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C O N T E N T S

Tourism, Airline Industry, and Economic Growth In India

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Abstract

This study explores the evolving interconnections between tourism, the airline industry, and economic growth in India, using a panel dataset spanning selected states and union territories from 2010 to 2020. By employing panel data regression analysis, this study aims to provide a comprehensive understanding of how these sectors interact and mutually influence one another. The least squares regression analysis is adopted to examine the impact of tourism and the airline industry on economic growth in India. In addition, the Granger causality test is employed to determine the nature of causality between the selected variables. The findings indicate that both tourism and the airline industry exert a significant and positive influence on economic growth, as demonstrated through least squares regression analysis. These results highlight the critical role that service-based sectors, particularly tourism and aviation, play in accelerating economic development. The causality analysis yields further insights: a bidirectional causality is observed between the airline industry and economic growth, suggesting a mutually reinforcing relationship. As economic activity expands, demand for air travel rises, while a robust aviation sector further increases economic growth. In the case of tourism and economic growth, a unidirectional causality is identified, where economic growth drives an increase in tourism. Finally, a unidirectional causality is observed between the airline industry and tourism, wherein changes in the airline industry lead to changes in tourism. These findings carry important implications for policymakers, planners, and investors. To maximize the economic potential of tourism and air transport, a coordinated approach is required—one that integrates infrastructure development, marketing strategies, and supportive policy frameworks. As India continues to assert itself as a leading global economy and travel destination, focused investment in these interlinked sectors can serve as a catalyst for sustained economic growth. Strategic investment in aviation and tourism can generate long-term benefits with respect to regional connectivity, thereby promoting economic growth.

Keywords: Tourism, Airline Industry, Economic Growth, Least Squares Regression, Granger Causality Test.

Introduction

India's vast cultural heritage, breathtaking landscapes, and historical sites draw a significant number of tourists. Tourism is recognized as a vital catalyst for economic development, directly influencing income generation, investment opportunities, and infrastructure growth. The World Travel & Tourism Council highlights that the travel and tourism sector accounted for 9.1% of global Gross Domestic Product (GDP) in 2023 (WTTC, 2024). In the Indian context, tourism plays an essential role in providing livelihoods for local communities and driving overall economic progress (Saluja et al., 2022). Moreover, plenty of evidence indicates that increased tourism can help diminish income inequality and enhance investments in airline infrastructure. Consequently, the rise in tourism has provoked a heightened demand for air travel, leading to increased passenger movement (Alcalá-Ordóñez & Segarra, 2023; Almeida & Pinto Machado, 2021; Nguyen, 2021).

Air transport is well-regarded for its ability to stimulate economic activity, due to higher employment levels within the service sector by creating job opportunities in airports, hotels, and travel agencies. These jobs not only elevate individual incomes but also benefit the economy in general through increased consumer spending. Furthermore, air transport enhances route connectivity, thereby generating positive externalities, especially in developing nations where tourism is often a critical sector (Seetanah, 2011).

Tourism and air travel are intricately linked; the large influx of tourism, both business and leisure travel, has created an elevated demand for air travel. Air travel is often viewed as a derived demand, driven by tourism-related needs. As more individuals seek to explore new destinations or travel for business, the requirement for air transport naturally escalates (InterVISTAS, 2009; Iyer & Arabhi, 2012; Rodrigue, 2024). On the other hand, developments in the airline sector through improved services and better connectivity tend to encourage tourism in the country (Ansari, 2024; Papatheodorou, 2021).

The relationship among tourism, the airline industry, and economic growth is complex, while existing research suggests a strong link exists (Pulina, 2014). Causal relations vary depending on the country examined and the economic context during which existing studies were conducted. Certain studies indicate that economic growth

fuels the expansion of tourism and the airline industry, while others propose that the development of these sectors leads to economic growth (Balaguer & Cantavella-Jordá, 2002). Hence, the direction of causal relationships between these areas remains an area of active research. Understanding the dynamics of these interrelationships is crucial for policymakers aiming to enhance the tourism and aviation sectors for economic advancement.

