlan [46] in a trivariate context, has provided evidence for TLG in India. Jayathilake [47] and Srinivasan, Kumar [48] established unidirectional Granger causality between tourism and economic growth for Sri Lanka; and Adnan, Qazi [2] suggest that tourism causes economic growth in Pakistan. In the African continent, Durbarry [4] found that tourism has promoted economic growth in Mauritius. Gunduz and Hatemi-J [49] validated TLG for Turkey by using tourist's arrivals, real gross domestic product, and real exchange rate. Kim and Chen [45] found bidirectional causality between tourism and economic growth for Taiwan, suggesting that tourism and economic growth both compensate each other. The lack of consensus on the relationship between tourism and economic growth lend the extent of the investigation to further debate. Based on the literature findings, we posit the following hypotheses for tourism and economic growth.

Hypothesis 1 (H1). *Tourism influences economic growth.*

Hypothesis 2 (H2). *Economic growth influences tourism.*

2.4. Relationship between Tourism and Carbon (CO_2) Emissions

Tourism is highly reliant on transportation and considered the fifth-largest emitter of greenhouse gas [50]. The investigation on the linkages concerning tourism and environmental pollutants is narrow [15]. Sharif, Afshan [11] found unidirectional causation between tourists' arrivals and CO_2 emissions in Pakistan by using a multivariate framework in the Autoregressive Distributive Lag (ARDL) model. The findings of Işik, Kasımatı [9] suggest that tourism, economic and financial development, and international trade enhanced CO_2 emissions in Greece. Solarin [51] reported that growth in traveler arrivals lead to a rise in the environmental pollutants in Malaysia. Katircioglu [10] applied a trivariate framework and found that tourism development in Turkey contributes to high energy consumption

and carbon dioxide emanations. Paramati, Alam [52] found that tourism impact on carbon dioxide emanations is faster in developing than advanced economies. Although a considerable number of studies suggest that tourism contributes to CO_2 emissions, yet few studies also suggest the opposite, i.e., CO_2 emissions decrease tourist arrivals [53]. Tourism is weather- dependent industry; the high level of CO_2 emissions make tourism a victim of climatic impacts [54,55]. Scholars such as Gössling and Hall [56] suggested that environmental effects on tourism are more visible and severe. Scholars such as Sajjad, Noreen [57] conducted a multivariate analysis for three regions and argued that environmental changes are creating a nightmare for the tourism industry. Based on related literature, we posit the following hypotheses.

Hypothesis 3 (H3). *Tourism influences CO_2 emissions.*

Hypothesis 4 (H4). *CO_2 emissions influence tourism.*

2.5. Relationship between Tourism and Energy Consumption

Worldwide, it is recognized that the tourism industry requires high amounts of energy for the production of goods, services, and visitor experiences; however, the use of energy causes environmental pollution. Energy is needed to facilitate transportation, amenities, and support services at the visited destinations [58]. In a trivariate analysis, Katircioglu, Feridun [59] found that tourism Granger causes energy consumption in Cyprus. Based on the analysis of international tourism, energy consumption, and CO_2 emissions in a trivariate framework, Katircioglu [10] revealed that an increase in tourism arrivals is significantly attached to energy consumption in Turkey, which leads to CO_2 emissions. Tiwari, Ozturk [60] used a trivariate model and submitted that shock in tourism impacts energy consumption in OECD countries. Nepal [13] noted that in rural Nepal, tourism contributed to the increasing consumption of prime energy resources. The use of fossil fuels in tourism was significantly documented on energy consumption in small islands [3]. Tourism prompted vulnerabilities were extremely noted in various countries [8]. Similarly, Solarin [51], in a multivariate analysis, found a unidirectional causality between tourists' arrival and energy consumption in Malaysia. The trends suggest that limited econometrics studies have tested the relationship between tourism and energy utilization. In light of the above literature, we posit the following hypothesis.

Hypothesis 5 (H5). *Tourism influences energy consumption.*

Hypothesis 6 (H6). *Energy consumption influences tourism.*

2.6. Relationship between Tourism and Capital Investment (FDI)

Tourism is considered as a determinant of foreign direct investment (FDI) [44]. FDI plays an active role in the development of the tourism industry. The notion of globalization binds tourism, FDI, economic growth, and environmental pollution in a single sphere [61]. The move on liberalization has enhanced the magnitude of FDI in the services sector [62]. Trends suggest that the increase in FDI promoted CO_2 emissions in the developing economies due to the relaxed environmental standards [63]. It is claimed that tourism is a significant location-specific determinant of FDI [64]. Samimi, Sadeghi [65] used panel data of tourism and FDI for developing countries in the VECM framework and found a bidirectional relationship in the long-run. Unidirectional causality running from FDI to tourists' arrivals was reported in India by using the VAR framework [66]. Tang, Selvanathan [64] revealed a unidirectional linkage between FDI and tourism in China by employing Granger causality in the VAR framework. The findings of Sanford Jr and Dong [67] indicated a significant relationship between tourism and succeeding foreign direct investment in the USA by using TOBIT analysis. Craigwell and Moore [68] used a panel causality to investigate the linkages between FDI and tourism in Small Island

Developing States and noticed bidirectional causality. Khoshnevis Yazdi, Homa Salehi [69], under the multivariate framework, by using ARDL, found that no causality had been reported for Iran between tourism and FDI. The literature trends suggest that little amount of studies has examined the causal relationship between capital formation and tourists' arrivals in a time-series framework. Based on the trends, we posit the following hypotheses:

Hypothesis 7 (H7). *Tourism influences capital investment.*

Hypothesis 8 (H8). *Capital investment influences tourism.*

Based on the literature review and hypotheses, Figure 1 represents the conceptual model of the study.

