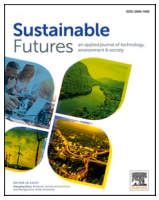
Sustainable Futures 12 (2026) 102157



Contents lists available at ScienceDirect

Sustainable Futures

journal homepage: www.sciencedirect.com/journal/sustainable-futures



Macroeconomic, digital and environmental drivers of tourism demand in low-arrival countries: Implications for sustainable development

Rangana Munasinghe [a], Dulitha Chathurika [a], Jithmini Fernando [a], Mewna Maduwanthi [a], Ruwan Jayathilaka [b], Lochana Perera [a,*]

[a] SLIIT Business School, Sri Lanka Institute of Information Technology, New Kandy Road, Malabe, Sri Lanka
[b] Department of Information Management, SLIIT Business School, Sri Lanka Institute of Information Technology, New Kandy Road, Malabe, Sri Lanka

ARTICLE INFO

Keywords:
Tourism demand
Low tourist arrival countries
Inflation
Exchange rate
Per capita GDP
Internet usage
CO_2
Panel data

ABSTRACT

Tourism demand plays a critical role in employment generation, economic growth, and foreign exchange earnings, particularly in economies with limited external income sources. Despite the global expansion of tourism, several countries continue to experience persistently low levels of international visitor arrivals. Understanding the determinants of tourism demand in these low-arrival economies is therefore essential for inclusive and sustainable development. This study examines the impact of inflation, exchange rates, internet usage, carbon dioxide (CO_2) emissions, and per capita GDP on tourism demand across 20 low tourist arrival countries over the period 2010–2023. A panel regression framework, complimented by cross-country multiple linear regression, is employed to analyse these relationships. The indicate that exchange rate movements and per capita GDP are positively associated with tourism demand, reflecting the roles of price competitiveness and economic capacity. In contrast, the effects of CO_2 emissions, internet usage, and inflation are heterogeneous and context-dependent, highlighting variations in environmental conditions, digital readiness, and macroeconomic stability. Overall, the results underscore the importance of context-specific tourism strategies in low-arrival economies. From a sustainability perspective, the findings reveal trade-offs between economic competitiveness, digital expansion, and environmental pressures, emphasising the need for policies that balance short-term tourism growth with long-term sustainable development objectives.

1. Introduction

Tourism demand plays a critical role in economic growth, employment generation, and foreign exchange earnings, particularly in economies with low tourist arrivals and limited alternative sources of economic growth. Global tourism statistics show that, despite modest arrival numbers, tourism revenues account for a substantial share of service sector activity in several low arrival countries. In many small and emerging economies, tourism contributes between seven and ten percent of GDP [1]. This suggests that in these economies, even small shifts in tourism demand might have significant macroeconomic effects.

Economies with low tourist arrivals are distinct from those with high arrivals. Strong infrastructure, a variety of tourism products, well-known travel brands, and steady demand trends serve high-arrival nations. In contrast, low-arrival countries often face limited global visibility, inadequate infrastructure, lower levels of digital adoption, and higher sensitivity to environmental and macroeconomic shocks. These economies are more affected by inflation, exchange rate, and income variations, which can directly affect travel expenses and destination competitiveness, according to development indicators [2]. For the countries with low arrivals, tourism serves as a key sector for economic diversification and long-term growth.

This difference is further highlighted by statistical evidence. While a small number of nations account for the majority of all tourist arrivals worldwide, many nations receive fewer than one million visitors each year, despite significantly depending on tourism for employment and foreign exchange generation [1]. Therefore, findings from high-arrival destinations cannot be directly generalised to low-arrival economies because the dynamics of tourism demand are more volatile and context specific.

The literature on tourism demand has made significant progress in identifying key factors influencing tourism flows, particularly income, pricing, and exchange rates. However, most of the empirical data currently available comes from research focused on developed

* Corresponding author.
E-mail address: lakshani.p@sliit.lk (L. Perera).

https://doi.org/10.1016/j.sftr.2026.102157
Received 12 February 2026; Received in revised form 30 July 2026; Accepted 14 September 2026
Available online 19 September 2026
2666-1888/© 2026 The Authors. Published by Elsevier Ltd. This is an open access article under the CC BY license (http://creativecommons.org/licenses/by/4.0/).

economies and tourism destinations with high tourist arrivals. These studies frequently make assumptions about well-established tourism markets, sophisticated digital systems, and strong infrastructure conditions that are rarely found in low arrival environments.

The dependence on high arrival destinations includes unspoken assumptions that tourism demand responds effectively to economic signals and digital availability, as stated in international tourism and development assessments [1,3]. However, weak institutional capabilities, a lack of a digital tourism strategy, and environmental vulnerabilities may alter these connections in low-tourist nations, limiting the applicability of existing findings.

The current literature reveals several gaps. First, there aren't many comprehensive empirical models that examine the environmental, digital, and macroeconomic factors that influence tourism demand. Most of the research examines these variables independently, leading to a fragmented view of tourism demand dynamics, especially in economies with underlying constraints.

Second, there remains a lack of panel-based comparative data for countries with low tourist arrivals. Panel methods are increasingly employed in tourist research; however, they are primarily used to establish or popularise destinations. The necessity of comparative panel evidence to capture time variation and cross-country heterogeneity in low arrival economies is still emphasised in policy-oriented studies [2, 4]. The use of panel regression allows the survey to capture both cross-country effects and changes over a specific period.

Third, cross-country variation in tourism demand responses is hardly examined in current research. Many assume that effects are uniform across nations, ignoring the fact that, depending on national conditions, factors such as inflation, digitalisation, or environmental performance may affect tourism demand differently. This gap limits the relevance of current research for policy planning in countries with low tourism arrivals.

Understanding these dynamics is essential not only for improving tourism performance, but also for shaping sustainable tourism futures in low-arrival economies, where short-term demand expansion may conflict with long-term environmental resilience and digital inclusiveness.

This study's primary goal is to close these gaps by evaluating the effects of inflation, exchange rates, per capita GDP, internet usage and carbon dioxide emissions on tourism demand in countries with low tourist arrivals. The study specifically addresses the following research question: How does inflation affect tourism demand in low-tourist-arrival countries? How do fluctuations in exchange rates affect tourism demand? What is the relationship between tourism demand and economic progress as determined by per capita GDP? How does internet usage affect the need for travel, and what is the impact of environmental performance, as measured by CO_2 emissions, on tourism demand?

This study makes three significant contributions to the literature on tourism demand. By explicitly considering the distinct structural and economic circumstances of low-tourist-arrival nations, whose demand responses may vary from those observed in high-arrival locations, it theoretically extends tourism demand theory.

In terms of methodology, the study uses cross-country multiple linear regression together with panel regression approaches to identify both general trends and country-specific effects. Compared to a single country or only cross-sectional analysis, this method offers more robust and comprehensive evidence.

From a policy perspective, the results provide context-based information for developing tourism policies in economies with low tourist arrivals. The paper promotes evidence-based tourism strategy that is adapted to locations with structural constraints by emphasizing the significance of macroeconomic stability, digital readiness, and environmental performance.

The structure of the paper is as follows: the literature is reviewed, and the hypotheses are developed in Section 2. The conceptual framework is presented in Section 3. The data and technique are explained in Section 4. The empirical findings are presented in Section 5. The results are discussed in Section 6, and policy implications, limitations, and future research objectives are discussed in Section 7.

2. Literature review

2.1. Tourism demand in low arrival economies

Several fundamental economic and non-economic factors, including income levels, relative prices, currency rates, technological advancement, and environmental factors, are used by traditional tourism demand models to explain tourist flows. These models have been used extensively to comprehend demand trends and tourism behaviour. However, their capacity to capture cross-national variations and changing tourist dynamics is constrained by their essentially static structure and dependence on constructive concepts. Classical models are insufficient on their own because tourism demand differs among sites and evolves. To capture heterogeneity, dynamic impacts, and more precise correlations impacting tourism demand, new empirical research has been expanding these models utilising panel data methodologies.

2.2. Macroeconomic determinants of tourism demand

2.2.1. Inflation and tourism demand

The interconnectedness between demand for tourism and inflation is usually distinguished by the influence of rising prices on the cost of travel and accommodation. The prior study has focused on the exchange rate's considerable negative impact on internal tourism. The author argues that devaluing the euro may increase tourists' attraction to the region [5,6]. The bilateral distance and the wide-ranging difficulties, such as COVID-19, negatively influence tourism. In contrast, it is positively associated with the size of the population, income per capita, geographical contiguity, and political stability, which are also recognised as pivotal pull factors [7]. It emphasises a relationship between the reduction in GDP in 2020 and the tourism share of GDP, pointing out that tourism-dependent countries such as Spain and Italy endure more severe economic setbacks [8,9].