India has experienced a strong growth rate in recent years, with a real Gross Value Added (GVA) of 7.2% in the Financial Year (FY) 2023-24 (MOSPI, 2025). The service sector is currently the dominant driver of this expansion, contributing 54.72% to India's GVA in FY 2023-24 (MOSPI, 2024). Within the services domain, tourism and aviation are increasingly recognized as critical engines of development.
While extensive literature explores the interactions among tourism, the airline industry, and economic growth, a notable gap persists regarding these dynamics in India. Many studies focus on broader regions or other countries, often overlooking the unique socio-economic and cultural factors that significantly shape these interactions in India. Furthermore, previous research often examines the relationships between tourism, the airline industry, and economic growth in isolation, failing to account for their interconnected nature. This can hinder a holistic understanding of how changes in one sector impact the others.

This study addresses this research gap by investigating the interrelationships among tourism, the airline industry, and economic growth, utilising data from specific states and union territories (UTs) in India. By employing least squares regression and Granger causality tests on panel data from 2010 to 2020, this research yields significant insights by examining the direction and strength of these linkages. Moreover, this study incorporates recent data, enhancing its relevance to current economic conditions. The objectives of the study are: (i) to assess the impact of tourism and the airline industry on economic growth in India, and (ii) to investigate the causal relationships among tourism, the airline industry, and economic growth.

Review of Literature

The relationship between tourism, the airline industry, and economic growth has attracted considerable interest in the realm of economic literature in recent years. Due to globalisation, the movement of people across borders has significantly increased, resulting in a surge in international travel and tourism. Scholars and researchers have utilized a diverse array of methodologies to delve into the intricate linkages that are present among these three sectors. Many studies highlight tourism as a crucial driver of Gross Domestic Product (GDP) growth, emphasising its role in generating income and creating jobs, while also recognizing the airline industry's significant contribution to enhancing economic activity by increasing connectivity and accessibility. These interactions are not uniform; they can differ significantly across different countries due to differences in economic structures, cultural contexts, and infrastructure development. This variability provides a solid foundation for a more comprehensive examination of how these sectors interact with one another. In order to capture the interconnectedness between the airline industry, tourism, and economic growth, the papers are reviewed under three broad categories, namely, (i) Tourism and economic growth, (ii) Airline industry and economic growth, and (iii) Airline industry and tourism.
A recent study conducted by Singh & Alam (2024) applied Johansen's cointegration and error correction model to study the tourism-economic growth nexus in India. The study concluded that investment in tourism and Gross Domestic Product (GDP) had a bidirectional causal relationship, whereas the remaining variables, such as central government expenditure on tourism, foreign tourist arrivals, and foreign tourist visits, depicted a unidirectional causal relationship on GDP. Ohlan (2017), in his study, highlighted the impact of tourism on Indian economic growth from 1960 to 2014 using the Bayer and Hanck combined test. The results depicted the presence of cointegration among tourism, economic growth, and financial development. Furthermore, a unidirectional causal relation running from tourism to economic growth was also found. Chulaphan & Barahona (2018) examined the tourism-led economic growth hypothesis in Thailand using cointegration analysis and the Granger causality method. They used international tourist arrivals from four continents and the industrial production index to represent economic growth. The findings revealed that South Asian tourist arrivals led to economic growth; additionally, Thailand's economic growth led to a rise in tourists from Oceania. Abbes et al. (2015) also employed the co-integration analysis and Granger causality test to explore the relationship between tourism spending and economic growth in 49 countries. A cointegration relationship and a bidirectional causal relationship were identified between economic growth and tourism. Chou (2013) studied the causality between tourism expenditure and economic growth across 10 transition countries from 1988 to 2011, using the bootstrap panel Granger causality technique. The findings differed among the countries, with some countries experiencing causality running from tourism spending to economic growth, other countries witnessing an absence of causality between the variables, and a few other countries having an inverse relationship. Dogan & Zhang (2023) employed a Common Correlated Effects (CCE) estimation technique to assess the relationship between tourist arrivals and economic growth from 1995 to 2019 in the Schengen area. Their findings confirmed a positive and significant relationship between tourism and economic growth from 1995 to 2003. However, during the global financial crisis (2007 to 2008) and the recession in Europe (2012 to 2013), the relationship was found to be negative. Atan &

Arslanturk (2012) evaluated the tourism and economic growth nexus using input-output analysis in Turkey. It was concluded that the tourism sector supports the output of other related sectors, along with improving economic growth.