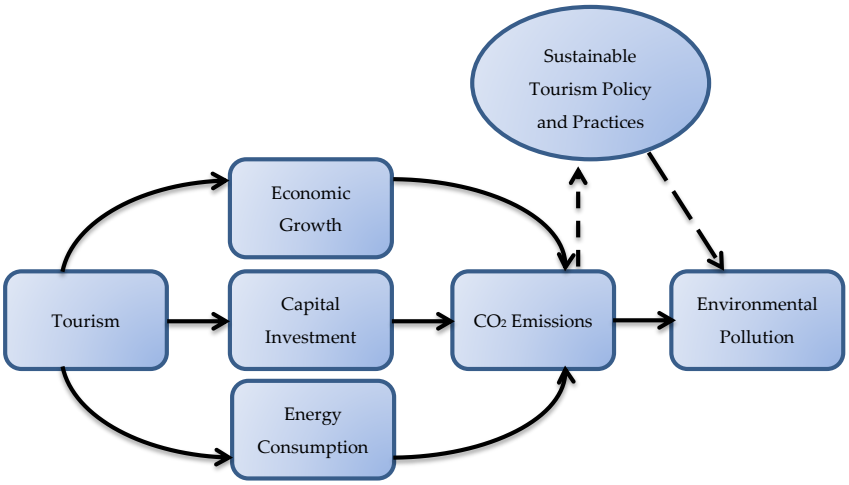

Figure 1. Conceptual Framework.

3. Methodology

This portion of this article focuses on data collection and methods applied. We used econometric methodological approaches for testing all our posited hypotheses.

3.1. Methodology and Estimation Strategy

The prime purpose of this research was to examine what kind of relationship exists between tourism, carbon (CO_2) emissions, economic growth (GDP), energy consumption, and capital investment in an emerging economy. Tourism was measured in millions of tourist arrivals, economic growth by GDP and capital investment by net FDI flows were measured in constant 2010 US$, environmental pollution by CO_2 emissions (metric tons per capita), and energy consumption by kg oil used per capita. We have developed five models based on our propositions to answer the proposed hypotheses.

$$GDP_{ti} = f\ (Tourism_{ti},\ Capital_{ti},\ Energy_{ti},\ CO_{2ti}) \quad (1)$$

$$CO_{2ti} = f\ (GDP_{ti},\ Tourism_{ti},\ Capital_{ti},\ Energy_{ti}) \quad (2)$$

$$Energy_{ti} = f\ (GDP_{ti},\ Tourism_{ti},\ Capital_{ti},\ CO_{2ti}) \quad (3)$$

$$Capital_{ti} = f\ (GDP_{ti},\ Tourism_{ti},\ CO_{2ti},\ Energy_{ti}) \quad (4)$$

$$Tourism_{ti} = f\ (GDP_{ti},\ CO_{2ti},\ Capital_{ti},\ Energy_{ti}) \quad (5)$$

The Dickey and Fuller [70] and Phillips and Perron [71] unit root tests were used for confirming the series stationarity. Afterward, the bounds test developed by Pesaran and Shin [72] and Pesaran,

Shin [73] for co-integration were applied to confirm long-run relationships. The bounds test approach is more practical and has several advantages over traditional approaches of co-integration. The bounds test approach takes an appropriate lag order and corrects the problem of serial correlation [72]. Johansen and Juselius [74] and Engle and Granger [75] co-integration methods are unable to be applied at different levels; however, the bounds test approach can be used for those series that are stationary at the level or first difference or a combination. The bounds test suggests that in the long-term, the variables of interest are bound together. Besides, a dynamic ECM can be extracted by the use of linear transformation. The ECM model assimilates the short-run relationships with the long-run dynamics without losing information. The bounds test is the execution of the Wald [76] test on the subsequent ECM:

$$\begin{aligned} \Delta Yt = \quad a0 + & \sum_{i=1}^{n} a1i\Delta Yt - i + \sum_{i=1}^{n} a2i\Delta X1,\ t - i + \sum_{i=1}^{n} a3i\Delta X2,\ t - i \\ & + \sum_{i=1}^{n} a4i\Delta X3,\ t - i + \sum_{i=1}^{n} a5i\Delta X4,\ t - i + a6Yt - 1 \\ & + a7X1,\ t - 1 + a8X2,\ t - 1 + a9X3,\ t - 1 + a10X4,\ t - 1 \end{aligned} \tag{6}$$

In Equation (6), Δ is the first difference; X represents the independent and Y the dependent variables. If the Wald test rejects null hypothesis H0: $a6 = a7 = a8 = a9 = a10 = 0$, it means that co-integration exists between the model variables. After confirming the co-integration by using bounds test approach, the short and long-run dynamics of equations one to five were estimated by applying the subsequent p1,q1, q2, q3, q4 autoregressive distributed lag (ARDL) model:

$$Yt = b0 + \sum_{i=1}^{p1} b1i\ Yt - 1 + \sum_{1=0}^{q1} b2i\ X1,\ t - 1 + \sum_{i=0}^{q2} b3i\ X2,\ t - 1 + \sum_{i=0}^{q3} b4i\ X3,\ t - 1 + \sum_{i=0}^{q4} b5i\ X4,\ t - 1 \tag{7}$$

We used the ARDL model for calculating the long-run dynamics in equations one to five by employing ARDL estimation in Equation (7). By applying the formulas in Equations (8) and (9), long-run interactions of equations, one to five were calculated:

$$a0 = \frac{bo}{1 - \sum_{i=1}^{Pt} b1,\ i} \tag{8}$$

$$aj = \frac{bm}{1 - \sum_{i=1}^{Pt} b1,\ i} \tag{9}$$

where i = 1,2 . . . , 4 . . . and m = 2,3,4 . . . . . .

We calculated the short-run dynamic for Equations (1)–(5) by using Equation (10).

$$\begin{aligned} \Delta Yt = \quad d0 + & \sum_{i=1}^{n} a1i\ \Delta Yt - 1 + \sum_{i=1}^{n} a2i\ \Delta X1,\ t - 1 + \sum_{i=1}^{n} a3i\ \Delta X2,\ t - 1 \\ & + \sum_{i=1}^{n} a4i\ \Delta X3,\ t - 1 + \sum_{i=1}^{n} a5i\ \Delta X4,\ t - 1 \\ & + \sum_{i=1}^{n} a6ECTt - 1 + et \end{aligned} \tag{10}$$

Cumulative sum (CUSUM) and the cumulative sum of square (CUSUMQ) tests [77] were used to approve the strength of the ECM model. All the standard diagnostics tests required were applied for checking the model misconceptions. Granger causality test based on vector error correction (VAR) model was used to determine the direction of causality [78]. Based on information on long- and short-run dynamics and Granger causality, we tested our proposed hypotheses.