Furthermore, evidence from Spain demonstrates that the relative price index (a proxy for inflation) exhibits a considerable negative correlation with long-term tourism demand. An upsurge in relative prices reduces the destination's competitiveness over time, leading to a decline in arrivals [10]. Moreover, the results of the study prove that the tourism-led growth hypothesis holds that inbound tourists have beneficial impacts on economic development while also affecting inflation. This research extends existing literature by incorporating both positive and negative consequences. In our study, it also depicts both positive and negative effects; therefore, the outcomes can be either positive or negative. Overall, existing studies suggest that inflation generally reduces tourism demand by increasing travel costs and reducing destination competitiveness, although the magnitude and direction may vary across contexts.

2.2.2. Exchange rate movements and price competitiveness

The interrelation between exchange rates and characteristics of the demand for tourism is a key theme in current evidence-based literature, frequently distinguished by substantial asymmetries and fluctuating directional outcomes, as identified across 47 developing countries [11]. A reduction in the household currency value, illustrated as an uplift in the exchange rate, has a positive effect on international tourist arrivals by making the destination more affordable.

In contrast, past studies recognised a general negative relationship between real exchange rates and the demand for tourism in famous European destinations, pointing out that currency appreciation generally acts as a powerful disincentive to arrivals compared to depreciation, which acts as an enhancer [11,12]. Further supporting this asymmetric point of view, past studies illustrated that outgoing migrants, like those who travel from Thailand to Asian destinations, are more responsive to

the depreciation of currency in countries that are targeted as destinations compared to appreciations, in accordance with prospect theory's priority on estimated cost savings [13,14]. The findings of the past study emphasise that exogenous shocks contribute to the depreciation of the exchange rate in tourism-dependent African regions, which can trigger considerable reductions in welfare and increased production costs, further aggravating the sector's consistency [15,16]. While prior studies have highlighted the adverse outcomes, our study highlights the positive side of the exchange rate on tourism demand. As a conclusion, it can be brought out that there can be positive impacts as well. Overall, the literature suggests that exchange rate movements significantly influence tourism demand through price competitiveness, although asymmetric effects are frequently observed across countries.

2.2.3. Economic development and per capita income

The correlation between demand for tourism and per capita GDP is a key theme in multiple empirical studies, demonstrating how economic flourishing functions as both a driver and an advantage-gainer of global travel. A wide-ranging evaluation of 160 economies shows that the relationship between tourism and sustainable development varies with GDP per capita, and that tourism is associated with positive sustainability outcomes in developed countries [17]. Existing literature largely overlooks infrastructure and publicity mechanisms, which are significant for the growth of the tourism sector and need a substantial investment amount. Reliable predictions -are also a concern for both the government and tourism related organisations in producing a positive gain on investment [18,19]. The research, which examined eight EU Med alliance nations between 2010 and 2020, found that income and trade have a statistically significant positive impact on inbound tourism [20]. Moreover, it indicates that broadening tourism productivity – assessed as arrival per inhabitant statistically triggers economic development about tourism capita GDP, and also this study suggests that tourism encourages domestic income and fosters accumulation of physical and human capital [18,21]. In developing markets like Turkey, higher income ranges are recognised as positive promoters of tourist engagement, with an obvious causal link from income to tourism demand [22]. PGDP plays a crucial role in considering the economic factors that affect the tourism industry. Existing literature largely overlooks the positive impacts. Similarly, our study emphasises the positive impacts, so it can be concluded that PGDP has a positive effect on tourism demand. Overall, per capita GDP is widely recognised as a key determinant of tourism demand, reflecting both income effects and broader economic development.

2.3. Digitalisation and tourism demand

Information and communication technologies (ICTs) have fundamentally transformed tourism worldwide by enhancing destination competitiveness and altering traveller behaviour. Empirical evidence suggests that internet usage by companies significantly and positively impacts both internal and cross-border tourism expenditures in stable and fluctuating economies [23]. Corporations' internet usage substantially increases costs for domestic and inbound travel, regardless of the country's nature [24]. At the end, the researchers shed light on findings from past studies and examined the European Union from the perspective of the "ICT Development Index". Their experience proved the powerful truth that the internet is the "Great Matchmaker." In contrast, individual internet usage has been shown to adversely affect domestic tourism costs in specific transition frameworks [25]. Overall, the internet is a pivotal macroeconomic determinant, enabling potential tourists to assess service quality and costs effectively. Despite extensive research on positive impacts, our study has examined both positive and negative effects, indicating that negative impacts can occur as well. Internet usage significantly affects tourism demand. Recent studies incorporated that the ESG outcomes and the digital transformation are interconnected with each other, because the digital transformation strengthens the ESG performance. However, the digital transformation enhances the ESG performance directly and indirectly. Innovations from the ESG outcomes improves the sustainable practices [26]. Digital Transformation has the potential to be an effective new driver for industrial changes. Digital transformation significantly boosts ESG performance compared to other industries. According to the supplementary analysis, companies with poor institutional environments can enhance their ESG performance through digital transformation. Previous empirical studies incorporated that the digital transformation enhances the operational efficiency and perceptual capabilities. However, the prior empirical studies suggested that the dynamic capabilities are playing a mediating role between digital transformation and ESG performance [27]. Overall, digitalisation enhances tourism demand by improving information accessibility and reducing search costs, although its effects may vary depending on the level of digital maturity across countries.

2.4. Environmental quality and tourism demand

Empirical proof from different regions emphasised varying impacts. In Sub-Saharan Africa, while economic development increases emissions, tourism income has shown potential mitigating effect, suggesting that financial advantages from the sector may support sustainable methods [28]. The research also emphasised that the growth of tourism is an alternative mechanism of economic growth but may trigger environmental imbalances if not controlled through rigid regulation. Former researchers found that in main tourism hubs, tourism growth regularly leads to carbon emissions [29]. Moreover, it emphasises that, while tourist arrivals from worldwide usually cause massive Co_2 emissions because of rising energy consumption in accommodation and travel [30].

The outcomes of this research indicate a few policy suggestions for policymakers to reduce CO_2 emissions through REN, RND, and environmentally friendly tourism policies [31]. Finally, an increasing-emissions approach is determined by several factors, including demand growth and the use of carbon–intensive tourism goods and services. A crucial awareness of these determinants is essential for evaluating and informing policy feedback that is efficient [32]. Emissions are affecting the tourism industry, both positively and negatively, depending on the country's pollution and industrialisation. Existing literature largely overlooks both positive and negative impacts. In conclusion, environmental quality affects tourism demand both positively and negatively. CO_2 significantly affects Tourism Demand. Overall, environmental quality plays a dual role in tourism demand, as increased tourism activity may contribute to environmental degradation, while environmental conditions also influence destination attractiveness.

2.5. Synthesis of literature and research gap

Overall, the existing literature provides extensive evidence on the macroeconomic determinants of tourism demand, including income, prices, and exchange rates. More recent studies have also incorporated digitalisation and environmental factors. However, most studies focus on high-arrival or developed economies, limiting their applicability to low-tourist-arrival countries. In addition, these determinants are often examined in isolation, resulting in a fragmented understanding of tourism demand dynamics. Furthermore, cross-country heterogeneity in low-arrival economies remains underexplored. This study addresses these gaps by integrating macroeconomic, digital, and environmental factors within a unified panel framework, focusing specifically on low-tourist-arrival countries.

2.6. Hypothesis development

In tourism demand studies, hypotheses are typically developed by

linking macroeconomic, financial, and environmental factors to tourist arrivals. These hypotheses help researchers validate theories and interpret empirical results systematically.

2.7. H_1: inflation significantly affects tourism demand

This study uses a panel approach to investigate H_1, which posits that inflation significantly affects tourism demand, in light of contradictory empirical findings from earlier studies.

2.8. H_2: exchange rate significantly affects tourism demand

This study examines H_2, which suggests that exchange rate changes significantly affect tourism demand within a panel framework, accounting for cross-country variations in price competitiveness.

2.9. H_3: per capita GDP significantly affects tourism demand

This study formulates H_3, which states that higher per capita GDP boosts tourism demand across countries, considering the function of economic development in promoting tourism activity.

2.10. H_4: internet usage significantly affects tourism demand

The analysis examines H_4, which suggests that internet usage affects tourism demand, reflecting the increased significance of digital connectivity in travel decisions.

2.11. H_5: CO_2 emission significantly affect tourism demand

This study assesses the H_5, which suggests that carbon dioxide emissions have an impact on tourism demand across a subset of economies, in relation to growing environmental concerns and sustainability awareness.