An expanding body of literature focuses on the interrelation between the airline industry and economic growth. Profillidis & Botzoris (2015) used correlation analysis to study the link between air passenger movement and economic activity, and confirmed that the variables depicted a strong correlation. Carbo & Graham (2020) used a causal analysis to assess the effects of air transport on the economy in the Chinese provinces. The authors discovered that the rise in air passengers and air cargo positively impacts the economy. Hu et al. (2015) adopted the Granger causality analysis to study the relationship between domestic air passenger movement and China's economic growth. The authors identified a short-term unidirectional causality, wherein domestic air passenger movement influences economic growth, along with a bidirectional causal relationship in the long term between the two variables. Marazzo et al. (2010) also used the Granger Causality technique to evaluate the connection between air transportation demand and Brazil's economic growth, and concluded that passenger movement and GDP are co-integrated. Kiracı & Bakır (2019) studied the causal interactions involving air transportation and economic growth among selected countries from 1990 to 2016 using the bootstrap panel Granger causality analysis, and the panel causality test used for heterogeneous mixed models. The results were mixed depending on the country's income level; however, a considerable number of countries reported a bidirectional causal relation between air transportation and economic growth. Kumar & Patel (2023) estimated the impact of international air arrivals on Fiji's economic growth from 1975 to 2017 using the Nonlinear Autoregressive Distributed Lag (NARDL) technique. The findings indicated that a decline in air arrivals creates a stronger impact on economic growth as compared to an increase in air arrivals. Raihan et al. (2024) examined the interrelation between Malaysian air transport and economic growth from 1970 to 2020, using the Autoregressive Distributed Lag (ARDL) technique, and concluded that air travel improves Gross Domestic Product (GDP) in the short term and long term. Hanson et al. (2022) also used the ARDL method and explored the causal relationship between the real GDP and air travel demand in the United States of America (USA) from 1972 to 2018. The authors concluded that the variables depicted a bidirectional causality between each other.

There are studies that have analysed the relationship between the airline industry and tourism. Eric et al. (2020) studied the impact of air connectivity on tourism development and welfare in Kenya. The authors used a gravity model and found a strong connection between air connectivity and passengers, thereby leading to tourism expansion. Tang et al. (2023) used a dynamic panel model to highlight the impact of the number of air routes on international tourist arrivals in China. Air routes have a positive influence on tourist arrivals. Küçükönal & Sedefoğlu (2017) applied the panel Granger causality analysis to determine the causality between air travel, Gross Domestic Product (GDP), tourism, and employment, in the Organisation for Economic Cooperation and Development (OECD) countries from 2000 to 2013. The findings reveal a unidirectional causal relation from economic growth, tourism, and employment towards air travel in the short run.

The literature highlights a strong and dynamic relationship among tourism, the airline industry, and economic growth, though the nature of this relationship varies across countries. Tourism is widely recognised as a key driver of GDP, with studies showing both unidirectional and bidirectional causality. Similarly, air transport significantly contributes to economic growth, although this connection may differ by country and income level. Finally, evidence suggests that tourism demand can stimulate growth in the airline sector. Despite these insights, region-specific studies, especially in the Indian context, remain limited, indicating the need for further focused research.

This study is original and adds to the body of research as it focuses on the joint impact of tourism and the airline industry on India's economic growth. Considering that studies in tourism and economic growth in the Indian context have mixed results (Singh & Alam, 2024), this study will offer important insights into their relationship. The study also examines the causality among the three variables: Total Tourist Visits (TTV), Indian National Departures (IND), and Gross State Domestic Product (GSDP), which are used to represent tourism, the airline industry, and economic growth, respectively. The study uses more recent data, and the variables chosen are more representative. The study is unique in the Indian context, which will add to the existing body of knowledge.

Research Methodology

This section presents the description of the panel data used in the study, along with the source. It also outlines the least squares regression model used for analysis. Finally, it states the hypotheses for the Levin-Lin-Chu unit root test, which is a prerequisite for the Granger causality test.