3.2. Data Collection

The sample of the present study covers annual time-series from 1975–2017. The data was collected from different sources, gross domestic product (GDP), net FDI, CO_2 emissions, and energy consumption were collected from numerous issues of economic survey of Pakistan, while tourists' arrival data was taken from the Ministry of Interior, Islamabad, Pakistan. Moreover, economic growth is measured by (GDP = G), capital investment/formation (net FDI flows = K), environmental degradation/pollutants (CO_2 emissions = CO_2), energy consumption (kg oil used per capita = EG) and tourism (tourists arrivals = T). Natural logarithms have been taken of all the variables to induce stationarity. All the monetary variables were constant in 2010 US$. The descriptive statistics are summarized in Table 1, and Figure 2 represents trends in the mentioned variables. To avoid multicollinearity, we measure tourism in tourists' arrivals instead of tourism receipts.

Table 1. Time-series descriptive statistic.

.	K	CO_2	EG	G	T
Maximum	22.44	12.04	6.26	26.20	13.99
Mean	19.83	11.28	6.01	25.29	13.08
Minimum	15.92	10.04	5.07	24.19	11.44
Std. Dev.	1.66	0.65	0.23	0.58	0.47

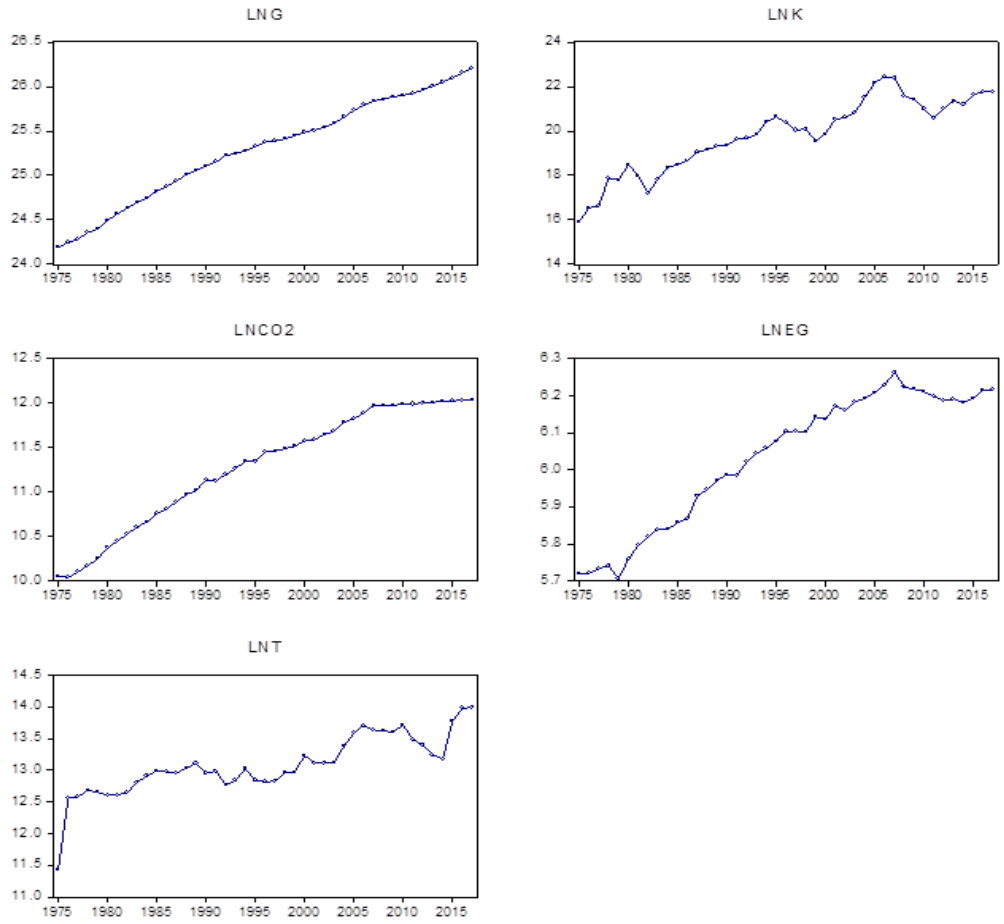

Figure 2. Variables trends (LN present log values, LNG = economic growth, LNK = capital investment, LNCO2 = carbon emissions, LNEG = energy consumption, LNT = tourists' arrivals, Y-axis represent a percentage of the total, X-axis represent years).

The trends in Figure 2 indicate that economic growth and CO_2 emissions are stably increasing as compared to the rest of the variables. It reveals that economic growth is supporting CO_2 emissions. The trends in energy indicate an upward tendency; in 1995, the Pakistan government invested in the private sector to boost energy production [79]. Tourists' arrivals have increased in Pakistan along with various shocks in different years; some major events disturbed the trend, for example, in 1995, the bomb blast incident in the Egyptian embassy in Islamabad killed 13 persons [80]; it is visible in Figure 2 that tourists' arrivals decreased in the upcoming years. After the 9/11 tragedy, the trends in "tourist's arrivals, economic growth, CO_2 emissions, capital investment, and energy consumption" shows many shocks because Pakistan was hardly blown by terrorists' events all around the country; electric grade station, hotels, hospitals, schools, colleges, and the universities were bombed.

All the variables in 2005 are showing a downward trend because of the enormous earthquake that took place in the northern part of Pakistan [2]. Capital investment and tourism are indicating fluctuations; literature revealed that political instability and terrorism are the leading cause of shocks in capital investment and tourism in Pakistan [81,82]. Although tourism shows variability, yet upward tendencies are observed. Tourism and CO_2 emissions exhibit upward trends in 2010, as shown in Figure 2, indicating that the increase in tourism increases CO_2 emissions, since the same pattern is visible in energy usage supported by the rise in capital investment in earlier years. After 2010, CO_2 emissions show relatively stable trends because policy agenda was taken to lower environmental and climatic impacts, such as Khyber Pakhtunkhwa (KP) government, at a rate of 2700 plants per acre has completed "one billion trees initiative" to increase forestation and the survival rate were found to be 75–80% [18]. Pakistan campaigns to cut off CO_2 emissions by 30% by 2025 [18].