3. Theoretical framework and conceptual model

3.1. Tourism demand theory

This study is grounded in tourism demand theory, which extends traditional consumer demand theory by treating travel as a composite good influenced by income, prices, and macroeconomic conditions. Tourism demand models typically incorporate structural economic determinants, price competitiveness, and income effects to explain variations in tourist flows across destinations [33]. In this approach, the income effect is represented by per capita GDP, which captures both purchasing power and the level of economic development, including infrastructure and service quality in destination economies and visitors' purchasing power. Price-related effects are represented by inflation and exchange rates, which influence tourism demand through changes in travel costs and destination affordability. While favourable exchange rate movements can enhance tourism by improving price competitiveness, rising inflation may reduce destination attractiveness. While favourable exchange rate fluctuations can boost tourism by making sites comparatively more affordable for foreign visitors, rising inflation may reduce price competitiveness.

3.2. Push-pull theory of tourism motivation

The push-pull motivation theory, which complements economic demand theory, provides a behavioural explanation of tourism demand by distinguishing between internal motivations (push factors) and destination-specific attributes (pull factors). This framework provides a behavioural perspective on tourism demand by explaining how individual motivations interact with destination characteristics to shape travel decisions. In this study, internet usage is conceptualised as a pull factor that enhances destination visibility, reduces information asymmetry, and facilitates travel planning through digital platforms. CO_2 emissions, as a proxy for environmental degradation, may reduce destination attractiveness, particularly in the context of increasing environmental awareness among tourists [34]. By integrating tourism demand theory with the push–pull framework, this study provides a comprehensive theoretical basis for examining how economic, digital, and environmental factors jointly influence tourism demand in low-arrival countries.

3.3. Integrated conceptual framework

The conceptual framework of this study is developed by integrating tourism demand theory with the push–pull framework to examine how macroeconomic, digital, and environmental factors are associated with tourism demand. Specifically, inflation, exchange rate, and per capita GDP capture macroeconomic conditions influencing price competitiveness and economic capacity. Internet usage represents digital connectivity and information accessibility, while CO_2 emissions reflect environmental conditions that may influence destination attractiveness. Accordingly, the framework proposes that tourism demand is associated with these key determinants, reflecting the combined influence of economic, technological, and environmental factors in shaping travel decisions in low-arrival economies.

3.4. Conceptual framework diagram

Fig. 1 presents the conceptual framework of the study, illustrating the hypothesised relationships between tourism demand (TD) and its key determinants. Tourism demand is measured as tourist arrivals per 1000 inhabitants. The independent variables include inflation (INF), exchange rate (ER), per capita GDP (PGDP), internet usage (INT), and carbon dioxide (CO_2) emissions. Inflation, proxied by the Consumer Price Index, captures destination price competitiveness. Exchange rate, measured using the official exchange rate, reflects relative travel costs and international price attractiveness. Per capita GDP (current US$) represents economic development and infrastructure capacity. Internet usage, measured as the percentage of individuals using the internet, captures digital connectivity and information accessibility. CO_2 emissions per capita are used as a proxy for environmental quality, reflecting environmental conditions that may influence destination attractiveness. As illustrated in Fig. 1, each independent variable is linked to tourism demand through hypothesised relationships (H1–H5). Summary of key literature, limitations & research gap are reported in Appendix 1. The directional arrows indicate the expected associations for modelling purposes and do not imply causality.

4. Data and methodology

4.1. Data sources and sample selection

The data was collected from several databases, including [1,2]. The dataset contained observations from different cross-sections over time, and the data analysis was conducted using Panel Regression Analysis and Multiple Linear Regression. The data file used for the study is presented in Appendix 2. This study used data on variables such as inflation, exchange rate, per capita GDP, internet usage, carbon dioxide emissions, and tourism demand for 20 low arrival countries from 2010 to 2023. This study focuses on twenty countries that had comparatively low tourist arrivals between 2010 and 2023. The countries were selected based on the data availability. Countries with missing data were excluded in our study to maintain the consistency. The sample consists of 20 countries characterised by relatively low levels of international tourist arrivals over the period 2010–2023. Countries were selected based on data availability and completeness across all variables, while those with substantial missing observations were excluded to ensure

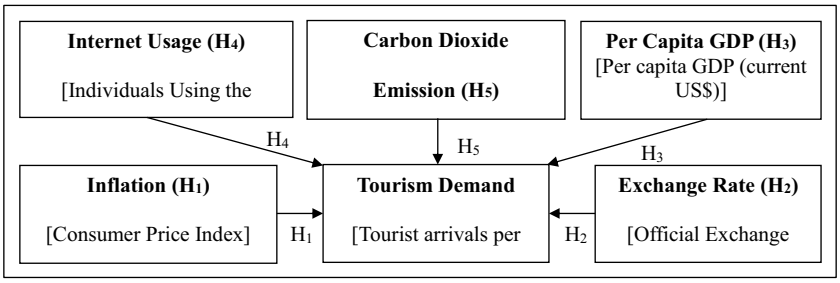


Fig. 1. Conceptual framework. Source: authors' compilation.

consistency in panel estimation.

4.2. Variable definitions and measurements

Table 1 presents the definitions, measurements, and data sources of the variables used in the study.

4.3. Econometric model specification

The main objective of this study is to examine the relationship between tourism demand and its key determinants, INF, ER, PGDP, INT and CO_2, on TD. This study adopts a reduced-form panel regression framework to examine the association between macroeconomic, digital and environmental variables and tourism demand. While this approach enables the identification of statistically significant relationships, it does not establish causality due to potential endogeneity, reverse causality, and omitted variable bias. In particular, endogeneity may arise because tourism demand can itself influence macroeconomic conditions, digital adoption, and environmental outcomes. As the empirical design does not explicitly address this concern the estimated relationships are interpreted as associations rather than causal effects. The dependent variable was measured by tourist arrivals per 1000 inhabitants to ensure consistency with the measurement structure of the independent variables. This measure was selected to examine the macroeconomic, digital and environmental factors effect on tourism inflows across the countries.

$$TD_{it} = \beta_0 + \beta_1 INF_{it} + \beta_2 ER_{it} + \beta_3 PGDP_{it} + \beta_4 INT_{it} + \beta_5 CO_{2it} + \mu_t + \omega_i + \varepsilon_{it} \quad (1)$$

The above linear panel model is employed to assess how inflation (INF), exchange rate (ER), per capita GDP (PGDP), internet usage (INT), and CO_2 emissions influence tourism demand (TD) across the 20 selected low-arrival countries over a 14-year period. In this equation i, denotes the country and t represents the year. ε_{it} represents the error term of the equation. In addition to country-specific effects, time fixed effects are incorporated to control for common shocks and global trends affecting tourism demand, including disruptions such as the COVID-19 pandemic. Panel regression allows to capture the unobserved heterogeneity across the countries. In addition to the panel regression authors implemented the Multiple Linear Regression (MLR) to capture the unique characteristics of each country.

$$TD_t = \alpha_0 + \alpha_1 INF_t + \alpha_2 ER_t + \alpha_3 PGDP_t + \alpha_4 INT_t + \alpha_5 CO_{2t} + \varepsilon_t \quad (2)$$

The country level analysis highlights the characteristics of each country over 14 years. Multiple Linear Regression offers country specific insights from each country. By integrating the two methodologies it strengthens the overall analytical scope of the study.

Table 1
Variables, measurements, and data sources.

Variable	Definitions	Measurement	Source
Tourism Demand	The total number of Arrivals per the population	Tourist Arrivals Per 1000 Inhabitants	https://doi.org/10.18111/9789284425808 UNWTO/ Own Calculation
Inflation	The annual percentage change in the CPI	Consumer Price Index	https://data.worldbank.org/indicator/FP.CPI.TOTL World Bank
Exchange Rate	The value of the destination country's currency	Official Exchange Rate	https://data.worldbank.org/indicator/PA.NUS.FCRF World Bank
Per Capita GDP	The total economic output of a country divided by population	Per capita GDP (current US$)	https://data.worldbank.org/indicator/NY.GDP.PCAP.CD World Bank
Internet Usage	The percentage of the population with access to internet	Individuals Using the Internet (% of population)	https://data.worldbank.org/indicator/IT.NET.USER.ZS World Bank
Carbon Dioxide Emission	Greenhouse gas from burning fossil fuels	CO_2 Per Capita	https://ourworldindata.org/co2-emissions Our World in Data

Source: Authors' Compilation.