Data Description

The study explores the relationship between three variables: Total Tourist Visits (TTV), Indian National Departures (IND), and Gross State Domestic Product (GSDP). The panel dataset consists of 66 observations with six states/union territories (UTs) in India spanning from 2010 to 2020. The following states/UTs were selected

based on the highest percentage of airport-wise IND in 2021: New Delhi, Maharashtra, Kerala, Tamil Nadu, Karnataka, and West Bengal. It may be noted that Hyderabad airport, currently in Telangana, was excluded from the study despite having a high percentage share of IND, as it belonged to Andhra Pradesh before the bifurcation in 2014. By excluding Hyderabad, the study eliminates potential discrepancies caused by the formation of a new state, such as changes in governance, resource allocation, infrastructure development, or any other effects of state bifurcation specific to Telangana post-2014. The selected airports represent a wide geographic coverage in India, ensuring the analysis captures national trends. Even without Hyderabad, the selected airports cover key regions across North, South, East, and West India, providing a balanced representation of the Indian aviation trends. According to the Ministry of Tourism, the joint percentage share of IND in the selected airports amounts to 78.8% (Ministry of Tourism, 2022).

Table No.1: describes the variables used in the study, the sectors they represent (tourism, airline industry, and economy), and their respective sources of data.

Table 1: Description of Variables

Variable	Measurement	Description	Source
Tourism	Total Tourist Visits (TTV)	TTV refers to the total number of tourist visits (both international and domestic) to the respective states/UTs.	Ministry of Tourism, 'India Tourism Statistics'
Airline industry	Indian National Departures (IND)	IND refers to the departures of Indian nationals from the select states/UTs.	Ministry of Tourism, 'India Tourism Statistics'
Economy	Gross State Domestic Product (GSDP)	The GSDP at current prices was used with the base year 2011-12. The amount is represented in ₹ Lakh.	RBI, 'Handbook of Statistics on Indian States, Publications'

Source: Compiled by authors.

Least Squares Regression Model

The Least Squares regression model is applied to the panel dataset to assess the impact of tourism and the airline industry on economic growth. The general functional form of the model is developed as follows:

$$〖GSDP〗_{it} = \beta_0 + \beta_1 (〖TTV〗_{(it-1)}) + \beta_2 (〖IND〗_{(it-1)}) + u_{it} \quad (1)$$

All variables are transformed to natural logarithmic form (ln), so the coefficients are in the form of elasticities. The independent variables are lagged in order to reflect the time taken for their changes to reflect on the dependent variable. The log-log model is presented as follows:

$$\ln(〖GSDP〗_{it}) = \beta_0 + \beta_1 \ln(〖TTV〗_{(it-1)}) + \beta_2 \ln(〖IND〗_{(it-1)}) + u_{it} \quad (2)$$

where:

- ln(GSDPit) = log of Gross State Domestic Product for state i at time t.
- ln(TTVit-1) = lagged log of Total Tourist Visits.
- ln(INDit-1) = lagged log of Indian National Departures.
- uit = error term.

Levin-Lin-Chu unit root test

Before conducting the Granger causality test, it is essential to confirm the stationarity of the panel data series. The three variables, ln(GSDP), ln(TTV), and ln(IND), are examined for stationarity using the Levin-Lin-Chu unit root test. The hypothesis is described as follows:

H0 = The series is non-stationary, i.e., panel data contains a unit root

HA = The series is stationary, i.e., panel data does not contain a unit root

This step ensures the validity of further analysis.

Granger Causality Test

After establishing the order of integration of the variables under study, the Granger causality test is employed to determine whether a causal relationship exists between the specified variables. The Granger causality test yields significant insights into the directionality of the relationships among the variables.

RESULTS

The summary statistics, results of the least squares regression analysis, the unit root test results, and the findings of the Granger causality analysis are depicted in Tables 2, 3, 4, and 5, respectively.

Summary Statistics

Table 2 depicts the summary statistics for the variables in the study: ln(GSDP), ln(TTV), and ln(IND). The Jarque-Bera test was utilized to test the normality of the variables. Upon analysing all three variables, it was determined that the null hypothesis of normality could not be rejected at a 5% level of significance, indicating no significant deviation from normality. Consequently, the three variables under consideration exhibit a normal distribution; the assumption of normality is crucial for the statistical analyses employed in this study.

Table 2: Summary Statistics

Statistic	***ln(GSDP)***	***ln(TTV)***	***ln(IND)***
Mean	18.31261	17.85094	14.44943
Median	18.22285	18.08614	14.52766
Maximum	19.42665	20.03358	15.60139
Minimum	17.22554	15.48881	12.24126
Std. Dev.	0.556474	1.115475	0.822210
Skewness	0.103982	-0.022544	-0.536563
Kurtosis	2.275163	2.035452	2.337205
Jarque-Bera	1.563754	2.564063	4.374969
Probability	0.457546	0.277473	0.112199
Sum	1208.632	1178.162	953.6624
Sum Sq. Dev.	20.12814	80.87852	43.94192
Observations	**66**	**66**	**66**

Source: Authors' calculation.