4. Findings

The Spearman's ranked correlation results exhibit that all the variables are highly positively correlated with each other, except tourism and CO_2 emissions, as displayed in Table 2. The positive correlation between the variables suggests that when one variable increases, the others also increase in the same direction.

Table 2. Spearman's Ranked Correlation.

Correlation	K	CO_2	EG	G	T
K	1				
CO_2	0.93 (0.00)	1			
EG	0.90 (0.00)	0.92 (0.00)	1		
G	0.93 (0.00)	0.99 (0.00)	0.91 (0.00)	1	
T	0.87 (0.00)	0.90 (0.00)	0.90 (0.00)	0.89 (0.00)	1

Note: () represent probability.

Table 3. Root tests.

Test	K	CO_2	EG	G	T
ADF	I(0)/I(1)	I(0)/I(1)	I(0)/I(1)	I(0)/I(1)	I(0)/I(1)
I(0)	−2.22	−3.57 **	−3.56 **	−2.08	−3.44 **
I(1)	−5.71 *	−8.59 *	−7.55 *	−4.09 *	−9.13 *
PP					
I(0)	−2.22	−3.48 **	−3.47 **	−2.47	−3.39 *
I(1)	−5.71 *	−5.84 *	−38.03 *	−4.10 *	−10.55 *

Note: The null hypothesis states that the unit root exists. The asterisks * and ** represent "the rejection of the null hypothesis at 1% and 5%; I(0) indicate at the level and I(1) at first difference.".

ADF and PP unit root tests have been conducted for testing the stationarity of the variables; the findings are given in Table 3. It is observed that all the variables are integrated of order I (0) or I (1) or both and provide freedom to employ the bounds test approach for establishing "co-integration."

As the bounds test approach is sensitive to lag length, hence, we estimated the lag length by using the VAR (lag order selection criteria test) as displayed in Table 4; as per the results, the optimum lag length is 1 confirmed by LR, FPE, AIC, SC, and HQ criteria.

Table 4. Lag length Criteria.

Lag	LogL	LR	FPE	AIC	SC	HQ
0	21.80769	NA	2.97e−07	−0.840385	−0.629275	−0.764054
1	237.4581	366.6057 *	2.18e−11 *	−10.37291 *	−9.106246 *	−9.914922 *
2	256.0096	26.89967	3.19e−11	−10.05048	−7.728272	−9.210843
3	283.6757	33.19933	3.29e−11	−10.18379	−6.806027	−8.962495

Note: * "indicates lag order selected by the criterion (each test at 5% level) LR = Sequential modified LR test statistic FPR = Final prediction error, AIC = Akaike information criterion, SC = Schwarz information criterion, HQ = Hannan-Quinn information criterion".

We proceeded bounds test for equations 1–5 and found that all the models were co-integrated except the model for economic growth (GDP); the results are displayed in Table 5. To avoid invalid results of the bounds test, we ensured that the proposed models are free of "serial correlation" problems.

Table 5. Bounds test for co-integration results.

ARDL Models	Critical Bounds Value		
	1%	5%	10%
FEG(EG|G, CO_2, K, T) = 7.82 *, ARDL (1, 0, 0, 0,0)	3.74–5.06	2.86–4.01	2.45–3.52
FG (G|EG, CO_2, K, T) = 1.21, ARDL (1, 0, 0, 1, 0)	3.74–5.06	2.86–4.01	2.45–3.52
FCO_2 (CO_2|EG, K, T, G) = 5.78 *, ARDL (1,0, 0, 0, 0)	3.74–5.06	2.86–4.01	2.45–3.52
FK(K|EG, G, CO_2, T) = 3.75 ***, ARDL (1, 0, 0, 1, 0)	3.74–5.06	2.86–4.01	2.45–3.52
FT(T|EG, G, CO_2, K) = 7.89 *, ARDL (1, 0, 1, 0, 0)	3.74–5.06	2.86–4.01	2.45–3.52

Note: "All the models use the assumption of unrestricted constant. Furthermore, asterisks *, *** represent co-integration at 1%, 5% and 10% significance level.".

The bounds test results allow us to calculate the long-run dynamics for CO_2 emissions, energy consumption, capital investment, and tourism. The estimated ARDL long-run elasticities for the mentioned four models are given in Table 6. All the explanatory variables exhibit some significant influence on each other. The results suggest that all the explanatory variables except economic growth significantly influence CO_2 emissions metric tons per capita.

Summary of the Long- and Short-Run Results

The findings suggest that economic growth leads to a significant increase in tourist arrivals, hence, support the economic growth-driven hypothesis and contradict with Katircioglu [83], who rejected TLG and GTL for Turkey. Besides, the results suggest that tourism makes a significant contribution to carbon emissions metric tons per capita, Zhang and Gao [50] pointed out "that tourism causally affects CO_2 emissions in the long-run." It is observed from the analysis that tourism has a significant positive impact on energy consumption; this finding is in line with the results of Katircioglu [10], who suggested that tourism influences energy consumption in Turkey. (Note, we have debated the long- and short-run relationship in this section, the coefficients of variables are discussed in detail in the Discussion section).

The fossil fuels such as crude oil, gas, and coal are used for energy production and consumption in tourism-related businesses (such as transport, hotels, restaurants, shopping malls, airlines, cruises, and other related businesses). Pakistan is an energy-dependent country on fossil fuels that cause a high

level of CO_2 emissions [84]; hence, Sharif, Afshan [11] suggested that tourism positively contributes to CO_2 emissions. Katircioglu, Feridun [59] proposed that "tourism is a catalyst for energy consumption in Cyprus"; our long-term dynamics also indicate that tourism makes a significant change in "energy consumption." Pao and Tsai [85] submit that energy consumption and CO_2 emissions contribute to each other in BRICS countries.

Table 6. ARDL long-run relationship and diagnostics.

