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# The Impact of Infrastructure and Environmental Quality on Tourism Development: Evidence from Pakistan

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## ABSTRACT

*Tourism has key role in economic development of any region, and several factors influence tourism like political stability, weather, and infrastructure etc. Therefore, this study aimed to explore the role of the infrastructure and environmental quality on tourism in Pakistan. The empirical analysis is conducted by using fully modified ordinary least squares (FMOLS). The data is obtained from World Development Indicator from 1975 to 2022. The study results have shown the long run relationship between tourism, infrastructure, environmental quality, economic growth, and trade openness. In addition, a significant and positive influence of the infrastructure on tourism development in Pakistan. Likewise, environmental quality has a positive and statistically significant influence on tourism in Pakistan. The effect of trade openness is insignificant while growth has significant effect on tourism. These finding highlights the importance of infrastructure and environment in enhancing tourism. Therefore, government should improve infrastructure and quality of the environment.*

***Keywords:*** *Tourism, infrastructure, Environmental quality, Economic Growth*

## INTRODUCTION

Tourism sector has key role in economies around the globe by contributing to economic development. The contribution of tourism in world economy is US $10.9 trillion which is equivalent to 10% of the world GDP (World Travel & Tourism Council, 2024). Similarly, from the year 2015 to 2023 the tourism sector employment share is 5.6% and has provided employment to 127 million people in year 2023 (UNWTO, 2024). Likewise, tourism sector is Pakistan is enhancing economic growth (Bano et al., 2021) and providing employment opportunities. Similarly, tourism reduces poverty and enhances foreign direct investment, economic growth, and agriculture development in developing economies (Khan et al., 2020). In year 2023, the share of tourism sector in employment sector is 6.7 % and its contribution in GDP is 5.8 % (WTTC, 2024). On the other side, tourism development also encourages the development of physical infrastructure, such as the building of hotels, restaurants, ports, and airports, all of which are essential for the tourism industry to become competitive. There are numerous avenues, both direct and indirect, via which tourism contributes positively to growth.

Since 2013 a large inflow of foreign tourists in Pakistan except during pandemic (Figure-1). Pakistan offers many beautiful natural features, like sea, mountains, flora and fauna, lakes, and vegetation. But what really draws visitors to Pakistan is rich cultural legacy includes the Gandhara Civilization and the Mohenjo-Daro Cradle of the ancient Indus Valley. This region is the meeting point of the three major mountain ranges: the Hindukush, the Karakoram, and the Himalayas. It combines elements of cultures that are ancient as well as modern. Pakistan's diversified topography, population, culture, and traditions are a gift from nature that have enabled investment in the tourism industry and given the country's economy a boost(Malik et al., 2010).

A large number of the factors influence sustainable tourism like infrastructure, safety, and security (Munir et al., 2025). Recently, the infrastructure development under CPEC initiatives has enhanced the domestic tourism (Zulfiqar et. al., 2023; Muhammad, Kiran, & Alam, 2023). in Pakistan. Each year a large number of domestic tourists visit Gilgit-Baltistan and other parts during summer. Likewise, the direct flights from Dubai to Skardu have also played significant role in enhancing tourism development in Gilgit-Baltistan.

Figure 1: International Tourist arrivals


Sources: World Bank. (2024).

Majority of the earlier studies have inspected the relationship among tourism and economic development (Imran & Ali, 2024; Iqbal et al., 2024; Khan & Khan, 2024; Muhammad et al., 2020)). Likewise, many studies have investigated the influence of tourism on environment ((Shah et al., 2025; Gharbi et al., 2025; Qamruzzaman, 2025; Muhammad et al., 2019). However, limited studies on investigating the influence of infrastructure and environmental quality on tourism in Pakistan. Therefore, the study re-examines the repercussions of infrastructure and environmental quality on tourism in Pakistan. Moreover, the study also explores the effects of growth and trade openness on tourism.

The structure of the paper is as follows: review of the previous studies has been discussed in the second section. The third section presents the research methodology and results are presented in fourth section of the paper. Lastly, the whole study is concluded in the last section.

## LITERATURE REVIEW

The tourism development impact on environment and macroeconomic determinants is still significant area for autopsy in the context of developing countries. This paper is going to shed light on the role of infrastructure development and environmental sustainability that are vital for competitive tourism. This paper re-examined the existing literature to provide deep understanding about proposed research on the nexus between infrastructure development, environment quality, and tourism development.

