sustainability

MDPI

Article

Sustainable Journeys: Navigating the Circular Economy Wave in EU Tourism for a Greener Future

Egla Mansi [1,2,*], Nerajda Feruni [3], Yan Ren [4], Eglantina Hysa [5] and Valentina Ndou [6]

[1] Department of Economics, Epoka University, 1000 Tirana, Albania
[2] Department of Management, University of Tor Vergata, 00133 Rome, Italy
[3] Department of Economics and Development, Mediterranean University of Albania, Bulevardi Gjergj Fishta 52, 1023 Tirana, Albania; nerajda.feruni@umsh.edu.al
[4] CERGE-EI, Politických vězňů 7, 110 00 Prague, Czech Republic
[5] Independent Researcher, 1110 Brussels, Belgium
[6] Department of Engineering for Innovation, University of Salento, 73100 Lecce, Italy
* Correspondence: emansi@epoka.edu.al

Abstract

This research explores the complex relationships between tourism, economic factors, environmental sustainability, and transportation infrastructure within the European Union (EU), as the tourist scene changes globally. Our research uses a comprehensive model to investigate the factors that influence the number of tourists arriving in the EU, focusing on the years 1990 to 2022. The model considers transportation infrastructure, environmental sustainability indices, and economic variables as major determinants of tourism flows. Economic variables encompass exchange rates, the Consumer Price Index (CPI), and per capita income, while environmental sustainability indicators include carbon footprint and renewable energy usage. Additionally, the model considers transportation infrastructure by assessing the quality and availability of transportation modes. We use a two-way fixed effect to account for any unobserved heterogeneity. Fixed effects give control over nation-specific factors that might affect tourism, as they are a reliable method to deal with potential biases in the estimated parameters. Our study aims to provide insightful information about the sustainable growth of tourism in the European Union, providing policymakers, scholars, and industry stakeholders with a comprehensive understanding of the variables influencing visitor arrivals. This research contributes to the tourism literature by integrating CE principles with behavioral insights from the theory of planned behavior, highlighting how tourists' pro-environmental attitudes, social norms, and perceived behavioral control influence travel choices. In the framework of the circular economy, the authors hope to inform policy choices and advance a more environmentally conscious travel industry in the EU by examining the points where economic, environmental, and transportation aspects converge.

Keywords: circular economy; tourism; sustainability; renewable energy; carbon footprint; EU

Academic Editor: Harry Coccossis

Received: 2 August 2025
Revised: 5 September 2025
Accepted: 9 September 2025
Published: 11 September 2025

Citation: Mansi, E.; Feruni, N.; Ren, Y.; Hysa, E.; Ndou, V. Sustainable Journeys: Navigating the Circular Economy Wave in EU Tourism for a Greener Future. *Sustainability* **2025**, *17*, 8197. https://doi.org/10.3390/su17188197

1. Introduction

Tourism plays a critical role in economic development, contributing to job creation, investment flows, and cultural exchange [1]. In the European Union (EU), the tourism sector accounts for nearly 10% of GDP and continues to be a key driver of growth, employment, and regional integration [2]. According to the UN World Tourism Organization, the EU received 45.8% of all international tourist arrivals in 2022 [3]. Eurostat reports that 43% of

total nights spent in tourist accommodations were by foreign visitors, with Spain and Italy leading in international tourism activity [4].

As the sector grows, so does the urgency of aligning tourism development with environmental sustainability. The long-term viability of tourism increasingly depends on managing the delicate balance between economic benefits and ecological preservation. Well-planned infrastructure, sustainable transportation, and responsible resource use are essential to achieving this balance. Within this context, the circular economy (CE) has emerged as a critical policy framework. Defined as an economic model that minimizes waste and maximizes resource efficiency through reuse, recycling, and closed-loop systems [5], the CE offers tools for aligning tourism practices with sustainability goals.

Despite growing interest in sustainability, the application of circular economy principles to tourism remains underexplored, especially in empirical research. Practices such as renewable energy adoption, low-impact infrastructure, and reduced consumption footprints may not only reduce environmental degradation but also enhance a destination's attractiveness to eco-conscious travelers. From a behavioral standpoint, tourists increasingly base travel decisions on personal values, environmental concern, and perceived social norms. According to the Theory of Planned Behavior [6], these factors collectively shape intention and actual behavior—suggesting that destinations promoting CE practices may positively influence tourists' decision-making by aligning with their environmental attitudes.

However, while the EU has promoted CE through initiatives like the European Green Deal and the Circular Economy Action Plan, little is known about how these efforts translate into tourism demand across countries. This study addresses that gap by investigating how economic indicators, environmental sustainability metrics, and transportation infrastructure jointly influence inbound tourism flows in Europe from 1990 to 2022. Using a two-way fixed effects model, we analyzed panel data for 36 countries, including EU member states, Western Balkan countries, the United Kingdom, and Türkiye. Our primary focus is on the relationship between circular economy indicators, specifically, renewable energy usage and consumption footprint, and the number of international tourist arrivals. While previous studies have explored environmental sustainability and tourism independently, few have explicitly operationalized CE metrics over a long-term, multi-country dataset. Moreover, this study extends the literature by jointly examining the interaction of CE with economic and infrastructural determinants, offering a more holistic view of sustainable tourism drivers.

We hypothesize that destinations with higher levels of renewable energy adoption and lower consumption footprints will attract more international tourists. Our results support this expectation, showing that both circular economy variables have a statistically significant and positive relationship with tourism inflow, even after controlling for economic and infrastructural factors. Despite the growing emphasis on sustainable tourism, the integration of circular economy practices into tourism research remains limited, particularly in long-term, multi-country contexts. By addressing this gap, our study contributes to three key areas. First, we empirically demonstrate how CE indicators, specifically renewable energy adoption and consumption footprints, shape tourism flows across diverse European destinations. Second, we adopt the Theory of Planned Behavior [6] to interpret the behavioral mechanisms underlying these relationships, explaining how environmentally conscious tourists respond to sustainability signals. Third, our analysis provides timely insights for policymakers and industry stakeholders, particularly in the context of the European Green Deal and the EU's Circular Economy Action Plan [5], offering evidence-based guidance for integrating CE principles into tourism strategies.