Least Squares Regression Analysis

The results of the least squares regression analysis are presented in Table 3. The impact of ln(TTVit-1) and ln(INDit-1) on ln(GSDPit) is examined. Both the independent variables are lagged by one year to reflect the delayed impact of tourism and airline activity on economic growth.

The estimated coefficients are both statistically significant at the 1% level. A 1% increase in ln(TTVit-1) leads to a 0.41% increase in ln(GSDPit), while a 1% increase in ln(INDit-1) leads to a 0.21% increase in ln(GSDPit), in the short run.

The model's adjusted R-squared is 0.6909, indicating that 69.09% of the variation in the dependent variable, ln(GSDPit), is explained by the model. The F-statistic value of 66.951 and its corresponding p-value of 0.000 indicate that the regression model is statistically significant overall.

Table 3: Least Squares Regression Analysis

Variable	**Coefficient**	**Std. Error**	**t-Statistic**	**Prob.**
Constant (C)	7.999	1.074	7.446	0.000 ***
$ln(TTV_{it-1})$	0.409	0.035	11.537	0.000 ***
$ln(IND_{it-1})$	0.209	0.015	4.069	0.000 ***
Adjusted R-Squared	0.6909			
F-statistic	66.951			
p-value	0.000 ***			

Note: *** indicates statistical significance at the 1% level. Source: Authors' calculation.

Stationarity Check: Levin-Lin-Chu Unit Root Test

Before conducting a Granger causality test, it is crucial to verify that the panel data series are stationary. This step ensures the validity of the subsequent analyses. The findings of the Levin-Lin-Chu unit root test, presented in Table 4, show the stationarity properties of the variables.
At the level form, all three variables are non-stationary, as the null hypothesis of a unit root is not rejected. However, upon taking the first difference of each variable, the variables become stationary with p-values well below the 0.05 threshold. The null hypothesis was rejected, confirming that the differenced variables exhibit stationarity. This confirms that all variables are integrated of order one, denoted as I(1), and are therefore suitable for use in the Granger causality test.

Table 4: Levin-Lin-Chu Unit Root Test

Form of variable	Variable	LCC Test statistic	p-value	Inference
Log form (Level)	*ln(GSDP)*	-0.22987	0.4091	Non-stationary
	ln(TTV)	-0.37434	0.3541	Non-stationary
	ln(IND)	-0.97342	0.1652	Non-stationary
1st difference of log	*d_ln(GSDP)*	-4.86811	0.0000 ***	Stationary
	d_ln(TTV)	-3.44002	0.0003 ***	Stationary
	d_ln(IND)	-2.75718	0.0029 ***	Stationary

Note: *** indicates statistical significance at the 1% level. Source: Authors' calculation.

Granger Causality Test
Table 5 depicts the results of the Granger causality test among the three pairs of variables. At a 5% level of significance, the Granger causality test suggests the following;
Causality between d_ln(TTV) and d_ln(GSDP): The null hypothesis that d_ln(TTV) does not Granger-cause d_ln(GSDP) is not rejected (p = 0.2387), while the null that d_ln(GSDP) does not Granger-cause d_ln(TTV) is rejected (p = 0.00001). This indicates a unidirectional causality from d_ln(GSDP) to d_ln(TTV).

Causality between d_ln(IND) and d_ln(GSDP): Both null hypotheses are rejected (p = 0.0037 and p = 0.0003), indicating a bidirectional causality between d_ln(IND) and d_ln(GSDP).

Causality between d_ln(TTV) and d_ln(IND): The null that d_ln(TTV) does not Granger-cause d_ln(IND) is not rejected (p = 0.9467), but the reverse is rejected (p = 0.0118), indicating a unidirectional causality from d_ln(IND) to d_ln(TTV).