Variables	EG		K		CO_2		T	
	Coefficient	t-stat	Coefficient	t-stat	Coefficient	t-stat	Coefficient	t-stat
EG			0.87	1.25	0.51 **	2.57	0.92 *	2.72
G	0.58	1.66	3.06 ***	1.74	0.39	1.22	1.94 *	3.78
CO_2	0.84 **	2.61	4.90 *	3.28			−1.87 *	−3.50
K	0.08 ***	1.90			0.21 **	2.57	0.16 *	2.29
T	0.27 **	2.34	1.02 ***	1.71	0.26 ***	1.88		
Constant	9.26 ***	1.89	33.12	1.31	2.33	0.39	−23.65 *	−2.98
A	1.57(0.22)		2.95(0.06)		0.82(0.44)		2.03(0.10)	
B	1105(0.00)		3.84(0.14)		0.84(0.65)		0.73(0.69)	
C	1.58(0.18)		0.32(0.91)		1.14(0.35)		1.25(0.31)	
Adj. R^2	0.52		0.39		0.44		0.53	
F-state	7.82(0.00)		3.80(0.00)		5.78(0.00)		6.64(0.00)	

Note: "asterisks *, **, *** indicate significance level at 1%, 5% and 10%. A: represent Breusch-Godfrey Serial Correlation LM test; B: Jarque-Bera Stat; C: Heteroskedasticity ARCH test; (Probability); F-state show overall model fit.".

The findings indicate that capital investment significantly influences tourism and vice versa. Our results validateHo and Rashid [86], who suggested that tourism positively affects FDI in the Philippines and Malaysia; however, Sanford Jr and Dong [67] also found that tourism attracts new FDI in the USA. Besides, capital investment shows a significant positive influence on energy consumption and CO_2 emissions in the long-run.

The findings show that energy consumption, economic growth, and capital investment have significant positive influences on tourism except for CO_2 emissions that negatively contribute to tourism. We contradict with Rabindra, M. [87], who suggested that energy consumption has a negative effect on tourism in the long-run. However, Lee and Brahmasrene [53] provided evidence that CO_2 emissions negatively contribute to tourism due to environmental degradation; our study also reflects the same findings.

The diagnostics test results in the bottom panel of Table 6 suggest that all the models are fulfilling the required criteria except the energy consumption model that violates some of the linear regression assumptions. The Jarque-Bera test for energy consumption has revealed non-normality; however, Thadewald and Büning [88] suggest that the findings are unprejudiced. The error correction term, which is a long-run element, is expected to be negative and significant. It shows a speed of adjustment and suggests convergence from short- to long-run [89]. We conducted CUSUM and CUSUM square tests for confirming the stability of the models shown in Figure 3. The CUSUM graphs indicate that the cumulative sum of recursive residuals plots is within the critical 5% significance line; hence, the test finds that our parameters are stable. Besides, the graphs of CUSUM square tests show that the plots of variance against time are within the 5% critical boundary line, suggesting that our models are free of structural breaks. Thus, CUSUM and CUSUM square tests collectively suggest that our dependent variables are stable. The findings indicate that abnormality in the long-run relationship for "capital investment", "carbon (CO_2) emissions", "energy consumption", and tourism models are adjusted by 98%, 17%, 51%, and 68% respectively, in a year, as shown in Table 7.

Table 7. Short-run and Error correction term results.

Variables	Δ EG		Δ K		Δ CO_2		Δ T		Δ G	
	Co-ef	**t-stat**	**Co-ef**	**t-stat**	**Co-ef**	**t-stat**	**Co-ef**	**t-stat**	**Co-ef**	**t-stat**
Δ EG			0.45	1.22	0.08 *	3.01	0.36 **	2.44	0.012	0.72
Δ G	0.66	1.66	8.49 *	3.21	0.07	0.41	1.32 *	3.78		
Δ CO_2	0.96 *	2.58	2.55 **	2.66			−1.27 *	−3.67	0.14	1.60
Δ K	0.09 ***	1.90			0.04 *	4.09	0.11 **	2.21	0.01 ***	1.84
Δ T	0.31 *	2.25	0.52 ***	1.70	0.045 ***	1.75			0.013	0.90
ECT	−0.98 *	−6.09	−0.51 *	−4.25	−0.17 **	−2.48	−0.68 *	−6.61	0.06	0.22

Note: "asterisks *, **, *** indicate significance level at 1%, 5% and 10%. Where Co-ef stands for coefficient.".

The short-run dynamics are reported in Table 7, indicating that capital investment and tourism are significantly contributing to energy consumption in the short-run. Besides, CO_2 emissions and economic growth show significant influences on capital investment. The findings for CO_2 emissions in the short-run suggest that energy consumption, capital investment, and tourism have significant impacts on CO_2 emissions. Sharif, Afshan [11] reported that tourism is positively significant with CO_2 emissions. Energy consumption, economic growth, and capital investment indicate significant positive effects on tourism; however, CO_2 emissions indicate negative impacts. The short-run dynamics for economic growth suggest that only capital investment has a significant influence on economic growth. (Note: The proportional weights of the causation in the long- and short-run are explained in the Discussion section). The Granger causality test has been conducted for finding the direction of causations; the results are shown in Table 8.

Table 8. Granger causality results.

Variables		Causality				
		Δ EG	**Δ K**	**Δ CO_2**	**Δ T**	**Δ G**
Δ EG	→		1.86	3.47 ***	5.67 **	0.39
Δ G	→	22.02 *	3.71 ***	0.21	12.34 *	
Δ CO_2	→	22.09 *	4.19 **		9.18 *	2.94 ***
Δ K	→	14.49 *		8.15 *	4.28 *	0.53
Δ T	→	8.07 *	0.18	3.06 ***		2.46

Note: "(t-stat), asterisks *, **, *** indicate significance level at 1%, 5% and 10%.".

Based on the long- and short-run dynamics and the findings of Granger causality in Table 8, it is concluded that energy consumption causes carbon (CO_2) emissions and tourism. Economic growth causes energy consumption, capital investment, and tourism. Carbon (CO_2) emissions cause "tourism and economic growth." Capital investment causes energy consumption and tourism. Besides, tourism causes "energy consumption and carbon (CO_2) emissions." The results further suggest that there is a two-way causality between "energy consumption and carbon emissions," "tourism and capital investment," "tourism and energy consumption," and "CO_2 emissions and tourism." The following highlighted are key causalities that provide a foundation for discussion and policy implantations under Section 5:

- The findings suggest unidirectional causality between economic growth and tourism, running from economic growth to tourism. The results reflect Tang [90], who validated GLT for Malaysia.
- Two-Way causation exists between carbon emissions and tourism. Sharif, Afshan [11] reported "one-way causation running from tourism to carbon emissions" in Pakistan. Katircioglu, Feridun [59] suggested that carbon emissions cause tourism in Cyprus. Hence, the results collectively replicate both scholars.