The remainder of this paper is structured as follows: Section 2 reviews the relevant literature, Section 3 presents the data and methodology, Section 4 outlines the empirical

strategy and results, and Section 5 discusses the findings. Section 6 concludes with policy recommendations and limitations.

2. Literature Review

The tourism sector has long attracted scholarly interest due to its economic significance and sensitivity to environmental, infrastructural, and policy shifts. This review synthesizes the literature along three primary dimensions– economic indicators, environmental sustainability, and infrastructure–while highlighting the emerging role of circular economy (CE) principles in shaping tourism demand. It also integrates behavioral theory to frame how tourists respond to sustainability signals. While a growing body of literature explores tourism demand determinants and environmental sustainability, there remains a notable empirical gap concerning the role of circular economy practices, especially in a multi-country, long-term context.

2.1. Economic Indicators and Tourism

Economic indicators are central to understanding the underlying dynamics of tourism demand, as they reflect a region's macroeconomic stability, income distribution, and overall affordability for travelers. Variables such as gross domestic product (GDP), unemployment, inflation, consumer price index (CPI), and exchange rates influence consumer purchasing power and travel behavior. By capturing these dimensions, economic indicators not only reveal a destination's competitiveness, but also help identify structural vulnerabilities and inform sustainable tourism strategies.

Several empirical studies emphasize the role of income levels and price dynamics in shaping international tourism flows. Examining Malaysia, ref. [7] finds a long-term co-integration between the number of foreign visitors, exchange rates, and income levels. Interestingly, their results suggest that an increase in Malaysia's relative prices is associated with a rise in tourist arrivals, a counterintuitive outcome that may reflect perceived quality improvements or value-added experiences. In contrast, using the generalized method of moments (GMM) on ASEAN countries, ref. [8] identifies inflation as a deterrent to tourism. They recommend exchange rate depreciation as a strategic tool for enhancing tourism competitiveness, arguing that financial market control plays a key role in driving tourist activity.

The influence of price levels is further explored by [9], who compare the CPI between source and destination countries. Their fixed effects panel analysis finds that higher tourism prices negatively impact arrivals, while GDP per capita and exchange rates are positively associated with tourist inflows. This aligns with the broader economic principle that wealthier individuals are more likely to travel internationally, reinforcing the role of income elasticity in tourism.

Exchange rate fluctuations, in particular, receive nuanced treatment in the literature. Ref. [10], using hidden co-integration and likelihood-based panel co-integration across ten European countries, reveals a long-term asymmetric relationship between tourism demand and exchange rate movements. Ref. [11] provides further evidence that tourists are generally more sensitive to real exchange rate changes than to income fluctuations, although this sensitivity varies by nationality. For instance, French tourists tend to respond more to changes in GDP, while British tourists are highly responsive to exchange rate shifts.

Broader panel and gravity model analyses support these findings. Ref. [12] demonstrates that real GDP, CPI, and exchange rates all significantly influence international tourism demand. However, in their study of U.S. tourism, ref. [13] finds demand to be inelastic with respect to real exchange rates (adjusted by CPI), but elastic with respect to income—suggesting that wealth effects may dominate price considerations in more mature economies.

Recent contributions have added temporal depth to this relationship. Ref. [14] distinguishes between short- and long-run effects, showing that GDP consistently boosts tourism demand across both horizons, while relative prices exert a negative influence only in the long run. This temporal dimension highlights the complex interplay between economic trends and consumer responsiveness. Finally, ref. [15] emphasizes the dynamic nature of tourism demand, advocating for the use of dynamic panel models. They argue that sustained tourism growth must be supported not only by economic expansion but also by parallel improvements in social development indicators.

Collectively, these studies underscore that the relationship between economic indicators and tourism demand is both multifaceted and context dependent. Income growth, inflation control, and competitive exchange rates are pivotal, but their effects vary by region, income group, and time horizon. This nuanced evidence supports the inclusion of economic variables in any comprehensive model of tourism demand.

2.2. Environmental Sustainability and Tourism

Environmental sustainability plays a pivotal role in the long-term viability of the tourism sector. While tourism contributes significantly to economic development, if left unmanaged, it can also lead to environmental degradation through pollution, habitat destruction, and the overexploitation of natural resources. As global concerns around climate change and ecological resilience intensify, sustainable environmental practices are increasingly viewed not only as ethical imperatives, but also as strategic assets in enhancing destination attractiveness. In the context of tourism, environmental sustainability refers to the responsible stewardship of ecosystems and resources to ensure the continued appeal and functionality of tourist destinations over time.

Recent empirical studies highlight the importance of environmental quality in influencing tourism demand. Using a Poisson pseudo-maximum likelihood (PPML) estimation, ref. [16] demonstrates that poor environmental quality, measured via ecological footprint, significantly reduces inbound tourism. They argue that mitigating greenhouse gas emissions through greater adoption of renewable energy enhances a country's environmental image, thereby increasing its appeal to international tourists. Similarly, employing the dynamic common correlated effects (DCCE) estimator in East Asia and the Pacific, ref. [17] finds that environmental quality, alongside trade openness, institutional performance, and real exchange rates, positively influences tourist receipts. Importantly, ref. [18] reveals that these environmental improvements have a disproportionately stronger effect in countries with smaller tourism market shares, suggesting a competitive advantage for emerging destinations that invest in sustainability.