Table No. 5: Granger Causality Test

Null hypothesis	F-statistic	Probability	Inference
d_ln(TTV) does not Granger-cause *d_ln(GSDP)*	1.421	0.2387	Not rejected null hypothesis
d_ln(GSDP) does not Granger-cause *d_ln(TTV)*	24.152	0.00001 ***	Rejected null hypothesis
d_ln(IND) does not Granger-cause *d_ln(GSDP)*	9.256	0.0037 ***	Rejected null hypothesis
d_ln(GSDP) does not Granger-cause *d_ln(IND)*	14.999	0.0003 ***	Rejected null hypothesis
d_ln(TTV) does not Granger-cause *d_ln(IND)*	0.004	0.9467	Not rejected null hypothesis
d_ln(IND) does not Granger-cause *d_ln(TTV)*	6.818	0.0118 **	Rejected null hypothesis

Note: *** and ** indicate statistical significance at the 1% and 5% levels, respectively.
Source: Authors' calculation

DISCUSSION
Least Squares Regression Analysis
The regression results indicate that both tourism and the airline industry exert a significant and positive influence on economic growth in India. The elasticity coefficient of 0.41 for Total Tourist Visits (TTV) confirms that tourism is crucial in stimulating regional economic activity. This finding supports previous research by Atan & Arslanturk (2012) and Ohlan (2017), which also observed a growth-enhancing effect of tourism.

Similarly, the coefficient of 0.21 for Indian National Departures (IND) highlights the contribution of the aviation sector to economic growth. These findings are consistent with existing studies (Carbo & Graham, 2020; Dimitrios et al., 2017; İnan, 2021; Raihan et al., 2024).

The lag structure used in the model reflects the reality that economic growth responses to tourism and air transport activities are not immediate, but change over time. The strength and statistical significance of the model validate the importance of both sectors in India's economic development.

Interpretation of Unit Root Results

The results of the Levin–Lin–Chu unit root test confirm that the natural log forms of the variables ln(GSDP), ln(TTV), and ln(IND) are non-stationary at the level form but become stationary after first differencing. This finding implies that the series exhibits unit roots.

The confirmation of integration at order one, I(1), satisfies the prerequisite for applying the Granger causality test, as causality testing requires stationary data to avoid spurious results. These results validate the assumptions of the causality analysis.

Interpretation of Granger Causality

The Granger causality analysis provides important insights into the relationships among tourism, the airline industry, and economic growth in India.

First, the unidirectional causality from d_ln(GSDP) to d_ln(TTV) suggests that economic growth acts as a driver of tourism activity. This aligns with similar findings from Chulaphan & Barahona (2018) in Thailand.

Second, the bidirectional causality between d_ln(IND) and d_ln(GSDP) implies a mutually reinforcing relationship between the airline industry and economic growth. This finding is consistent with Hu et al. (2015) wherein a similar interdependency was observed in China. It suggests that a strong air transport sector leads to economic expansion and vice versa.

Lastly, the unidirectional causality from d_ln(IND) to d_ln(TTV) reveals that improvements in air travel—such as increased departures or better air connectivity—stimulate tourism, while tourism itself does not appear to drive changes in airline departures. This emphasizes the airline industry's role as a facilitator of tourism rather than the reverse.

Overall, the findings highlight that economic growth appears to drive changes in tourist movements, while air travel also appears to influence tourist visits. However, tourist visits do not significantly predict either economic growth or air travel. Additionally, a bidirectional relationship between air travel and economic growth indicates a strong interdependent relationship between the two variables.

Conclusion

The study analysed data from 2010 to 2020 and explored the relationship between tourism, the airline industry, and economic growth. It may be concluded from the study that the tourist visits and air travel by Indians play an important role in the expansion of India's Gross State Domestic Product (GSDP), promoting economic growth. Furthermore, the study led us to conclude that there is an interdependence between tourist visits, air travel, and economic growth. The Granger causality test unravelled a bidirectional causality between air travel and economic growth, a unidirectional causality between economic growth and tourism, and a unidirectional causality between the airline industry and tourism, supporting the interdependence.

These findings emphasise the interconnectedness of the tourism and aviation sectors with the overall economy, illustrating their critical roles in fostering economic development. This connection presents significant implications for policymakers focused on promoting economic growth. By strategically enhancing tourism and increasing investments in the airline industry, the country can experience notable economic advancement. Policymakers should prioritize improvement in route connectivity and the enhancement of airport infrastructure, ensuring that facilities can accommodate growing passenger volumes. This will create a dual benefit of stimulating tourism along with enhancing economic growth. Economic growth, in turn, will enable investments in the airline industry, as well as support tourism and its related industries.