- The results suggest a two-way "bidirectional" causation between tourism and energy consumption. Katircioglu, Feridun [59]; Katircioglu [10], and Solarin [51] all suggest unidirectional causation running from tourism to energy consumption. Hence, our results contradict previous scholars.
- The findings suggest bidirectional causality between tourism and capital formation. Our results reflectCraigwell and Moore [68], who suggested bidirectional causality between capital investment and tourism. All the mechanisms will be significantly discussed and elaborated in Section 5.

5. Discussion and Implications

This research examines the direct and indirect contribution of tourism to environmental pollution. This research makes several novel contributions to the current literature. First, we collected the data from various sources because such length data is not available with international organizations for testing the mentioned relationship in any developing economy. Second, we reported several new relationships to the best of our knowledge, for instance, bidirectional causality between tourism and CO_2 emissions, and tourism and energy consumption. Third, it provides empirical evidence for policy implication and calls for the incorporation of environmental and sustainability criteria into overall economic growth policies. The two-way causation between tourism and carbon emissions encourages the policymakers in the developing nations to address responsible business practices in tourism through the integration of environmental criteria into tourism policies.

Similarly, the bidirectional causality between tourism, capital investment, and energy demands policymakers to consider green financing instruments for tourism-related projects for a low-carbon and resource-efficient economy. Investors should be encouraged to invest in green energy and tourism projects through incentives (such as subsidies and tax exemptions) for a transition towards low CO_2 emissions and climate-resilient investment. This section concisely discusses policy guidelines and implications for sustainable tourism based on the findings of empirical analysis and support from the literature.

5.1. Economic Growth and Tourism

This investigation reveals significant positive impacts of economic growth on tourism in the long-run, a 1% increase in economic growth increases tourism by 1.94%. In contrast, a 1% progress in economic growth significantly enhances tourism by 1.32% in the short-run, hence, provides support for the economy-driven tourism hypothesis. The tourism sector's total contribution to GDP in Pakistan is 2.9% in 2017, which is lower than Nepal, Sri Lanka, and Malaysia [16].

The results suggest no significant direct relationship of economic growth with energy consumption and CO_2 emissions metric tons per capita. However, economic growth has a significant positive relationship with the capital investment, which has a significant impact both on energy consumption and CO_2 emissions metric tons per capita in the long- as well in short-run. The findings indicate that a 1% increase in economic growth significantly increases capital investment by 3.06% in the long-run and 8.49% in the short-run. Besides, a 1% increase in capital investment significantly leads to an increase in energy consumption by 0.08% and CO_2 emissions metric tons per capita by 0.21% in the long-run. The overall finding is that economic growth has no direct relationship with CO_2 emissions, however, through indirect connections (i.e., positive relationships with tourism and capital development) contributing to environmental pollution.

Due to the ongoing progress of the China–Pakistan Economic Corridor, huge investments are taking place for infrastructure development, and tourists are visiting Pakistan in search of investment opportunities [91]; hence, it provides strength to our argument about economy-led tourism. Therefore, policy initiatives are essential for the development of the tourism industry, such as offering special economic zones to international hotel brands, resort developers, and food chains for investment. However, policymakers need to pay attention to collaboration with national tourism industry actors at large to support developmental strategies and emphasize adopting sustainable practices for a desirable level of sustainable tourism. Besides, a strategic fit between tourism, environmental, and overall

economic policies should be developed with consensus based on research. Academia must be involved in high-quality research for guiding future sustainable tourism policy and planning.

5.2. Tourism and CO_2 Emissions

We found bidirectional causality between tourism and CO_2 emissions both in the long- and short-run. The results indicate that tourism has a significant positive impact on CO_2 emissions both in the long- and short-run, and CO_2 emissions have a significant negative influence on tourism. The results indicate that a 1% increase in tourism would increase CO_2 emissions per capita metric tons by 0.26% in the long-run; besides, a 1% increase in tourism would increase CO_2 emissions per capita metric tons by 0.045% in short-run. Hence, an increase in tourism activities would increase CO_2 emissions.

Moreover, a 1% increase in CO_2 emissions metric tons per capita decreases tourism by 1.87% in the long-run; besides, a 1% increase in CO_2 emissions decreases tourism by 1.27% in the short-run. Hence, tourism development potentially contributes to CO_2 emissions and climatic changes that damage the industry's capacity. Tourism is dependent on transportation, which is connected with the burning of fossil fuels and, consequently results in high greenhouse gas emissions. Maximum numbers of tourism resources are situated in rural Pakistan; approximately 60.78% of the population live in rural areas and depend on wood-burning and fossil fuels for energy. Pakistan is among the top 10 countries affected by climate change [92].

This loudly calls for the implementation of sustainable tourism policies for moderating the impacts of tourism development on CO_2 emissions. Seeing the environmental pollution caused by tourism, the government should start a tourist awareness campaign about the pollution related to their travels to create awareness about environment-friendly transportation and businesses. Furthermore, slow travel should be adopted for a reduction in CO_2 emissions. Given the feedback to the causal relationship between tourism and CO_2 emissions, reduction in CO_2 emissions may adversely affect economic growth but can be achieved through technological improvements. Policymakers and institutions need to update and enforce corporate social responsibility laws for all businesses. Besides, the government should encourage cleaner energies such as hybrid engines or even carbon-neutral transport solutions for road transport. Moreover, the government should develop achievable plans for billion trees plantation projects when cropping vast forests for controlling the adverse effect of CO_2 emissions.