Air quality has also emerged as a critical determinant in destination choice. Studies by [19,20] show that while air pollution has no significant short-term effect on tourism, it negatively affects tourist arrivals in the long term. Ref. [21] further emphasizes that clean air should be considered a strategic tourism asset, capable of enhancing destination competitiveness. For European travelers, ref. [22] finds that although air quality and CO_2 emissions are less decisive in choosing travel mode, they are the strongest predictors of broader sustainable travel behaviors. This implies that environmental factors may influence higher-order preferences—such as choosing sustainable destinations—rather than specific logistical choices.

Nevertheless, it is important to acknowledge that the tourism sector itself is a significant contributor to environmental degradation. Ref. [23] identifies key sub-sectors—such as accommodation, transportation, and food services—as major sources of air pollutants and greenhouse gas emissions. As tourism continues to expand, so too does its environmental footprint, making mitigation strategies essential. Ref. [24] argues that green tourism

and low-carbon travel should be promoted to align tourism development with broader environmental goals and national modernization efforts. Complementing this perspective, ref. [25] contends that the transition from conventional to renewable energy sources offers a viable solution for reducing tourism-related emissions. They suggest that not only does this transition support environmental protection, but it can also foster tourism development and stimulate economic growth.

Collectively, these studies underscore a growing consensus: environmental sustainability is no longer a peripheral consideration, but a core factor shaping the future of tourism. Destinations that adopt renewable energy, improve air quality, and reduce ecological footprints can better position themselves in a competitive global tourism market, while simultaneously contributing to global climate objectives.

2.3. Infrastructure and Tourism

Infrastructure, particularly transport infrastructure, plays a foundational role in the development and competitiveness of the tourism industry. Efficient, accessible, and well-maintained transportation networks including highways, airports, and public transit systems, are essential to reducing travel times, enhancing connectivity, and improving the overall visitor experience. As the tourism industry increasingly aligns with sustainability goals, the importance of environmentally friendly and integrated transport systems is also gaining prominence, both as a practical necessity and as a means to mitigate tourism's environmental footprint.

The link between tourism and transport development is well established in the literature. As modernization and diversification of transportation options have accelerated, tourism activity has expanded accordingly [26]. Employing a nonlinear panel ARDL approach, ref. [27] finds a strong positive relationship between long-term investments in tourism infrastructure, including transport, communications, and hospitality facilities, and international tourist arrivals. This underscores the importance of coordinated capital investment to enhance destination appeal and global competitiveness. Similarly, using the ARDL bounds testing method in the context of Pakistan, ref. [28] demonstrates that infrastructure development, proxied by the percentage of paved roads, significantly boosts tourism in both the short and long term.

Improved transportation networks reduce travel costs, enhance accessibility, and encourage cross-border movement. Ref. [29] emphasizes that such improvements lower the variable costs associated with travel and trade, thereby facilitating international tourism. Ref. [30] extends this argument by using a gravity model to analyze tourism flows into Poland. Their findings suggest that the availability and quality of transport infrastructure, especially passenger air transport, is a key determinant of inbound tourism. They argue that destinations with better connectivity experience higher tourism intensity due to easier access and more efficient mobility.

However, the relationship between transport infrastructure and tourism is not strictly one-directional. Ref. [31] proposes a more complex interaction, showing that while air transport infrastructure is important, its development is also a consequence of tourism demand. Their study finds a stronger causal effect running from increased tourist arrivals to flight connectivity than the reverse. Analyzing the Chinese context, ref. [32] presents similar findings. Their results reveal a unidirectional Granger causality from railway infrastructure to tourism growth, but a bidirectional relationship between highway infrastructure and tourist arrivals, indicating that transportation and tourism co-evolve over time.

Beyond national-level analyses, city-level studies also support the infrastructural imperative. Ref. [33] observes that investment in multimodal transport infrastructure, spanning highways, airports, and railways, in Marrakech led to a measurable increase

in overnight stays across different accommodation types. This suggests that transport upgrades do not just facilitate access, but also stimulate the broader tourism ecosystem, including hospitality, food services, and local economies.

In sum, high-quality transport infrastructure is not merely supportive of tourism; it is one of its key enablers. While its effects may differ across contexts and transportation modes, there is robust evidence that infrastructure investment enhances tourism flows, particularly when integrated with broader development strategies. As destinations seek to remain competitive and resilient, strategic infrastructure planning will remain central to sustainable tourism development.

2.4. Theoretical Linkages Between Circular Economy and Tourism

The circular economy (CE) is broadly defined as an economic system that seeks to minimize resource input, waste, emissions, and energy leakage by narrowing, slowing, and closing material and energy loops [5]. Its foundational principles—reduce, reuse, and recycle—align closely with the broader objectives of sustainable development, particularly in tourism, where environmental degradation and resource overuse can threaten long-term destination viability.

In the tourism sector, CE-related practices can influence both supply and demand dimensions. On the supply side, destinations that adopt renewable energy, implement closed-loop waste systems, or promote circular mobility (bike-sharing and low-impact transit) enhance their resource efficiency while complying with EU-level sustainability targets. These practices also reduce operational costs and support climate adaptation goals. On the demand side, the role of tourist behavior is pivotal in mediating the impact of CE practices. Increasingly, tourists exhibit heightened environmental awareness, shaping their preferences for eco-certified accommodations, green transport options, and destinations with visible sustainability commitments. According to the theory of planned behavior [6], individual travel decisions are shaped by attitudes toward behavior, subjective norms, and perceived behavioral control. When a destination exhibits strong CE performance like high renewable energy usage or low consumption footprint, it may serve as a signal of environmental responsibility, thereby aligning with the attitudes and expectations of environmentally conscious travelers.