References

Abbes, S. M., Mostéfa, B., Seghir, G., & Zakarya, G. Y. (2015). Causal Interactions between FDI, and Economic Growth: Evidence from Dynamic Panel Co-integration. Procedia Economics and Finance, 23, 276–

290. https://doi.org/10.1016/S2212-5671(15)00541-9
Alcalá-Ordóñez, A., & Segarra, V. (2023). Tourism and economic development: A literature review to highlight main empirical findings. Tourism Economics, 13548166231219638. https://doi.org/10.1177/13548166231219638

Almeida, A., & Pinto Machado, L. (2021). Rural Development and Rural Tourism: The Impact of Infrastructure Investments. https://doi.org/10.5772/intechopen.95610

Ansari, M. A. (2024). Tourism and Economic Growth: Evidence from Cross-Country Data with Policy Insights. Journal of the Knowledge Economy. https://doi.org/10.1007/s13132-024-02031-7

Atan, S., & Arslanturk, Y. (2012). Tourism and Economic Growth Nexus: An Input Output Analysis in Turkey. Procedia - Social and Behavioral Sciences, 62, 952–956. https://doi.org/10.1016/j.sbspro.2012.09.162

Balaguer, J., & Cantavella-Jordá, M. (2002). Tourism as a long-run economic growth factor: The Spanish case. Applied Economics, 34(7), 877–884. https://doi.org/10.1080/00036840110058923

Carbo, J. M., & Graham, D. J. (2020). Quantifying the impacts of air transportation on economic productivity: A quasi-experimental causal analysis. Economics of Transportation, 24, 100195. https://doi.org/10.1016/j.ecotra.2020.100195

Chou, M. C. (2013). Does tourism development promote economic growth in transition countries? A panel data analysis. Economic Modelling, 33, 226–232. https://doi.org/10.1016/j.econmod.2013.04.024

Chulaphan, W., & Barahona, J. F. (2018). Contribution of disaggregated tourism on Thailand's economic growth. Kasetsart Journal of Social Sciences, 39(3), 401–406. https://doi.org/10.1016/j.kjss.2017.07.012

Dimitrios, D. J., John, M. C., & Maria, S. F. (2017). Quantification of the air transport industry socio-economic impact on regions heavily depended on tourism. Transportation Research Procedia, 25, 5242–5254. https://doi.org/10.1016/j.trpro.2018.02.051

Dogan, E., & Zhang, X. (2023). A nonparametric panel data model for examining the contribution of tourism to economic growth. Economic Modelling, 128, 106487. https://doi.org/10.1016/j.econmod.2023.106487

Eric, T. N., Semeyutin, A., & Hubbard, N. (2020). Effects of enhanced air connectivity on the Kenyan tourism industry and their likely welfare implications. Tourism Management, 78, 104033. https://doi.org/10.1016/j.tourman.2019.104033

Hanson, D., Toru Delibasi, T., Gatti, M., & Cohen, S. (2022). How do changes in economic activity affect air passenger traffic? The use of state-dependent income elasticities to improve aviation forecasts. Journal of Air Transport Management, 98, 102147. https://doi.org/10.1016/j.jairtraman.2021.102147

Hu, Y., Xiao, J., Deng, Y., Xiao, Y., & Wang, S. (2015). Domestic air passenger traffic and economic growth in China: Evidence from heterogeneous panel models. Journal of Air Transport Management, 42, 95–100. https://doi.org/10.1016/j.jairtraman.2014.09.003

İnan, T. T. (2021). The Determination of the Factors Affecting Air Transportation Passenger Numbers. The Determination of the Factors Affecting Air Transportation Passenger The Determination of the Factors Affecting Air Transportation Passenger Numbers Numbers. https://www.academia.edu/75928741/The_Determination_of_the_Factors_Affecting_Air_Transportation_Passenger_Numbers

InterVISTAS. (2009). The Impact of International Air Service Liberalisation on India. https://www.iata.org/en/iata-repository/publications/economic-reports/india-benefits-from-further-liberalization/

Iyer, R., & Arabhi, M. (2012). Introduction to tourism and ecotourism: Indian context. http://awsassets.wwfindia.org/downloads/course_1__block_2.pdf

Kiracı, K., & Bakır, M. (2019). Causal Relationship Between Air Transport and Economic Growth: Evidence from Panel Data for High, Upper-Middle, Lower-Middle and Low-Income Countries. https://www.academia.edu/41398533/Causal_Relationship_Between_Air_Transport_and_Economic_Growth_Evidence_from_Panel_Data_for_High_Upper_Middle_Lower_Middle_and_Low_Income_Countries