4.4. Estimation strategies

4.4.1. Panel regression approach

The panel regression approach is appropriate for this study as it allows for the simultaneous analysis for cross country variation and time dynamics in tourism demand. By combining both dimensions panel data model provides more efficient estimates and enable control for unobserved heterogeneity across countries, which is particularly important in a heterogeneous sample of low tourism economy. Fixed Effect, Random Effect and POLS are the main models in the panel regression approach. The Fixed Effect model is used to control for unobserved, time-invariant characteristics of each country. The Random Effect model assumes that country-specific effects are random and uncorrelated with the variables. According to our study, RE was selected after the Hausman test, indicating that country-specific characteristics are uncorrelated with the variables in our study. Although Hausman test suggests the use of the Random Effects model this assumption may be restrictive in the contest of Tourism Demand where unobserved country specific restricts such as geography, institutional quality and destination attractiveness are likely to be correlated with exploratory variables. Given these considerations the fixed effect model is treated as a benchmark specification as it controls for the time invariant unobserved heterogeneity across countries. Cross country heterogeneity is a key feature of the data set. This is addressed through panel estimation techniques including fixed effects and random effect model which control for unobserved country specific characteristics. The Random Effects (RE) model is used since it permits

the examination of time-invariant independent variables and assumes that study variables are uncorrelated.

Prior to estimation unit root tests are conducted to examine the stationarity properties of the variables. The empirical specification could include the combination of level and difference variables. In this context coefficients of the level variable capture the relationship between the levels of variable and tourism demand whereas coefficient of difference variables represents the effects of the changes in these variables over time.

4.4.2. Country-level heterogeneity analysis

In addition to panel regression, country-specific multiple linear regression (MLR) models are estimated to capture within-country dynamics over time. Given the relatively short time series, these results are interpreted as exploratory rather than definitive for country-level inference. It is important to note that the country specific multiple linear regression analysis is based on relatively short time series (2010–2023) which may limit the statistical reliability of individual country estimates. Therefore, these results should be interpreted as exploratory insight rather than definitive evidence for the country level inference. Fig. 2 shows the workflow diagram representing the study pathway. It outlined tasks from the start to the end of the current study, providing a clear path for the study.

4.4.3. Diagnostic and robustness test

The stationarity test is conducted using Levin-Lin-Chu (LLC) unit root test. Appendix 3 is highlighting the results for the stationarity test. Tourism Demand and Internet Usage are the only variables that sufficient the stationarity at the first level. To satisfy the stationarity INF, ER, PGDP, CO_2 variables are converted into first difference variables. To identify the difference variables authors named the variables by indicating "d" to the front of the variable name. TD and INT variables have p value of 0.0000 and 0.0014 which are <0.05. INF, ER, PGDP and CO_2 variables have p values, 0.9996, 0.8682, 0.8623, 0.1221 accordingly at the first level. After transformed those values into first difference those variables have p values, d_INF (0.0044), d_ER (0.0014), d_PGDP (0.0000), d_Co_2 (0.0000) which are satisfying the stationarity of the variables. Appendix 4 providing the results for the multicollinearity test.

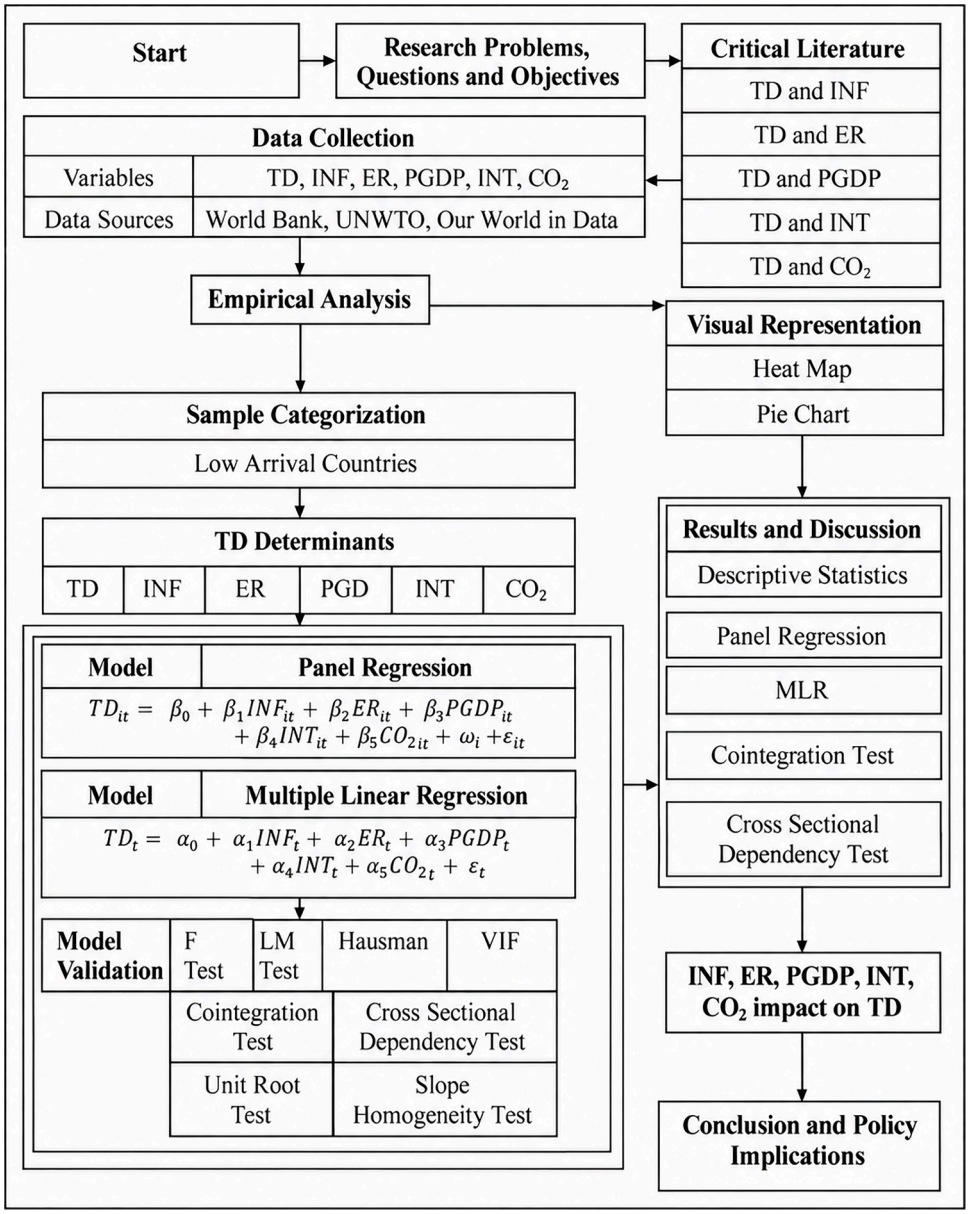


Fig. 2. Workflow diagram. Source: authors' illustrations.

All the VIF values are <2 by confirming indicating no significant multicollinearity concerns in the data set. The empirical results are compared the cross effect and random effect specification, and the main findings are broadly consistent in terms of direction and significant. The results are robust across alternative model specifications, with consistent signs and significance levels of key coefficients.

Additional panel diagnostic tests were conducted to strengthen the robustness of the empirical analysis. The detailed Stata outputs are presented in Appendix 5, and the summary results are reported in Table 2. First, the Pesaran cross sectional dependency test was applied, and the results indicates the presence of cross-sectional dependency, suggesting that common shocks may influence tourism demand across the sample countries. Similar panel-based studies have emphasised the importance of considering cross sectional dependency and slope heterogeneity when analysing interconnected country panels [35,36]. Second, the Pesaran and Yamagata slope homogeneity test does not reject the null hypothesis of slope homogeneity, indicating that the panel specification is statistically acceptable. Third, panel unit root test shows mixed stationarity properties at level: therefore, variables were retained in level form to transform into first differences where appropriate to reduce the risk of superiors' regression. This procedure is consistent with previous econometric studies that examine interrelation properties before estimation [37,38]. Finally, the Pedroni and Kao cointegration test provide evidence of cointegration, while the Westerlund test provides weaker evidence. Therefore, the cointegration results are interpreted cautiously as partial evidence of a long run association among tourism demand and its macroeconomic, digital, and environmental determinants. Overall, these additional tests improve the methodological transparency and econometric robustness of the study.

5. Empirical results

This section describes results of the Panel Regression and Multiple Linear Regression for the 20 Low Arrival Countries from 2010 to 2023.

5.1. Descriptive statistics and stylish facts

Fig. 3 illustrates substantial cross-country heterogeneity in Tourism Demand as well as the presence of the common temporal shocks particularly during the covid 19 period. These patterns highlight the importance of adapting a panel data framework that can simultaneously capture cross sectional variations and time specific effects. In particularly the pronounced decline observed across most countries during the pandemic reinforces that needs to control for global shocks through time fixed effects in the empirical model.