This signaling effect acts as a psychological nudge, fostering favorable destination perceptions and potentially increasing tourist inflows. In other words, CE adoption does not just impact the physical landscape, it also activates cognitive and emotional factors in travelers, who increasingly seek authenticity, sustainability, and alignment with personal values. Thus, behavioral mediators, including environmental concern, social influence, and perceived destination responsibility, serve as an important mechanism through which CE practices translate into tourism demand. Despite these linkages, empirical studies rarely integrate CE indicators with behavioral theory in tourism research. This study addresses that gap by empirically testing whether CE signals (renewable energy, consumption footprint) are associated with inbound tourism, controlling for macroeconomic and infrastructural conditions. In doing so, it positions CE not merely as a technological or regulatory tool, but as a core component of sustainable tourism strategy—one that interacts with visitor values and preferences to shape market outcomes. While our econometric model does not directly use constructs from behavioral theory, the theory of planned behavior offers a useful lens to interpret how circular economy signals, such as renewable energy adoption, may influence tourists' attitudes and intentions, thereby indirectly shaping tourism demand. The selection of the theory of planned behavior (TPB) as the conceptual foundation for this study is grounded in its explanatory power for sustainability-driven decision-making in tourism [6]. TPB posits that individual behavior is shaped by three factors: attitudes, subjective norms,

and perceived behavioral control. In the context of tourism, environmentally responsible destinations signal alignment with tourists' values, which influence behavioral intentions and actual travel choices. As destinations increasingly adopt CE practices, tourists who value sustainability are more likely to select them due to perceived social approval and control over making pro-environmental decisions. By applying TPB, this study captures the cognitive mechanisms connecting CE-driven policy adoption to actual tourism flows, thereby strengthening the theoretical foundation of our empirical findings.

To sum up, there is a plethora of literature on tourism and circular economy. However, few studies focus on the empirical side of it. While prior research has extensively examined the effects of environmental sustainability, economic performance, and infrastructure on tourism demand [1,14], most studies treat these dimensions in isolation rather than adopting an integrated, multidimensional perspective. Moreover, few empirical works operationalize circular economy (CE) indicators over long-term, multi-country datasets, leaving a gap in understanding how CE strategies shape tourist behavior across diverse institutional contexts. Some studies find strong environmental effects on tourism demand [16] whereas others report weaker or context-dependent relationships, particularly in regions with higher policy integration [34]. By addressing these inconsistencies and incorporating CE proxies alongside economic and infrastructural variables, this study seeks to provide a more holistic understanding of sustainable tourism drivers within the EU. Lastly, our hypotheses are as follows:

- Circular economy, road infrastructure, GDP per capita and CPI have a positive significant result in increasing the inbound of tourism.
- The exchange rate has a negative significant result in increasing the inbound of tourism.

3. Data

This study investigates the impact of circular economy (CE) practices on inbound tourism, as well as the role of related economic variables and transportation infrastructure across European countries. To conduct our empirical analysis, we constructed an unbalanced panel dataset comprising annual data from 1990 to 2022 for 36 countries. The dataset includes EU member states, Western Balkan countries (excluding Kosovo due to data limitations), the United Kingdom, Türkiye, and Switzerland, resulting in 671 observations. All variables are expressed on a yearly basis, and data were collected from authoritative sources including the World Bank, Eurostat, OECD, and OurWorldinData.

The dependent variable, Inbound Tourism, is defined as the total number of foreign overnight visitors arriving in a country during a given year and it was sourced from Eurostat. A single individual can generate multiple arrivals if they enter a country on separate occasions or visit multiple countries on one trip. Therefore, this metric reflects the total arrival count rather than the unique number of travelers. To address right-skewed distributions and facilitate interpretation of elasticities, we apply the natural logarithm to the inbound tourism variable, as well as to selected explanatory variables.

Economic variables included in the analysis are the Consumer Price Index (CPI), GDP per capita, and exchange rate. CPI captures annual price inflation and reflects cost-of-living dynamics that influence travel decisions. GDP per capita, measured in constant international dollars, serves as a proxy for average income levels and economic development. The exchange rate is defined as the national currency value against the U.S. dollar, capturing the relative cost of traveling for international tourists. Exchange rate dynamics represent a critical determinant of international tourism demand, as relative currency valuations affect the affordability of destinations for foreign visitors [11,35]. When a country's currency appreciates, inbound tourism may decline due to higher relative costs; conversely, currency depreciation may make the destination more attractive. While our baseline results indicate

that exchange rate effects are less pronounced within the EU, partly due to currency convergence and integrated economic policies, we include this variable to control for cost-related dynamics influencing cross-border travel decisions. These variables were obtained from the World Bank and OECD databases.

The primary circular economy variables are consumption footprint and renewable energy, both of which serve as indicators of a country's environmental sustainability efforts. Consumption footprint measures the total environmental impact of final consumption, standardized per capita, and was sourced from Eurostat. It encompasses resource use across sectors such as food, housing, mobility, and goods. Renewable energy is defined as the share of renewables in total primary energy supply (TPES) and reflects the country's energy transition progress; this data was drawn from OECD and OurWorldinData. The primary circular economy variables are consumption footprint and renewable energy, selected due to their empirical availability, cross-country consistency, and conceptual relevance. Consumption footprint captures the environmental cost of final consumption across multiple sectors (food, mobility, housing), aligning with CE goals of reducing material throughput. Renewable energy use reflects progress toward decarbonized energy systems and aligns with circularity principles like resource regeneration. While other tourism-specific CE indicators such as eco-label certifications, waste recycling rates in hospitality, or green building practices may provide valuable insights, comprehensive, standardized, and long-term data for these metrics is not available across all countries or years in our sample period (1990–2022). The two selected indicators were thus chosen for their representativeness of broader CE transitions and their ability to serve as reliable signals of environmental sustainability in international datasets. While renewable energy share and consumption footprint are robust proxies for environmental sustainability, we acknowledge that these two measures cannot fully capture the complexity of circular economy (CE) practices in tourism. Ideally, CE operationalization would integrate tourism-specific sustainability indicators, such as eco-label certifications, waste recycling rates in hospitality, and green mobility infrastructures [36–39]. However, the lack of standardized and long-term data across 36 countries from 1990 to 2022 constrained our choice of variables. Future studies may benefit from integrating broader CE dimensions as more granular, sector-specific data become available.