Küçükönal, H., & Sedefoğlu, G. (2017). The Causality Analysis of Air Transport and Socio-economics Factors: The Case of OECD Countries. Transportation Research Procedia, 28, 16–26. https://doi.org/10.1016/j.trpro.2017.12.164

Kumar, N. N., & Patel, A. (2023). Nonlinear effect of air travel tourism demand on economic growth in Fiji. Journal of Air Transport Management, 109, 102402. https://doi.org/10.1016/j.jairtraman.2023.102402

Marazzo, M., Scherre, R., & Fernandes, E. (2010). Air transport demand and economic growth in Brazil: A time series analysis. Transportation Research Part E: Logistics and Transportation Review, 46(2), 261–269. https://doi.org/10.1016/j.tre.2009.08.008

Ministry of Tourism. (2022). India Tourism Statistics. https://tourism.gov.in/sites/default/files/2023-01/India%20Tourism%20Statistics%20English%202022%20%28Revise%29%20%281%29.pdf

MOSPI. (2024, October 2). India GDP sector-wise 2024—StatisticsTimes.com. https://www.statisticstimes.com/economy/country/india-gdp-sectorwise.php

MOSPI. (2025, January 7). FIRST ADVANCE ESTIMATES OF GROSS DOMESTIC PRODUCT, 2024-25. https://www.pib.gov.in/www.pib.gov.in/Pressreleaseshare.aspx?PRID=2090875

Nguyen, Q. H. (2021). Impact of Investment in Tourism Infrastructure Development on Attracting International Visitors: A Nonlinear Panel ARDL Approach Using Vietnam's Data. Economies, 9(3), Article 3. https://doi.org/10.3390/economies9030131

Ohlan, R. (2017). The relationship between tourism, financial development and economic growth in India. Future Business Journal, 3(1), 9–22. https://doi.org/10.1016/j.fbj.2017.01.003

Papatheodorou, A. (2021). A review of research into air transport and tourism: Launching the Annals of Tourism Research Curated Collection on Air Transport and Tourism. Annals of Tourism Research, 87, 103151. https://doi.org/10.1016/j.annals.2021.103151

Profillidis, V., & Botzoris, G. (2015). Air passenger transport and economic activity. Journal of Air Transport Management, 49, 23–27. https://doi.org/10.1016/j.jairtraman.2015.07.002

Pulina, M. (2014). Has the tourism-led growth hypothesis been validated? A literature review. Current Issues in Tourism. https://www.academia.edu/117777215/Has_the_tourism_led_growth_hypothesis_been_validated_A_literature_review

Raihan, A., Voumik, L. C., Akter, S., Ridzuan, A. R., Fahlevi, M., Aljuaid, M., & Saniuk, S. (2024). Taking flight: Exploring the relationship between air transport and Malaysian economic growth. Journal of Air Transport Management, 115, 102540. https://doi.org/10.1016/j.jairtraman.2024.102540

Rodrigue, J.-P. (2024). Air Transportation Growth and Economic Growth, 1950-2020 | The Geography of Transport Systems. https://transportgeography.org/contents/chapter5/air-transport/air-transport-economic-growth/

Saluja, V., Anand, S., Kumar, H., & Peng, J. (2022). The perceived impact of tourism development and sustainable strategies for residents of Varkala, South India. International Journal of Geoheritage and Parks, 10(2), 184–195. https://doi.org/10.1016/j.ijgeop.2022.03.003

Seetanah, B. (2011). Assessing the dynamic economic impact of tourism for island economies. Annals of Tourism Research, 38(1), 291–308. https://doi.org/10.1016/j.annals.2010.08.009

Singh, D., & Alam, Q. (2024). Is tourism expansion the key to economic growth in India? An aggregate-level time series analysis. Annals of Tourism Research Empirical Insights, 5(2), 100126. https://doi.org/10.1016/j.annale.2024.100126

Tang, J., Wu, H., Ramos, V., & Sriboonchitta, S. (2023). The impact of international air routes on tourism. Annals of Tourism Research, 101, 103583. https://doi.org/10.1016/j.annals.2023.103583

WTTC. (2024). Travel & Tourism Economic Impact | World Travel & Tourism Council (WTTC). https://wttc.org/research/economic-impact