5.3. Tourism and Energy Consumption

Sustainability in tourism is one of the foremost emphasized areas under discussion on environmentally-integrated tourism development. This article suggests bidirectional causality between tourism and energy consumption, a 1% increase in energy consumption increases tourism by 0.92%, implying that tourists prefer destinations equipped with required amenities and prerequisites' energy. Additionally, a 1% increase in tourism influences energy consumption by 0.27%. The coefficient of energy consumption has a significant positive relationship with CO_2 emissions both in the short and long run. The findings indicate that a 1% increase in energy consumption significantly increases CO_2 emissions metric tons per capita by 0.51% in the long-run; besides, a 1% increase in energy consumption will increase substantially CO_2 emissions metric tons per capita by 0.08% in short-run. The overall result recommends that tourism activities involve energy consumption directly through fossil fuels or indirectly through electricity in every step, from transportation to accommodation. This large dependency of tourism on energy consumption leads to significant CO_2 emissions and causes environmental damages. Maximum numbers of tourist destinations in Pakistan are dominated by firewood and fossil fuels energy, which causes deforestation and ecological degradation. Pakistan is an energy deficient country that heavily relies on imported fossil fuels and approximately spends 60% of foreign exchange on energy imports [93].

To fulfill Pakistan's energy needs, under China Pakistan Economic Corridor (CPEC), Chinese investors are investing in seventeen projects, out of which eight are coal-based plants, three hydro,

four wind, and two solar parks [94]. This increase in energy will enhance tourism arrivals in Pakistan. However, Pakistan should plan dependence on coal as a short-run solution together with the use of the latest technology and rigorous policies to minimize environmental degradation to the best possible extent. Besides, the expert teams from China and Pakistan should be organized for monitoring the ecological risk-related concerns to curtail the environmental cost of CPEC's developments. Moreover, Pakistan poses huge potentials for hydropower; efforts must be focused on hydropower projects and dams; it would benefit in several ways. First, it is a less expensive method of producing energy. Second, Pakistan needs storage of water to alleviate the shortage of drinking and agricultural water, and to meet SDGs' requirements. Third, its negative contribution to the environment is minimal. Furthermore, substantial afforestation initiatives should be taken by the government with the active participation of the society at large.

5.4. Capital Investment and Tourism

Our long-run findings suggest that a 1% increase in capital investment significantly increases tourism by 0.16%; however, a 1% increase in tourism increases capital investment by 1.02%, indicating bidirectional causality. The short-run estimates suggest that a 1% increase in capital investment increases tourism by 0.36%; also, a 1% increase in tourism increases energy consumption by 0.52%. Our findings are in line with previous literature, which suggests that tourism attracts new investments to the host country [67]. Besides, investments also accelerate tourists' arrivals [66]. International tourism permits potential investors to experience a country environment being visited and to obtained information about competitors, environment regulations, ethical standards, and culture [95].

Moreover, the findings suggest that a 1% increase in capital investment significantly increases energy consumption by 0.08%, and CO_2 emissions metric tons per capita by 0.21% in the long-run. Besides, a 1% increase in capital investment significantly enhances energy consumption by 0.09% and CO_2 emissions metric tons per capita by 0.04% in the short-run.

Foreign investments develop host country tourism by building destinations, hotels, restaurants, and transportation facilities that stimulate a large number of tourist arrivals, which requires energy for daily operations. The statistics suggest that tourism-related investments in Pakistan were 9.1% of total investments [16]. In comparison to total investments in Pakistan's tourism sector which was noted at $3.9 billion, Nepal was $0.2 billion, Sri Lanka $0.9 billion, Bangladesh $1.0 billion, and Myanmar $0.3 billion, indicating that the tourism sector in Pakistan is attracting more investments.

In the wake of CPEC, Pakistan offers enormous potentials for investment in the tourism sector due to its natural, cultural, and heritage resources. The feasibility of constructing a spatial tourism structure in Pakistan is under discussion with foreign investors, which includes two centers, one axis, and five tourism zones [94]. Foreign investors are showing keen interest in developing resorts in the scenic areas in Khyber Pukhtunkhwa (KP) Province, especially the Karakorum Highways, which connects Pakistan and China [96].

Moreover, international hotel brands are making considerable investments in the hotel sector of Pakistan [97]. Overall all these pieces of evidence support our hypotheses and confirm the bidirectional relationship between tourism and capital investment in Pakistan. To make these investments sustainable, the government needs to take severe measures on priority bases for the conservation of water, air, and soil, and to develop climate-sensitive developmental policies. The CO_2 emissions suggest a significant adverse effect on tourism proposing that policymakers need to develop consistent environmental strategies for controlling ecological degradation and safeguarding the natural and cultural heritage. Vibrant and enforceable laws are essential to achieve the set targets for what it considers as an environmentally-sustainable level. Integrated tourism, capital investment, energy, and environmental policy would be helpful for sustainable tourism development. Besides, institutional reforms, clear guidelines for renewable energy, environmental protection, and tourism development would help in achieving overarching SDGs' vision and building an ecological civilization. Based on the findings, we summarized all the posited hypotheses in Table 9.

Table 9. Summary of hypotheses.

Hypothesis	Relationship	Findings
H1: Tourism significantly influences economic growth	No	Not supported
H2: Economic growth significantly influences tourism	G positively influences T	Supported
H3: Tourism significantly influences CO_2 emissions	T positively influences CO_2	Supported
H4: CO_2 emissions significantly influence tourism	CO_2 negatively influences T	Supported
H5: Tourism significantly influences energy consumption	T positively influences EG	Supported
H6: Energy consumption significantly influences tourism	EG positively influences T	Supported
H7: Tourism significantly influences capital investment	T positively influences K	Supported
H8: Capital investment significantly influences tourism	K positively influences T	Supported

6. Conclusions

This study examined the causal relationship of tourism with economic growth, capital investment, CO_2 emissions, and energy consumption in a developing economy to guide public policy. Several econometric time-series techniques such as the ARDL bounds test approach and Granger causality tests were applied for validating the posited hypotheses. Since the economic-driven tourism growth hypothesis (H2) holds in this study, therefore, the government should allocate funds and resources to the leading industries (such as energy, communication, agriculture) so that it will improve the overall economy and boost tourism activities in the country. Moreover, environmental protection must be prioritized in economic policies by addressing the low use of non-renewable resources and improved technology for producing higher output with less pollution.