To account for transportation infrastructure, we included road infrastructure as an explanatory variable taken from OECD Transport Statistics. This measures the total length of the national road network, which serves as a proxy for accessibility and internal mobility, both important determinants of tourism inflow. The variable is expressed in logarithmic terms to mitigate scale effects and interpret the coefficients in percentage terms.

This dataset provides a comprehensive, multi-dimensional view of tourism demand in relation to sustainability, macroeconomic conditions, and infrastructure across Europe over a 32 year period. The unbalanced nature of the panel reflects data availability differences across countries and years, which are common in long-term, cross-national studies.

4. Empirical Strategy

We analyzed an unbalanced panel dataset covering 36 European and neighboring countries over a 32 year period from 1990 to 2022. The countries included all 27 EU member states, the Western Balkan countries (excluding Kosovo due to missing data), the United Kingdom, Türkiye, and Switzerland. Given the cross-country heterogeneity in environmental policy, infrastructure quality, and economic development, a pooled ordinary least squares (OLS) regression would likely suffer from omitted variable bias. Specifically, unobserved factors such as country-specific environmental legislation, cultural attitudes toward sustainability, and institutional effectiveness can bias coefficient estimates if not

properly controlled. Additionally, common shocks such as the 2008 financial crisis or EU-level regulatory reforms may induce year-specific effects that are also unobserved.

To mitigate these issues, we adopted a two-way fixed effects (FE) regression model, which controlled for unobserved heterogeneity across both countries and years. This approach allowed us to isolate the within-country variation over time while accounting for time trends that are common to all countries [40]. The decision to use fixed effects rather than a random effects model was statistically supported by a Hausman test, which yielded a p-value of 0.0241, allowing us to reject the null hypothesis that the random effects estimator is consistent [41]. The results from the random effects and pooled OLS models are presented in Appendix A Tables A1–A4, Table A1 for comparison. The baseline empirical model is specified as follows:

$$\log(IT_{ct}) = \beta_1 EV_{ct} + \beta_2 CE_{c,t-1} + \beta_3 Road_{ct} + \delta_c + \lambda_t + \varepsilon_{ct} \quad (1)$$

In this specification, $\log(IT_{ct})$ denotes the natural logarithm of inbound tourism to country c in year t. The variable EV is a vector of economic variables, including the consumer price index (CPI), exchange rate, and GDP per capita. The term $CE_{c,t-1}$ captures lagged circular economy indicators, specifically renewable energy use and the consumption footprint. $Road_{ct}$ represents the natural logarithm of total national road length, serving as a proxy for transportation infrastructure. The model also includes country fixed effects (δ_c) and year fixed effects (λ_t) to control for unobserved heterogeneity across countries and over time. Finally, ε_{ct} is the idiosyncratic error term. The primary coefficients of interest are contained in β_2, which capture the effects of CE variables on inbound tourism. These variables were lagged by one year for two reasons. First, reverse causality may arise if current tourism inflows influence a country's CE performance, for example, through tourism-driven investments in green infrastructure. Second, tourism decisions are often based on environmental signals and infrastructure from the previous year, particularly in international travel planning. Therefore, lagging CE variables helps to reduce endogeneity and aligns with the temporal decision-making process of travelers.

A reasonable question is why only CE variables were lagged, while economic and infrastructure variables are not. While lagging all variables could provide additional causal clarity, we assumed that economic indicators such as CPI and GDP per capita influence tourism more contemporaneously, as travelers respond to real-time economic conditions when booking trips. Similarly, road infrastructure tends to change gradually, and its effect is presumed to be relatively stable over time, allowing us to include it contemporaneously without inducing simultaneity bias. Nonetheless, we acknowledged that road infrastructure and GDP per capita may also be endogenous, as inbound tourism itself could lead to improvements in infrastructure or contribute to economic growth. To mitigate this potential bias, we employed an instrumental variables (IV) approach, using the lagged values of these variables as instruments in a two-stage least squares (2SLS) framework. This method leveraged the assumption that past infrastructure and income levels are correlated with current values but are not directly affected by present tourism flows, thus helping to isolate exogenous variation. This IV strategy complements our fixed-effects design by strengthening causal inference. It also aligns with standard practice in macro-panel econometrics when external instruments are unavailable. Robustness checks confirmed that our core results remain stable under this specification, suggesting that endogeneity did not significantly distort the estimated effects. Nonetheless, we acknowledge this as a modeling assumption and suggest future work could test alternative lag structures for robustness.