### Tourism and Infrastructure development

Recently, the existing literature recognized that infrastructure is one of the significant pillar of tourism. Khan and Abdullah (2025) debated that in the region South Asia, "high-quality multimodal connectivity" (air, road, and digital) is further important for tourist influx. Their study in Bangladesh depicts that online payment systems and fast and easy accessibility of the internet vividly have a positive impact to enhance tourism and tourist experience. In the same way, an empirical study of different countries by "World Tourism and Travel Council (WTTC)" in 2024, published the "Resilient Infrastructure Index," which presenting that the investment on infrastructure such as environment friendly energy and flood-proofed transportation tempted for long-stay tourism and faster recovery from economic externalities. This approach depicts country smart approach to develop infrastructure in tourist centric. Further, Almeida et al. (2025) illustrated that "smart tourism cities" enhancing city management and providing more personalized services which has a significant on leveraging tourist satisfaction and repetition of visits.

The study of (Munir et al., 2025) identified tourist satisfaction as key factor in sustainable tourism while the influential determinants of the tourist satisfaction are trust in institutions and infrastructure. Moreover, the research has shown that infrastructure mediates the relationship between sustainable tourism and tourist satisfaction. Likewise, the important determinant of enhancing tourism in KPK, Pakistan is Hazara Motorway under CPEC initiative (Saheed et al., 2021). The researchers (Nadeem et al., 2020) have explored the role of the ICT and physical infrastructure, terrorism, and military expenditure on tourism in Pakistan. The results have shown adverse effect of terrorism and military expenditure on tourism while governance structure has positive influence on tourism.

Many researchers also investigating the "green spillover" in the context of different economies. Likewise, Fernández and Lee (2025) paper suggested that environment friendly infrastructure developments (such as, EV public transports, green buildings according to the international standards etc.) are attracting tourists and create a positive image on them. However, risk is aroused. Their study found that extensively poor infrastructure planning might start to enhance tourist arrivals in the start but in long run it could lead to "environmental degradation backlash" and, devastating the natural environment & scenic spots that attracted tourists initially in Nigeria (Okafor et al., 2024). This case study enlightens the awareness to incorporate policy. Furthermore, Singh and Watanabe (2025) demonstrated the concept of "Regulatory Trilemma" and argued that developing economies are facing inequality problem in rapid infrastructure development, environment protection, and public benefits. The recent existing literature reveals the give-and-take between infrastructure development and environmental quality.

Tourism and Environmental Quality

The tourism and environmental quality have a conclusive relationship which stimulated from simple to interdependent. Former literature has documented only clean and natural environment work as a pull factor for tourism. However, recent work, portrayed that air quality, clean water, uprightness of biodiversity and cities green landscape are determinants of environment quality and "core determinants of

general tourism competitiveness." By analyzing ASEAN nations, Chen et al. (2025) statistically demonstrated that waning air quality has a significant negative relationship with international tourism inflow and nature-based tourism. On the other hand, Ricciardi and Park in 2024 emphasized on "Environmental Branding" and shows that environmental controlled measures or environmentally friendly nations which spread messages about environment protection successfully improved image the areas and intent of tourists to visit. Wilson & Ghosh (2025) further corroborates this, they established that "Blue Flag" beaches or "Green Key" certified lodgings are priority for ten to fifteen percent tourists which is depicting that environmental identifications are also a source of revenue.

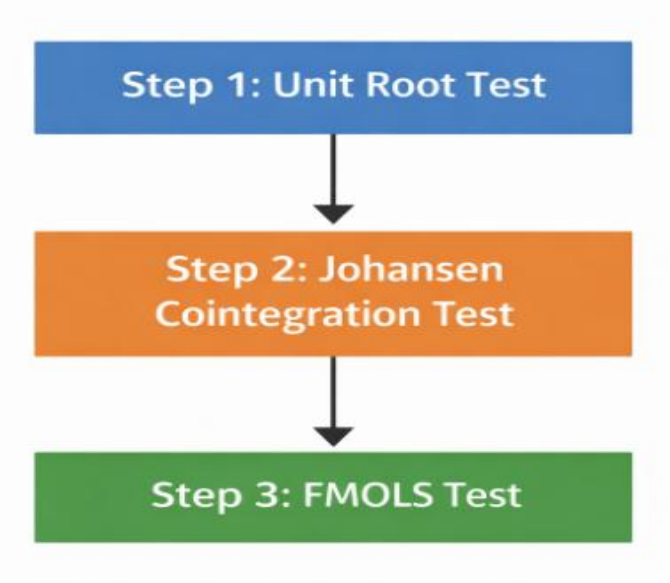
**Economic Growth, Trade Openness, and tourism development**

The influence of extensive economic forces on tourism continues to be crucial. In recent research (which research) underlines that tourism development is strongly related to economic well-being and international growth. Inline, Petrović and Zhao (2025) investigated by using advanced econometric gravity models to be posited that trade liberalization helps in culture exchange, leisure tourism and business travel, through this boost and ease air-links and economic stability, Moreover, the "growth-led tourism theory" is currently being developed. It is claimed that economic development must be encompassed to consistent growth in domestic tourism, which obliges as a robust footing for the sector (Sanchez & Ito, 2024). A contemporary study by Bertoli and Marconi (2025), analyzed that post-covid-19 data and found that trade openness's influence on tourism is more prominent in countries with strong digital infrastructure, easy visa processing, and focused marketing.