In light of hypotheses H3 and H4, the empirical analysis proposed that hostile environmental damage and shrink tourism developments. It could be argued that due to high pollution, the natural and heritage landscape may lose its natural presence and would cause a steep reduction in tourist arrivals. However, these negative environmental influences can be minimized by following the golden principle of sustainable tourism. The policymakers should adopt a sustainable tourism agenda for reducing climatic vulnerabilities. At national, provincial, and local levels, sustainable organizational mechanisms of a tourist's destination and the construction of a useful model of cooperation between government, business, and society should be developed for minimizing the negative environmental and social impacts through the reduction in carbon and responsible behaviors. The use of sustainable practices would probably reduce CO_2 emissions and improve tourist arrivals as our findings recommend CO_2 negative coefficient for tourism. It is loudly suggested that policymakers should attempt to pursue policy changes in the tourism sector that seek to increase foreign tourism demand by inspiring sustainable, eco-friendly environmental regulations and minimize non-renewable energy consumption. Otherwise, the lack of attention to sustainable development policies would lead to irredeemable damages to the economy, food, biodiversity, and health.

Hypotheses H5 and H6 identified a bidirectional relationship between tourism and energy consumption, indicating that the provision of energy at tourists' destinations increases visitations; however, tourism increase energy consumption that leads to greenhouse gas emissions. Northern areas of Pakistan from Gilgit Baltistan to Khyber Pukhtunkhawa are considered as a hub of tourism. There is a vast capacity of hydropower production as it presents potentials for the development of small and large scale dams. It is estimated that Pakistan exists the possibilities of 60,000 MW hydropower, while approximately 11% of the identified resources are operational [98]; therefore, it is suggested that the government should focus on hydropower production to minimize dependency on fossil fuels to reduce environmental degradation. Besides, these hydropower plants would add value to tourism assets as secondary attractions. To reduce the negative influence of energy consumption and CO_2 concentrations in the atmosphere, afforestation programs on a large scale would not only help to slow down the accumulation of carbon but also could generate jobs and income, safeguard biodiversity and the ecosystem, and provide support in bioenergy production. This would enhance tourism in notable ways: First, more energy production and low carbon mean high tourist arrivals as posed by our hypotheses; second, afforestation means more green spaces for tourists. By taking

these initiatives, developing economies such as Pakistan can enhance their capacity to meet several sustainable developmental goals, i.e., SDG 2, 3, 6, 7, 8, 12, 13, and 15.

The findings of hypotheses H7 and H8 indicated bidirectional causality between tourism and capital investment. This information conveys to policymakers that the association between tourism and capital investment can promote economic growth in the developing economies. First, policymakers need to pay a high level of attention to tourism for attracting maximum numbers of tourists, especially under the CPEC initiative. Second, priorities should be given to the appropriate policies to provide information about the current potential investment opportunities through fame tours as well as international property exhibitions. In this regard, the role of travel agents and tour operators would be highly critical and vital as they have direct linkages with international tourists and tourism organizations. Moreover, foreign investors should be attracted through policy initiatives (such as tax incentives, high investment security, and friendly procedures) to develop the tourism sector by establishing hotels, food chains, and resorts, which could result in a higher number of foreign tourists. Nevertheless, sustainable investment policy should be in place beforehand for controlling environmental degradation and the low use of fossil energy consumption for sustainable developments.

Thus, it is concluded that tourism can play a crucial role in driving the transition to a low-carbon and resource-efficient economy. Hence, to achieve sustainable and inclusive growth, tourism policy must be integrated with broad economic, energy, and environmental policies that focus on green investments, green energy development, quality job generation, and consider the trade-offs and complementarities with associated policy areas. This study would be generalizable and helpful for those developing countries where tourism is a contributor to environmental degradation. Though the results of this study provide significant contributions to the existing literature on developing countries, yet this study is not free of limitations. Due to the unavailability of data with international organizations, the data has been collected from various sources. Besides, we did not examine the relationships between the variables from year to year; hence, scholars are suggested to use the same sample with a quantile ARDL model for more robust findings. From a future research perspective, it is suggested that there is a dire need for additional research in developing economies related to specific tourism activities, for instance, hotel industry, tourists' behavior at destinations, corporate social responsiveness, and green initiative in the tourism sector. This would help to provide more valuable information for sustainable tourism policy guidelines. Moreover, scholars are encouraged to use different econometric models on the same sample data for checking the robustness of the findings.

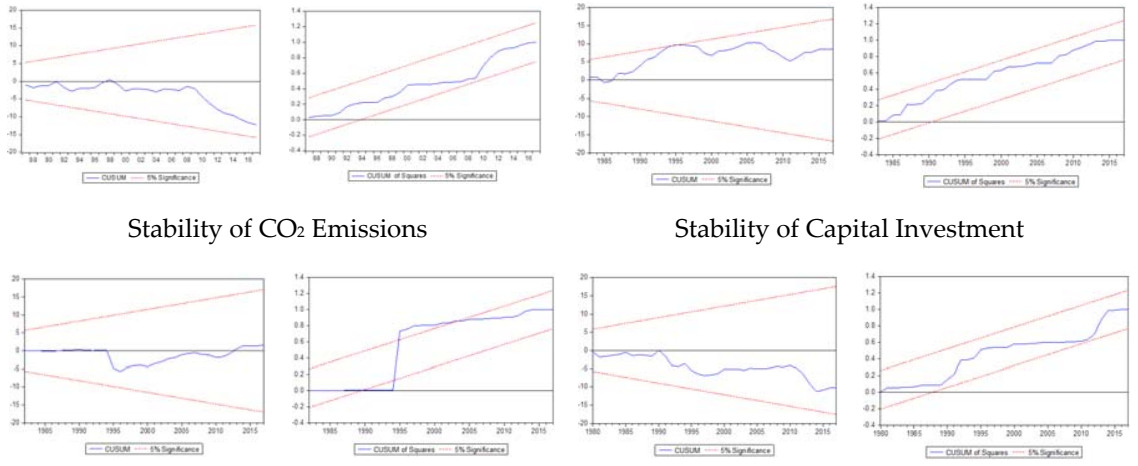

Figure 3. Cumulative Sum and Cumulative Sum of Squares.

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