To ensure our findings were not driven by persistence in tourism flows themselves, we conducted a robustness check by including a lagged difference term of the depen-

dent variable. This accounted for the dynamic nature of tourism behavior and potential autocorrelation in the error term. The robustness model is specified as follows:

$$\log(IT_{ct}) = \beta_1 EV_{ct} + \beta_2 CE_{c,t-1} + \beta_3 Road_{ct} + \beta_4 \Delta\log(IT_{c,t-1}) + \delta_c + \lambda_t + \varepsilon_{ct} \quad (2)$$

In this regression, we included $IT_{c,t-1}$ to capture the influence of past tourism development. This term was the difference between $IT_{c,t-1}$ and $IT_{c,t-2}$, that is, the change in inbound tourism in year t−1 compared to in year t−2. It captured the short-run change in tourism flows from the previous period. This variable controlled for the momentum in tourism development and helped isolate the true effect of CE indicators on current inbound tourism. All other variables remained as described in Equation (1), and we continued to include two-way fixed effects to control for unobservable factors. Standard errors were clustered at the country level to account for serial correlation within panels. In addition, variance inflation factors (VIFs) were tested to ensure multicollinearity was not a concern among the independent variables. To ensure the robustness of our findings, we complemented the baseline two-way fixed-effects specification with several additional analyses found in the appendix. First, we computed the Driscoll–Kraay (DK) standard errors [42]. DK SEs are robust to heteroskedasticity, serial correlation, and cross-sectional dependence, making them well-suited for our panel structure (36 countries, 32 years). Second, we tested alternative lag structures by estimating specifications where circular economy variables are lagged two years (t−2). Third, we performed subsample analyses contrasting EU vs. non-EU countries and pre-2010 vs. post-2010 periods, capturing the evolution of CE policy effects under the European Green Deal and related frameworks. Across all these robustness checks, the results remained stable in sign, magnitude, and significance, confirming the consistency of our baseline findings. Although our model includes a lagged dependent variable, we did not apply a generalized method of moments (GMM) estimators [43] in our analysis. Considering that the Nickell bias [44] in dynamic models diminishes rapidly as time increases, the Nickell bias associated with our model was small, as our panel spanned 32 years, which is a relatively long period. Therefore, TWFE could provide a consistent baseline for our context.

5. Results and Discussion

The trends of inbound tourism across countries are displayed in Figure 1. Inbound arrivals gradually increased in most of the countries. However, to rigorously assess the influence of circular economy (CE) variables on tourism inflows, while accounting for structural and macroeconomic controls, we conducted a panel regression analysis using a two-way fixed effects model.

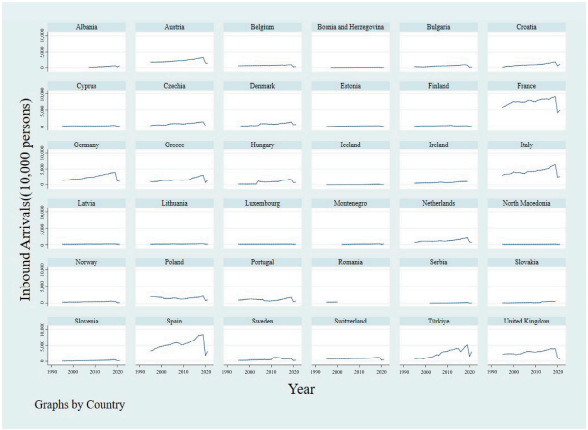

Figure 1. Inbound tourism between 1990 and 2022. Source: Author's own elaboration.

The results of the regression model are summarized in Table 1.

Table 1. The Results of Two-way Fixed Effects Regression, Random Effects and Pooled OLS.

Log Inbound Arrivals	Fixed Effects	Random Effects	Pooled OLS
Consumption Footprint	0.0663 **	0.0541 *	−0.194 ***
	(0.0223)	(0.0218)	(0.0257)
Renewable Energy	0.0102 *	0.00768	−0.0205 ***
	(0.00446)	(0.00438)	(0.00414)
GDP per capita	0.00562 ***	0.00533 ***	0.0162 ***
	(0.00158)	(0.00157)	(0.00235)
CPI	0.00744 ***	0.00778 ***	0.00838 ***
	(0.000771)	(0.000768)	(0.00174)
Exchange Rate	−0.000508	−0.00102	−0.00302 ***
	(0.00169)	(0.00158)	(0.000913)
Road Infrastructure	0.165 *	0.251 ***	0.726 ***
	(0.0721)	(0.0638)	(0.0414)
cons		14.28 ***	15.72 ***
		(0.242)	(0.212)
N	647	647	647
R^2	0.313		0.462

Standard errors in parentheses. * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$. Source: Author's own elaboration.

As can be seen from Table 1, both circular economy variables, consumption footprint and renewable energy, were statistically significant in the two-way fixed effects model. The consumption footprint increased the number of arrivals of tourists by 6.63% while renewable energy increased tourism arrivals by 1%, keeping every other variable constant. This effect is also explained by the literature, due to its ability to promote circular flows among suppliers and consumers, as well as its multiplier effect on the whole economy; the tourist sector has a vital role to play in the ongoing economic change [36]. Additionally, propelled by an increasing awareness of environmental issues, postmodern tourists prefer locations that emphasize sustainability. Therefore, a destination's dedication to a minimal carbon footprint and dependence on renewable energy sources may increase its allure to travelers looking for eco-friendly experiences. This positive correlation is because people see these places as progressive, responsible, and forward-thinking, which helps them to project a positive image to the world. The positive association between consumption footprint and inbound tourism requires a nuanced interpretation. On the one hand, higher domestic consumption levels often indicate greater purchasing power, better-developed infrastructure, and diversified hospitality services, all of which enhance the attractiveness of destinations for international travelers [14]. On the other hand, elevated consumption also implies greater environmental pressure through increased resource use, emissions, and waste generation. From a circular economy perspective, this duality underscores the need for tourism strategies that decouple economic attractiveness from environmental degradation by promoting resource efficiency, green innovation, and low-impact visitor experiences [34]. Additionally, using renewable energy can create opportunities for eco-tourism, drawing in specialized consumers who are eager to support and engage with eco-friendly activities. Adopting renewable energy may also result in more competitive pricing, appealing to a broader range of tourists due to the possible cost savings [38,39]. The tourist industry may attract investments by creating a favorable business climate through government support and incentives for sustainable practices. Furthermore, an emphasis on cultural exchange, community involvement, and educational tourism offers visitors special chances to see and partake in sustainable living methods [36,37,45,46]. In general, a destination's dedication to renewable energy and a low consumption footprint not only fits

with the preferences of today's travelers, but it also establishes the destination as strong, innovative, and able to provide engaging, sustainable experiences, all of which add to the destination's long-term appeal to inbound travelers.