**RESEARCH METHODOLOGY**

This research investigates the influence of infrastructure and environmental quality on tourism in Pakistan. Therefore, for empirical analysis time series techniques have been used. Initially, unit root tests have been used to test the stationary/nonstationary. Later, based on the outcomes of the unit test the researchers have used Cointegration and FMOLS method. The timer period of the research is from 1975 to 2022, and data is obtained from the World Development Indicators (WDI).

Diagram 1: Time Series Analysis Workflow



The proposed regression equation is given below.

$$TOUR_t = \beta_0 + \beta_1 GDP_t + \beta_2 INFS_t + \beta_3 TOP_t + \beta_4 ENQL_t + \varepsilon_t$$

The dependent variable is tourism (*TOUR),* which is measured by the number of international visits arrivals. The independent variables include economic growth (*GDP*) which is measured by the natural log of GDP domestic product. Likewise, the second independent variable is Infrastructure (*Infs*). The proxy for environmental quality (*Enql) is* $CO_2$ emissions (metric tons per capita). Lastly, the proxy of trade openness (*top)* is trade as a percentage of GDP.

## DATA ANALYSIS AND RESULTS

### Descriptive Analysis

Table 1 shows the descriptive statistics of the variable of the study. The normality is determined by the Jarque-Bera test. The values of all the variable values are greater than 0.05, the Jarque-Bera test indicates that all variables are normally distributed. The values of the Skewness are less than 3, which indicates that they are bit platykurtic.

Table 1 Descriptive statistics

| | TOUS | GDPP | ENQL | TOP | INFTS |
|---|---|---|---|---|---|
| Mean | 21.02556 | 7.151243 | 11.79615 | 29.74581 | 15.12722 |
| Median | 21.19160 | 7.158838 | 11.85801 | 30.33319 | 15.03687 |
| Maximum | 21.92203 | 7.436002 | 12.19975 | 38.33013 | 15.66725 |
| Minimum | 19.91807 | 6.941077 | 11.32342 | 21.45997 | 14.57038 |
| Std. Dev. | 0.614214 | 0.165564 | 0.274396 | 4.464391 | 0.331376 |
| Skewness | -0.401402 | 0.195641 | -0.226298 | -0.017356 | 0.230775 |
| Kurtosis | 1.955031 | 1.769489 | 1.766351 | 2.081465 | 1.691587 |
| | | | | | |
| Jarque-Bera | 2.025865 | 1.945137 | 2.014522 | 0.985730 | 2.245801 |
| Probability | 0.363152 | 0.378111 | 0.365218 | 0.610874 | 0.325335 |
| | | | | | |
| Sum | 588.7157 | 200.2348 | 330.2921 | 832.8827 | 423.5623 |
| Sum Sq. Dev. | 10.18600 | 0.740105 | 2.032916 | 538.1314 | 2.964870 |
| | | | | | |
| Observations | 28 | 28 | 28 | 28 | 28 |

### Unite root test

Conducting a unit root test to assess stationarity is essential in time series analysis to distinguish between stationary and non-stationary data. Consequently, this study employs two distinct tests, namely the Augmented Dickey-Fuller (ADF) test and the Phillips-Perron (PP) test.

From Table 2 all variables, i.e., growth, tourism, infrastructure, environment quality, and trade openness are initially non-stationary at level and changed into stationary at the first difference for both ADF and PP tests.