Table 2
Additional panel diagnostic tests.

Test	Null Hypothesis	Main Results	Decisions
Pesaran cross sectional dependency test	Cross sectional independence	Pesaran CD test is statistically significant	Cross sectional dependency exceeds
Pesaran and Yamagata slope homogeneity test	Slope coefficients are homogenous	Delta and adjusted delta statistics are not statistically significant	Do not reject the slope homogeneity
Panel unit root test	Panels contains unit root	Mixed results at level: Variables becomes stationary after appropriate transformation	Stationarity properties were addressed before the estimation
Pedroni cointegration test	No cointegration	Most statistics are statistically significant	Evidence of cointegration
Kao cointegration test	No cointegration	Most statistics are statistically significant	Evidence of cointegration
Westerlund cointegration test	No cointegration	Test statistics is not statistically significant	Weaker evidence of cointegration

Source: Authors' Compilation.

Descriptive Statistics are demonstrated in Appendix 6 For each variable, the results report the number of observations, mean, standard deviation, minimum, and maximum values in the dataset. The mean value of Tourism Demand is maintained at a high level across low-arrival countries. Inflation and the exchange rate have the highest mean values, whereas the other variables have lower mean values. Internet Usage and CO_2 emissions have a moderate average value, while the PGDP indicate the strong income levels across the observations. Descriptive Statistics is divided into two parts. One part was a summary of the descriptive statistics for the entire data set, and the other part was the descriptive statistics for the low-arrivals countries separately. There are 280 observations over the 14 years.

Fig. 4 summarizes the descriptive statistics across countries, highlighting substantial variation in tourism demand and explanatory variables. While the figure confirms the presence of heterogeneity across countries the complexity of the visualization limits its interpretability. Therefore, the key insights emphasize in the extension of cross-country variation which further supports the use of panel estimation techniques.

Overall, the visual evidence highlights two key features of the data set: substantial heterogeneity across countries and the presence of common global shocks effecting all countries simultaneously. These characteristics justify the use of panel regression techniques which both country and time fixed effects to appropriately capture the underlined data structure.

Appendix 7 presents the summary statistics for the countries separately. Seychelles, Antigua and Barbuda, St. Lucia, and Luxembourg show high arrivals per 1000 inhabitants, indicating a high tourism dependency among low-arrival countries. Also, these countries have high GDP and High Internet Usage, highlighting their industrial capabilities. Countries like Sierra Leone, Angola, Honduras, and Bolivia have low Tourism Demand along with low GDP and INT, highlighting the low infrastructure in those countries. Angola, Sierra Leone, and Moldova have the highest inflation, which may be a reason for low tourist arrivals. Antigua and Barbuda, Belize, Dominica, St. Lucia, and St. Vincent have a fixed exchange rate that can favourably increase tourism across those countries. Luxembourg, Brunei, and Trinidad and Tobago have the highest PGDP, showing the high-income economies that support the tourism industry.

5.2. Panel regression results

All specification tests are conducted using Stata version 17. The specification tests are performed to verify the suitability of the data set for the FE, RE, and POLS. The Hausman test is incorporated to select the most suitable test for the study from RE and FE. Based on the Hausman Test results, the Random Effects model was the most appropriate for the study. RE results are incorporated in Appendix 8 Specification test results are indicated in Appendix 9 To ensure robustness the results are examine alternative model specification the consistency of key coefficients across fixed and random effect model suggests that the findings are not driven model specific assumptions. The random effects model is used to assess variability across groups or entities, assuming they are random samples from a larger population. According to the Random Effect Model results, Exchange Rate and Internet Usage are the only variables that are significant after the robustness test. The inclusion of time fixed effect ensures that the estimated coefficient capture country specific variations, net of global shocks affecting simultaneously.

In this specification coefficients associated with the level variables (Internet Usage) Capture the relationship between the level of the variable and tourism demand, while coefficients on difference variables (Exchange Rate, Inflation, Per capita GDP, Co_2 emission) represents the

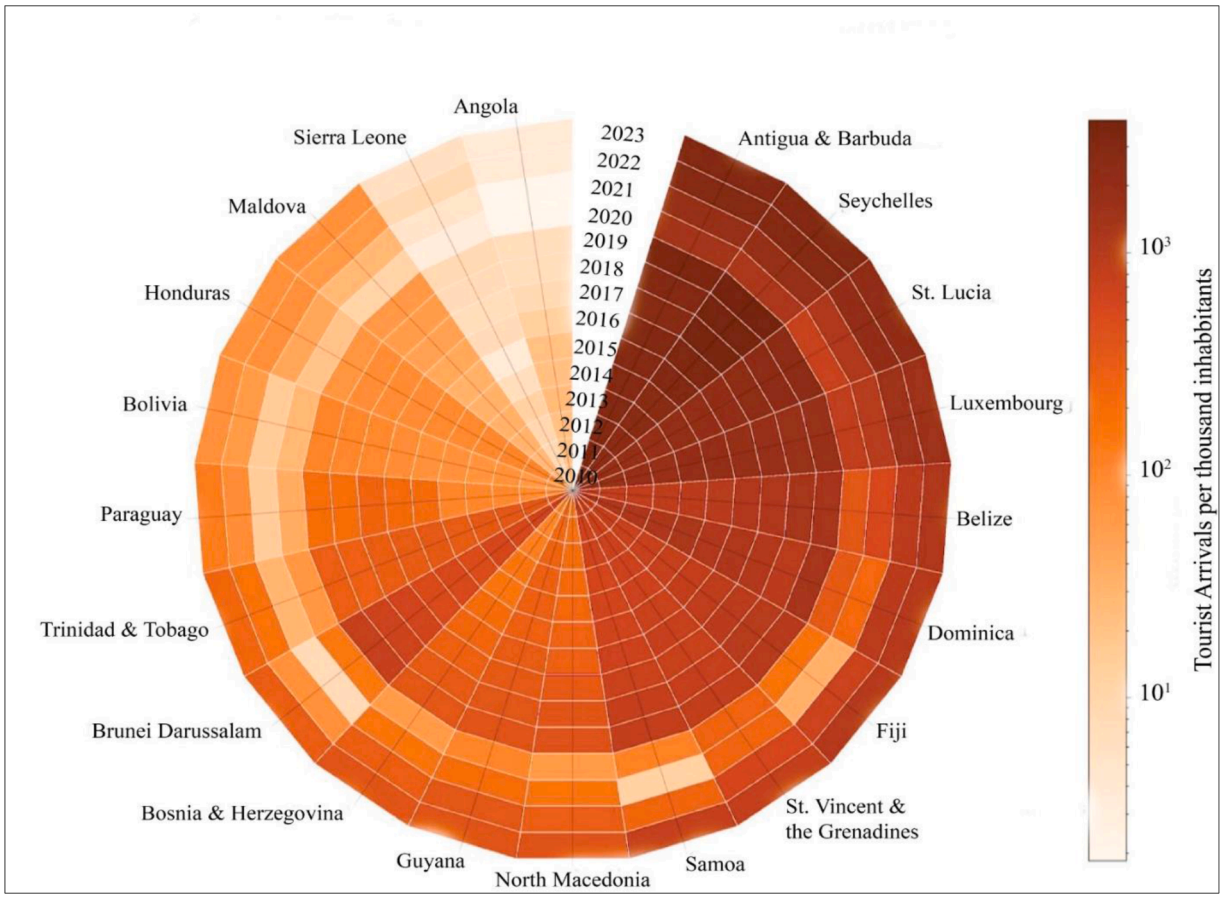


Fig. 3. Tourism demand on low tourist arrival countries. Source: author's illustrations.

effects of changes in these variables over time. Accordingly, the model primary captures the short run for within period adjustments rather than long run equilibrium relationships.

While holding other variables constant, time-invariant unobserved heterogeneity is assumed to be random and uncorrelated with the independent variables. Changes in the exchange rate is expected to increase tourism demand in low-tourist-arrival countries over time, indicating that tourists are prioritising product quality over prices. While holding other variables constant, time-invariant unobserved heterogeneity is assumed to be random and uncorrelated with the independent variables. Higher internet usage is expected to reduce tourism demand in low-tourist-arrival countries over time, by increasing the risk of false information discouraging travel decisions.

5.3. Country-level heterogeneity analysis

Given the limited number of observations per country, the following country level results are presented primarily to illustrates heterogeneity patterns rather than to derive robust country specific conclusions.