Moreover, economic variables including CPI, GDP per capita and exchange rate appeared to be on par with the literature, besides the latter. The exchange rate is not a significant enough variable to prevent tourists from visiting a country. Based on the table, CPI and per capita increases tourist inflow with 0.7% and 0.6%, respectively. Both are highly significant results. On the other hand, exchange rate decreases this inflow by 0.05%. This effect as seen is quite small and also not statistically significant. A lower CPI indicates stable pricing and a more desirable tourism location, since it suggests cheaper living and travel expenditures [47–50]. Comparably, a larger GDP per capita denotes economic prosperity and raises disposable money, which in turn raises travel inclination [51–54]. On the other hand, the exchange rate has a detrimental impact on travel. Travel expenses for foreign visitors can be greatly impacted by fluctuations in currency rates [55]. Travel may be discouraged if international tourists find the place more expensive due to a stronger local currency [56]. The aforementioned negative association underscores the susceptibility of tourism to fluctuations in currency rates and underscores the financial ramifications for both travelers and host economies.

Lastly, road infrastructure seems to adhere to our aforementioned hypothesis. It also appears to be the one variable that shares the highest impact on inbound tourism, with an effect of 16.5% increase in tourism inflow. A destination's tourism environment is greatly shaped by its well-maintained road infrastructure, which has a positive impact on a number of factors that lead to a rise in visitor numbers. First and foremost, better road connections increase accessibility, shorten travel times, and increase the destination's appeal to tourists [57]. Smoother and more pleasant transit is made possible by effective and well-maintained road networks, which gives guests a favorable first impression. By making isolated or less-traveled locations accessible, this accessibility can open up new tourist opportunities and enhance the visitor experience. Second, improved road infrastructure adds to travelers' general sense of security and safety [58,59]. Well-built roads with appropriate lighting and signs lower the chance of accidents, and provide drivers with a sense of confidence. Travelers' perceptions of safety play a significant role in determining their destination preferences, especially for families and those looking for hassle-free travel. Thirdly, the local companies and communities along these routes will benefit economically from upgraded road networks [37,59]. More accessibility benefits tourism-related businesses, including lodging, dining, and attractions, which stimulate the economy and create jobs. The infrastructure and services associated with tourism may be developed and maintained in part by the favorable economic effect.

As we were concerned that previous tourism might also affect current tourism, which would confound the effect of circular economy, we conducted a further robustness check, as we suggested in the last section. Our results (Table 2) suggest that the effect of circular economy is robust. The coefficients of both circular economy variables, consumption footprint and renewable energy, are consistently significantly positive, with a slight change in magnitude. Consumption footprint increases the number of arrivals of tourists by 4.72% while renewable energy increases tourism arrivals by 1.63%, keeping every other variable constant.

Table 2. The Results of Robustness Check.

Log Inbound Arrivals	**Fixed Effects**
Δ_{t-1} log Inbound Arrivals	0.600 *** (0.0537)

Table 2. *Cont.*

Log Inbound Arrivals	Fixed Effects
Consumption Footprint	0.0472 * (0.0211)
Renewable Energy	0.0163 *** (0.00436)
GDP per capita	0.00522 *** (0.00148)
CPI	0.00815 *** (0.000748)
Exchange Rate	−0.000940 (0.00169)
Road Infrastructure	0.201 * (0.0809)
N	621
R^2	0.403

Standard errors in parentheses. * $p < 0.05$, *** $p < 0.001$. Source: Author's own elaboration.

This study advances the theoretical understanding of sustainable tourism by integrating circular economy (CE) indicators within a behavioral framework. Unlike prior research that primarily focuses on economic or environmental determinants of tourism demand [1,14], our findings demonstrate that CE practices, such as renewable energy adoption and reduced consumption footprints, serve as powerful signals influencing tourists' attitudes and behavioral intentions. Drawing on the theory of planned behavior [6], we show that destinations adopting CE strategies align more closely with travelers' pro-environmental values, thereby shaping their perceptions and destination choices [22]. By combining CE indicators with behavioral insights, the study contributes to a more comprehensive theoretical foundation for understanding tourism flows in sustainability-driven contexts. From a managerial perspective, the findings provide actionable insights for policymakers and destination managers. First, integrating CE practices into tourism strategies enhances destination competitiveness by attracting environmentally conscious travelers [37] and strengthening the destination's sustainability image. Second, improving infrastructure, particularly road networks, amplifies these effects by facilitating accessibility and promoting regional tourism integration [57]. Finally, behavioral insights from the TPB suggest that tourism operators should design communication campaigns emphasizing environmental responsibility and collective participation in sustainable practices, thereby encouraging tourists to engage with destinations that prioritize sustainability [36].

6. Conclusions

In conclusion, this study provides valuable insight into the complex interplay between tourism, economic conditions, environmental sustainability, and transportation infrastructure across the European Union (EU). The empirical results underscore the importance of integrating circular economy (CE) strategies into tourism policy, particularly through reducing consumption footprints and increasing the amount of renewable energy. These factors not only support ecological preservation but also enhance the long-term competitiveness and appeal of destinations among environmentally conscious travelers.