**Table 2 Unit root test**

| Variable | Test | ADF Test Statistic | ADF p-value | PP Test Statistic | PP p-value |
|---|---|---|---|---|---|
| ***gdp*** | Level | 0.831277 | 0.9927 | -3.302918 | 0.0252 |
| | 1st Difference | -3.302918 | 0.0252 | -3.302918 | 0.0252 |
| ***Infts*** | Level | -1.615764 | 0.4606 | -3.376580 | 0.0214 |
| | 1st Difference | -3.376580 | 0.0214 | -3.303713 | 0.0251 |
| ***top*** | Level | -2.145571 | 0.2296 | -4.402324 | 0.0019 |
| | 1st Difference | -2.194196 | 0.2127 | -3.303713 | 0.0251 |
| ***Enql*** | Level | -1.432164 | 0.5517 | -4.290089 | 0.0025 |
| | 1st Difference | -1.406398 | 0.5642 | -4.285065 | 0.0026 |
| ***Tous*** | Level | -1.726000 | 0.4074 | -5.709387 | 0.0001 |
| | 1st Difference | -1.705101 | 0.4175 | -5.684852 | 0.0001 |

**Cointegration test**

The null hypothesis of no cointegration is rejected based on the results of the cointegration test (Table 3). The results of the Johansen Cointegration Test indicate there are two cointegrating equations among the variables, which suggests that long-term equilibrium relationships exist. The null hypotheses of no cointegration and at most one cointegrating equation are rejected by the Trace and Maximum Eigenvalue tests, which support this finding.

**Table 3 Johansen Cointegration Test**

| Hypothesized No. of Cointegrating Equations | Eigenvalue | Trace Statistic | Critical Value (0.05) | p-value (Trace) | Max-Eigen Statistic | Critical Value (0.05) | p-value (Max-Eigen) |
|---|---|---|---|---|---|---|---|
| None | 0.891290 | 110.2102 | 69.8189 | 0.0000 | 55.47670 | 33.87687 | 0.0000 |
| At most 1 | 0.689162 | 54.73349 | 47.85613 | 0.0099 | 29.21210 | 27.58434 | 0.0307 |
| At most 2 | 0.545043 | 25.52139 | 29.79707 | 0.1436 | 19.68882 | 21.13162 | 0.0786 |
| At most 3 | 0.187526 | 5.832567 | 15.49471 | 0.7152 | 5.191793 | 14.26460 | 0.7175 |
| At most 4 | 0.025305 | 0.640774 | 3.841465 | 0.4234 | 0.640774 | 3.841465 | 0.4234 |

**Long run Estimations**

The results of the cointegration have shown the long run relationships among the variables. Therefore, FMOLS has been employed, and results are presented in Table 4. The results have shown positive and major influence of the infrastructure development on tourism in Pakistan. Infrastructure has a significant role in enhancing tourism through easy accessibility and reducing the time to reach the destination. The study of (Jama et al., 2024) also showed a positive role of infrastructure and marketing strategies in attracting tourists. Likewise, a significant and positive relation between environmental quality and tourism in line with study of Pervaiz et al., (2025). Among all the explanatory variables trade openness

has an insignificant but positive influence on tourism. While the effect of economic growth on tourism is significant and positive.

**Table 4 Long**-Run Estimation Results (DOLS and FMOLS)

| Variables | FMOLS | | | DOLS | | |
|---|---|---|---|---|---|---|
| | Coefficient | t-stat | Prob. | Coefficient | t-stat | Prob. |
| *Infs* | 0.5441*** | 4.8545 | 0.0001 | 0.4704*** | 3.6003 | 0.0057 |
| *Enql* | 3.5896*** | 4.4985 | 0.0002 | 2.5085* | 1.8130 | 0.1032 |
| *Top* | 0.0073 | 0.7028 | 0.4892 | 0.0297 | 1.6149 | 0.1408 |
| *Gdp* | 1.3943*** | 4.8532 | 0.0001 | 1.5282*** | 4.5450 | 0.0014 |

Notes: Dependent variable is tourism. DOLS = Dynamic Ordinary Least Squares; FMOLS = Fully Modified Ordinary Least Squares. ***, **, and * denote statistical significance at the 1%, 5%, and 10% levels, respectively. Long-run coefficients are reported under cointegration.

## CONCLUSION AND RECOMMENDATIONS

This study examined the impact of infrastructure and environmental quality on tourism in Pakistan from 1975 to 2022. The researchers have employed the Fully Modified Ordinary Least Squares (FMOLS) method, following the results of unit root tests. Additionally, the Dynamic Ordinary Least Squares (DOLS) technique was utilized to verify the consistency of the findings. The results of FMOLS have shown long-term relationship among the variables, with infrastructure playing a significant role in enhancing tourism in Pakistan by improving accessibility and reducing time and cost. Similarly, the effect of environmental quality on tourism is also positive and significant. Given Pakistan's substantial potential for tourism, it is recommended that the government enhance infrastructure, such as roads, trains, and airports, in major tourist areas. Furthermore, environmental quality is a crucial factor in attracting tourists; therefore, policymakers should formulate policies to ensure sustainable tourism development. A primary limitation of this study is the exclusion of political stability and terrorism in Pakistan, which also influence tourism.

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