In addition to the panel regression, the authors conducted multiple linear regression (MLR) to identify specific characteristics in each country. Table 3 represents the MLR results for the study. Authors identified a special characteristic in the Exchange Rate variable. For these countries, Antigua and Barbuda, Belize, Dominica, St. Lucia, and St. Vincent, the exchange rate variable is omitted due to collinearity. INF shows a significant negative impact in Angola, Antigua and Barbuda, Belize, and Sierra Leone, indicating that purchasing power influences TD. Countries like Angola, Antigua and Barbuda, Belize, Dominica, Fiji, Honduras, Samoa, Seychelles, and St. Vincent have a significant positive impact of PGDP on tourism demand, indicating the highest industrial capabilities.

While holding other variables constant, changes in the inflation are associated with increasing tourism demand in Fiji, Luxembourg, and Trinidad and Tobago, respectively, over time, while changes in the inflation are associated with decreasing tourism demand in Angola, Antigua and Barbuda, Belize, and Sierra Leone, respectively, over time.

While holding other variables constant, a change in the per capita GDP is associated with enhanced tourism demand in Angola, Antigua and Barbuda, Belize, Dominica, Fiji, Honduras, Samoa, Seychelles, St. Lucia and St. Vincent respectively over time. While holding other variables constant, a change in the CO_2 emission is associated with an increase in tourism demand in Angola, Paraguay and Trinidad and Tobago, respectively, over time, while changes in the CO_2 emission is related to a reduction in tourism demand in Antigua and Barbuda and Fiji, respectively, over time.

6. Discussion

It is important to note that the empirical model does not directly identify the underline mechanism linking explanatory variables to tourism demand. Therefore, the interpretations should be viewed as an indicative association rather than the definitive casual pathways and alternative explanations related to omitted structural behavioural factors cannot be ruled out.

6.1. Interpretation of core findings

The findings of the study reveal that tourism demand is shaped by better interaction among economic activities, the effectiveness of digital connectivity, and environmental factors. Exchange rate fluctuations play a significant role in tourism demand by influencing tourist arrivals through price competitiveness. Conversely, the impact of inflation and

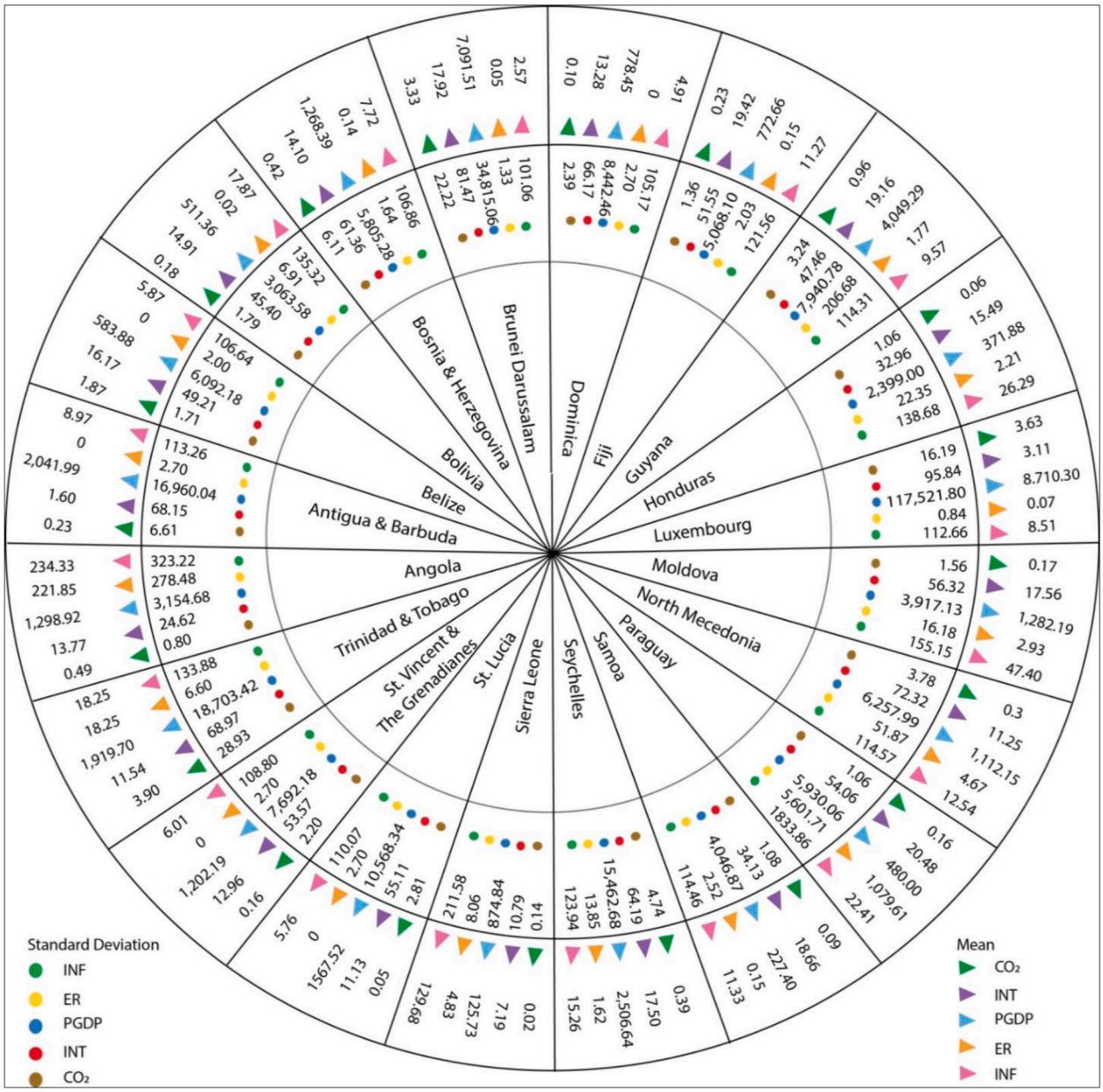


Fig. 4. Descriptive statistics for the 20 low arrival countries. Source: author's illustrations.

per capita GDP implies that macroeconomic stability and economic growth are insufficient to enhance tourism demand without structural, institutional conditions. Furthermore, the contrasting impacts of CO_2 emissions indicate that an increase in tourism demand in some countries is tied to carbon-intensive development.

6.2. Implications for sustainable tourism futures

First, tourism maturity plays a vital role in shaping heterogeneity effects across countries. Countries with well-structured tourism infrastructure and intense internet penetration can withstand macroeconomic fluctuations, such as inflation, without experiencing a decline in tourism demand. Second, structural differences contribute to heterogeneity effects, such as transport connectivity and governance quality, which impact economic growth and exchange rate fluctuations, thereby shaping tourism demand. Third, digital readiness helps to define the heterogeneous effect of internet usage across countries. Countries with developed digital tourism with online systems, digital marketing, and increased internet usage increase the tourism demand. Countries with underdeveloped digital tourism might have the opposite effect.

6.3. Comparison with existing literature

Our research aligns with earlier research. Previous research has indicated a favourable correlation between tourism demand and per capita GDP [19]. Previous research has revealed a negative correlation between tourism demand and inflation. However, other research indicates that the desire for travel and inflation are positively correlated [39]. According to past studies, the travel demand is significantly impacted negatively by the currency rate [5]. The Exchange Rate has dual effect on Tourism Demand. The depreciation of the currency makes the destination more affordable for tourists by increasing the tourist arrivals. At the same time a weaker currency may raise the cost of the good and services [40]. Internet usage positively impacts travel demand. Internet usage has a favourable impact on foreign tourism flows, according to earlier research [41]. Most prior findings align with our

Table 3
Multiple linear regression results.

Countries	Constant	R^2	TD				
			INF	ER	PGDP	INT	CO_2
Angola	- 0.004***	0.9706	−0.01*	0.01*	0.00**	0.18**	43.11***
Antigua and Barbuda	+0.000***	0.9082	−102.72***	0	0.63***	26.69**	−2489.52***
Belize	+0.276	0.6128	−63.52*	0	0.70***	3.16	271.54
Bolivia	−0.190	0.7765	−0.47	166.26	0.04	−1.75*	84.57
Bosnia and Herzegovina	−0.145	0.5311	8.42	135.60	−0.06	5.26	14.24
Brunei Darussalam	+0.376	0.6454	−56.44	1474.60	0.02	4.11	−27.05
Dominica	−0.892	0.8255	−8.28	0	0.46***	−30.64***	118.80
Fiji	−0.005***	0.8424	59.27*	3868.94***	0.41*	−59.43***	−1959.05**
Guyana	−0.083*	0.5620	−11.04	74.88*	0.04	−4.90	−104.54
Honduras	−0.013**	0.0834	−0.46	3.54	0.13***	3.84***	14.27
Luxembourg	−0.396	0.5149	87.87*	−709.97	−0.02	117.54	277.16
Moldova	+0.182	0.5713	−1.94	22.10	0.09	−1.22*	−297.89
North Macedonia	−0.451	0.3214	3.32	2.94	−0.04	5.32	33.39
Paraguay	−0.705	0.4511	1.61	−0.03	0.02	−3.01	467.61**
Samoa	−0.003***	0.8260	18.09	935.11*	0.85***	−29.74**	786.77
Seychelles	−0.674	0.9198	−2.07	−101.94	0.31***	−23.58	389.33
Sierra Leone	−0.991	0.2428	−0.07*	2.08*	0.01	−0.05	−32.67
St. Lucia	+0.060*	0.7598	−21.87	0	0.45***	−33.89**	−2698.96
St. Vincent	−0.838	0.6439	−7.42	0	0.45**	−43.06**	170.95
Trinidad and Tobago	−0.032**	0.8968	9.27***	370.62**	0.00	−14.82**	31.83***

Note:.
* Significant at 10%.
** significant at 5%.
*** significant 1% significance level. Source: Authors' Compilation.

research's empirical results, demonstrating the accuracy of our results.

7. Policy implication

The country level patterns provide indicative insight; however, policy recommendations should be interpreted with caution due to the limited time series observations. The findings provide indicative insights for policy makers, however given the associational nature of the analysis policy conclusion should be interpreted with caution. It is important to note that the empirical results of this study are based on reduced-form framework and should be interpreted as indicative association rather than causal effects. Therefore, the following discussion outlines general policy relevance insight rather than respective recommendations.

7.1. Macroeconomic stability and tourism strategies

The impact of changes in the inflation on tourism demand indicates that an increase in price levels does not reduce tourist arrivals. Then country level patterns may provide insights to maintain macroeconomic stability rather than strict price control. Furthermore, tourism authorities should focus on improving service standards and value creation, as a positive tourism experience accompanies price increases. Whereas the negative association between the changes of the inflation and tourism demand imply that an increase in price levels reduces the tourist arrivals. These patterns may be relevance for policymakers to implement strategies to maintain price stability in the tourism sector, including transportation, accommodation, food, and beverages.

The impact of changes in the per capita GDP on tourism demand is indicating that higher economic growth supports higher tourist arrivals. The findings suggested to encourage investors to invest more in tourism infrastructure, such as transportation, accommodation, and other tourism-related services, to enhance tourist arrivals.

7.2. Exchange rate management and competitiveness

The positive association between changes in the exchange rate movements and tourism demand are suggest that price competitiveness may play a role in attracting tourists. However, exchange rate policies often constrain by broader macroeconomic objective and institutional arrangements, therefore, should not be viewed as a direct policy level for tourism development. Then the findings suggest that to maintain the macroeconomic and tourism policies to maintain the better exchange rates that supports to the tourist arrivals.

7.3. Digital tourism readiness

The impact of internet usage on tourism demand appears to be context dependent potentially reflecting differences in development stages digital maturity and travel behaviour. Therefore, digital expansion along may not uniformly translate into increased tourism demand. Then the results provide indicative insights to encourage investors to develop digital infrastructure. Whereas the negative association between internet usage and tourism demand may reflect broader structural dynamics such as differences in development stages, substitution effects towards outbound tourism or unobserved institution and digital quality factors rather than the direct causal mechanism. This pattern may be relevance for policymakers to implement strategies to enhance digital connectivity and improve the quality of websites, better online payment systems and digital marketing.

7.4. Environmental sustainability and tourism planning

The impact of changes in the CO_2 emission on tourism demand may reflect broader economic activity rather than direct tourism related effects therefore, environmental policy implications should be interpreted cautiously and conjunction with sustainability objectives. The negative association between changes in the CO_2 emission and tourism demand may reflect environmental degradation decreases tourist arrivals. The results provide insights to implement rules and regulations to protect the environment and encourage people to engage in low-carbon emission activities.

It is important to recognise that the estimated relationships are conditional on the variables included in the model. Given the exclusion of certain structural and institutional factors the coefficient may partially capture broader country characteristics or unobserved influences. Therefore, the findings should be interpreted within the context of the model specification rather than as full comprehensive determinants of tourism demand.

8. Conclusion

8.1. Summary of key findings

The study investigated the impact of inflation, exchange rates, per capita GDP, internet usage, and CO_2 emissions on tourism demand in 20 low-tourist-arrival countries over the period 2010–2023, using panel regression and multiple linear regression analyses.

The findings on inflation show that fluctuations in price levels do not uniformly reduce tourism demand. Exchange rates are a key factor affecting tourism demand, with a significant positive impact in several countries, implying the importance of price competitiveness to enhance tourist arrivals in low-tourist-arrival destinations. The findings related to per capita GDP suggest economic growth is insufficient to enhance tourist arrivals. Internet usage displays a significant negative impact, implying that an increase in internet usage is inadequate to enhance tourist arrivals.

8.2. Contribution to theory and practice

The findings of the study support the tourism demand theory, which argues that inflation and exchange rates play a crucial role in increasing tourist arrivals. Inflation and exchange rates are positively influencing the growth of tourism demand in low-tourist-arrival countries.

The results of the study, which show a significant positive impact of internet usage, extend the digital tourism theory by improving internet penetration, online services, and information access, thereby increasing tourism demand. At the same time, the study shows a significant negative impact of internet usage, implying that digitalisation does not only support the enhancement of tourist arrivals. Enhancement of the tourist arrivals depend on how effective digital tools they incorporate to the tourism industry.

From a sustainable futures perspective, the findings suggest that tourism development in low-arrival countries cannot rely solely on economic expansion or digital penetration. Instead, long-term tourism resilience depends on aligning macroeconomic stability, environmentally responsible infrastructure, and effective digital governance. Without such integration, tourism growth risks reinforcing carbon-intensive development paths that undermine sustainability objectives.

8.3. Limitations and further research

The key limitation of the study is to potentially present the endogeneity and the reverse causality. Tourism itself influence macroeconomic condition, digital adoption and environment outcomes. As the empirical design does not incorporate instrumental variables as dynamic panel techniques, the results should be interpreted as associational rather than causation. Furthermore, the study has several limitations. First, the study incorporates CO_2 emissions as a proxy for environmental quality and uses internet usage as a proxy for digitalisation. Second, the study uses 20 low tourist arrival countries and 13 years for the analysis, which limits the generalizability of the results. The model does not explicitly include structural variables such as infrastructure quality, governance political stability or destination visibility due to data limitation. These omitted factors may influence tourism demand and could lead to potential omitted variable bias. Future research could incorporate these dimensions using more comprehensive datasets or alternative modelling approaches.

The use of mix specification combining level and first differenced variables imply that the estimated relationship primarily reflects short run dynamics rather than long run equilibrium relationship therefore, the caution is required to interpreting the results particularly in distinguishing between level effect and changes over time.

The Random Effect model relies on the assumptions that unobserved country specific effects are uncorrelated with the explanatory variables which may not fully holding the context of tourism demand. Although, robustness check using the fixed effect provide the consistence results remains a potential limitation.

To avoid the limitations of the study, future research could use more accurate measurements of environmental quality, such as air quality and water quality. This would give a better understanding of how ecological factors affect tourism demand. Future studies need to be extended to the other measures of tourism demand to capture the overall context of the tourism inflows. Future researchers could assess the impact of tourism-related services, such as online payment systems and tourism applications, on tourist arrivals. The researchers could consider lower-tourist-arrival countries and extend the years taken into analysis. Overall the findings contribute to the literature by providing cross-country evidence on the short-run associations between macroeconomic, digital, and environmental factors and tourism demand, while highlighting the importance of cautious interpretation in reduced-form empirical settings.

Funding statement

This research did not receive any specific grant from funding agencies in the public, commercial, or not-for-profit sector.

Clinical trial number

Not applicable.

Ethical approval

Not applicable. This study used publicly available secondary data, and no direct involvement of human participants, human tissue, or identifiable personal data was required.

Consent to participate

Not applicable.

CRediT authorship contribution statement

Rangana Munasinghe: Writing – review & editing, Writing – original draft, Visualization, Validation, Software, Methodology, Formal analysis, Data curation, Conceptualization. **Dulitha Chathurika:** Writing – review & editing, Writing – original draft, Visualization, Validation, Software, Methodology, Formal analysis, Data curation. **Jithmini Fernando:** Writing – review & editing, Writing – original draft, Visualization, Validation, Software, Methodology, Formal analysis, Data curation. **Mewna Maduwanthi:** Writing – review & editing, Writing – original draft, Visualization, Validation, Software, Formal analysis, Data curation. **Ruwan Jayathilaka:** Writing – review & editing, Writing – original draft, Visualization, Validation, Supervision, Resources, Project administration, Methodology, Investigation, Funding acquisition, Formal analysis, Conceptualization. **Lochana Perera:** Writing – review & editing, Writing – original draft, Validation, Resources, Investigation.

Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

Supplementary materials

Supplementary material associated with this article can be found, in the online version, at doi:10.1016/j.sftr.2026.102157.

Data availability

The dataset is available as supplementary material in Appendix 2.

References

[1] United Nations World Tourism Organization. UNWTO: united nations world tourism organization; 2024 Available from: www.e-unwto.org.
[2] World Bank. World Bank: world Bank; 2024 Available from: https://data.worldbank.org.
[3] Organisation for Economic Co-operation and Development. OECD: organisation for economic co-operation and development; 2024 Available from: https://www.oecd.org/.
[4] International Monetary Fund. IMF: international monetary fund; 2024 Available from: www.imf.org.
[5] R. Brahim, The impact of exchange rate on tourism demand in the euro area (using panel data approach), Int. J. Acad. Res. Bus. Soc. Sci. 12 (4) (2022) 409–421.
[6] Q.H. Nguyen, Tourism demand elasticities by income and prices of international market regions: evidence using Vietnam's data, Economies 10 (1) (2021) 1.
[7] E. Malaj, V. Malaj, Determinants of international tourism: empirical evidence from three Mediterranean countries journal of tourism, Herit. Serv. Mark. 9 (2) (2023) 66–72.
[8] U. Gunter, E. Smeral, B. Zekan, Forecasting tourism in the EU after the COVID-19 crisis, J. Hosp. Tour. Res. 48 (5) (2024) 909–919.
[9] G. Bilek, Modeling tourism demand in Turkey (2008–2024): time-series approaches for sustainable growth, Sustainability 17 (4) (2025) 1396.
[10] S. Borrego-Domínguez, F. Isla-Castillo, M. Rodríguez-Fernández, Determinants of tourism demand in Spain: a European perspective from 2000 to 2020, Economies 10 (11) (2022) 1–21.
[11] S. Ongan, C. Işik, D. Özdemir, The effects of real exchange rates and income on international tourism demand for the USA from some European Union countries, Economies 5 (4) (2017) 51.
[12] Y. Yalcin, C. Arikan, N. Köse, The asymmetric impact of real exchange rate on tourism demand, Eur. J. Comp. Econ. (EJCE) 18 (2) (2021) 251–266.
[13] X. Zhang, Y. Chen, X. Lu, W. Yamaka, Asymmetric impacts of the World Uncertainty Index and exchange rates on tourism using non-linear autoregressive distributed Lag models, Decis. Anal. J. 14 (1) (2025) 1–13.
[14] I. Rookayyah, B. Seetanah, R. Nunkoo, Z.K. Jaffur, The impact of exchange rate and exchange rate volatility on tourism demand using disaggregated data, Int. J. Tour. Res. 26 (2) (2024) 1–13.
[15] A. Feuerbacher, D. Flaig, Tourism in Africa and economic vulnerabilities to exogenous shocks, Econ. Model. 152 (1) (2025) 1–12.
[16] D. Ding, Y. Timmer, Exchange rate elasticities of international tourism and the role of dominant currency pricing, J. Int. Money Finance 137 (1) (2023) 1–15.
[17] C. Elgin, A.Y. Elveren, Unpacking the economic impact of tourism: a multidimensional approach to sustainable development, J. Clean Prod. 478 (1) (2024) 1–11.
[18] P. Maneejuk, W. Yamaka, W. Srichaikul, Tourism development and economic growth in Southeast Asian countries under the presence of structural break: panel kink with GME estimator, Mathematics 10 (5) (2022) 723.
[19] M. Topcu, Z. Denaux, C. Crews, Good governance and the us tourism demand, Ann. Tour. Res. Empir. Insights 4 (1) (2023) 100095.
[20] F. Dreshaj, S. Krasniqi, K. Dreshaj, Determinants of tourism demand in selected EU med countries: empirical panel analysis, J. Tour. Serv. 13 (25) (2022) 69–89.
[21] J.G. Brida, D. Matesanz Gómez, V. Segarra, On the empirical relationship between tourism and economic growth, Tour. Manag. 81 (1) (2020) 1–11.
[22] B. Darıcı, A. Aydın, F. Ayhan, M. Altaylar, Macroeconomic determinants of tourism demand toward emerging markets, Istanb. J. Econ. /İstanb. İktisat Derg. 73 (2) (2023) 837–864.
[23] M. Bratić, J. Petrović, N. Golubović, Ž. Anđelković, The impact of internet on tourism demand, Teme 1 (4) (2025) 891–904.
[24] M.P. Lee Chen, W. Wu, W. Xing, The impacts of ICTs on tourism development: international evidence based on a panel quantile approach, Inf. Technol. Tour. 23 (4) (2021) 509–547.
[25] S. Milićević, J. Petrovic, The ICT impact on inbound and outbound tourism demand in the EU, Manag. J. Sustain. Bus. Manag. Solut. Emerg. Econ. 25 (1) (2019) 1–9.
[26] Q. Liu, H. Wang, Digital transformation, innovation capability, and ESG performance, Finance Res. Lett. 78 (1) (2025) 1–12.
[27] L. Zhang, Y. Ye, Z. Meng, N. Ma, C.H. Wu, Enterprise digital transformation, dynamic capabilities, and ESG performance:based on data from listed Chinese companies, J. Glob. Inf. Manag. 32 (1) (2024) 1–20.
[28] R. Anaba MI, J. Alaganthiran, K.L. Gold, F.O.T. Obasuyi, Tourism, growth, and carbon emissions in Sub-Saharan Africa: a balancing act, Eur. J. Govern. Econ. 13 (1) (2024) 85–102.
[29] S. Wang, O. Cheablam, Sustainable tourism and its environmental and economic impacts: fresh evidence from major tourism hubs, Sustainability 17 (11) (2025) 5058.
[30] I. Meșter, R. Simuț, L. Meșter, D. Bâc, An investigation of tourism, economic growth, CO_2 emissions, trade openness and energy intensity index nexus: evidence for the European Union, Energies 16 (11) (2023) 1–26.
[31] E. Balli, O. Cengiz, A.I. Koca Balli, B.G. Akar, Analyzing the nexus between tourism and CO_2 emissions: the role of renewable energy and R&D, Front. Environ. Sci. 11 (1) (2023) 1–20.
[32] Y.Y. Sun, F. Faturay, M. Lenzen, S. Gossling, J. Higham, Drivers of global tourism carbon emissions, Nat. Commun. 15 (1) (2024) 1–10.
[33] H. Song, R.T.R. Qiu, J. Park, Progress in tourism demand research, Theory Empir. Tour. Manag. 94 (1) (2023) 1–11.
[34] J. Joseph, J. Gillariose, Revisiting the push–pull tourist motivation model: a theoretical and empirical justification for a reflective–formative structure, Tour. Hosp. 6 (3) (2025) 139.
[35] N.A. Suci, M.H. Rahman, S.C. Majumder, Environmental performance indicators and quality of life: new insight from emerging countries, Sustain. Futures 10 (2025) 100836.
[36] I.J. Tanha, M.H. Rahman, S.C. Majumder, Green financing, technological innovation, education and CO_2 emissions outlook to determine health outcomes in Next-11 countries, Discover Environ. 4 (1) (2026) 1–23.
[37] M.H. Rahman, L.C. Voumik, M.M. Rahman, S.C. Majumder, Scrutinizing the existence of the environmental Kuznets curve in the context of foreign direct investment, trade, and renewable energy in Bangladesh: impending from ARDL method, Environ. Dev. Sustain. 26 (5) (2023) 12619–12638.
[38] J. Ferdaus, B.K. Appiah, S.C. Majumder, A.A.A. Martial, A panel dynamic analysis on energy consumption, energy prices and economic growth in next 11 countries, Int. J. Energy Econ. Policy 10 (6) (2020) 87–99.
[39] M. Kırca, M. Öze, The impact of tourism demand on regional inflation in Turkey, J. Geograph. Inst. 'Jovan Cvijić' SANU 70 (3) (2020) 241–254.
[40] Tung L.T., Thang P.N. Impact of exchange rate on foreign tourist demand: evidence from developing countries, GeoJournal Tour. Geosites. 2022;45(1):1579–85.
[41] A. Guedes, S. Faria, S. Gouveia, J. Rebelo, The effect of virtual proximity and digital adoption on international tourism flows to Southern Europe, Tour. Econ. 29 (6) (2023) 1643–1661.