Economic indicators, notably GDP per capita and the Consumer Price Index (CPI), also play significant roles in shaping tourism demand. Higher per capita income is associated with increased tourism inflows, while lower CPI values reflect cost stability, making destinations more affordable and attractive. Interestingly, the exchange rate does not exhibit a statistically significant effect, suggesting that its impact may be muted within the EU

context or among countries with close economic integration and relatively stable currency systems. Among all variables, road infrastructure emerges as the most influential factor, with a 16.5% increase in inbound tourism linked to improvements in transport networks. This finding highlights the foundational role of accessibility, safety, and regional connectivity in supporting tourism growth. Well-developed road infrastructure not only facilitates tourist mobility but also fosters local economic benefits along travel corridors. Our findings align with previous studies showing the importance of renewable energy adoption and infrastructure in shaping sustainable tourism demand [16,37], but they expand upon prior work by demonstrating the dual role of consumption patterns as both drivers of attractiveness and sources of environmental pressure. By integrating circular economy indicators within a behavioral framework based on the theory of planned behavior [6], this study contributes a multidimensional perspective on sustainable tourism development in the EU. The results highlight that policy strategies combining CE practices with infrastructural investment can enhance competitiveness while supporting climate objectives.

Despite these contributions, the study is subject to several limitations. First, the geographic focus on the EU means that the findings may not generalize to regions with different economic, institutional, or cultural contexts. Second, the dataset covers the period from 1990 to 2022, which excludes more recent shifts due to technological innovations, evolving traveler behavior, or post-pandemic policy developments. Future research should consider expanding the geographical scope, incorporating more recent data, and examining cross-regional comparisons to enhance external validity. Another important limitation lies in the measurement of circular economy variables. While renewable energy and consumption footprint are robust proxies for national-level circularity, they do not capture tourism-specific sustainability practices. Future research should seek to include sectoral indicators, such as eco-certifications for accommodations, circular waste systems, or green mobility infrastructure, once such data becomes consistently available across countries and time periods. Moreover, while this study draws conceptually on behavioral theory to interpret the appeal of sustainable destinations, it does not empirically test micro-level behavioral mechanisms. Future studies would benefit from integrating survey-based or experimental data to directly assess how tourists' environmental attitudes, subjective norms, and perceived behavioral control, as posited by the theory of planned behavior (TPB), mediate the relationship between CE practices and tourism flows.

In terms of policy implications, the findings support three key recommendations. First, promote CE integration in tourism planning through investment in renewable energy and resource-efficient systems. Second, prioritize strategic investment in transport infrastructure, especially road networks, to unlock broader regional tourism potential. Third, encourage sustainable consumption and production patterns in tourism services to align with growing environmental awareness among travelers. Collectively, these actions can enhance destination attractiveness, support climate objectives, and contribute to a more resilient and sustainable tourism sector in the EU and beyond. Finally, future research should complement this study's quantitative approach with qualitative dimensions, such as tourism policy frameworks, environmental certification schemes, and traveler preferences. Combining econometric modeling with in-depth interviews, case studies, or experimental approaches would provide a more holistic understanding of how circular economy practices influence tourism dynamics at both micro and macro levels. Integrating these perspectives would also enable researchers to capture behavioral responses, institutional dynamics, and policy effects that are difficult to observe using panel data alone.

Author Contributions: Conceptualization, E.M. and N.F.; Methodology, E.M.; Validation, V.N.; Formal analysis, N.F., Y.R. and E.H.; Investigation, E.M., Y.R. and E.H.; Data curation, N.F.; Writing—review and editing, E.H. and V.N.; Visualization, N.F.; Supervision, V.N.; Project administration, V.N. All authors have read and agreed to the published version of the manuscript.

Funding: This research was partially funded by research funds from Epoka University.

Institutional Review Board Statement: Not applicable.

Informed Consent Statement: Not applicable.

Data Availability Statement: Data available upon request.

Conflicts of Interest: The authors declare no conflicts of interest.

Appendix A

Table A1. Subsample robustness (t−1 lags), two-way fixed effects with country and year dummies; Driscoll–Kraay SEs.

Variable	Full (t−1)	EU only (t−1)	Non-EU (t−1)	≤2010 (t−1)	>2010 (t−1)
Consumption Footprint (t−1)	0.049 (0.031)	0.036 (0.034)	0.176 (0.109)	0.090 ** (0.042)	−0.072 *** (0.027)
Renewable Energy (t−1)	0.005 (0.018)	0.015 (0.020)	−0.037 *** (0.012)	0.008 (0.016)	−0.023 (0.015)
GDP per Capita	−0.004 (0.003)	−0.002 (0.004)	−0.006 ** (0.003)	−0.002 (0.003)	0.008 * (0.004)
CPI	0.004 *** (0.001)	0.005 (0.003)	0.004 ** (0.002)	0.008 ** (0.003)	0.002 (0.001)
Exchange Rate	0.000 (0.001)	0.000 (0.001)	0.003 (0.004)	−0.004 *** (0.001)	0.003 ** (0.001)
Log Road Infrastructure	0.237 *** (0.048)	0.237 *** (0.045)	0.835 *** (0.154)	0.074 (0.052)	0.165 (0.403)

Entries report coefficient with robust standard error in parentheses. Significance: * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. Dependent variable: log(Inbound). Controls include GDP per capita, CPI, exchange rate, and log road infrastructure. Specifications estimated via OLS with country and year fixed effects; Driscoll–Kraay SEs clustered at the country level.

Table A2. Model size and fit (t−1).

Spec	N	R^2
Full (t−1)	674	0.975
EU only (t−1)	548	0.969
Non-EU (t−1)	126	0.994
≤2010 (t−1)	396	0.984
>2010 (t−1)	278	0.985

Table A3. Lag-structure robustness (t−2, full sample), two-way fixed effects; Driscoll–Kraay SEs.

Variable	Full (t−2)
Consumption Footprint (t−2)	0.047 (0.031)
Renewable Energy (t−2)	0.009 (0.017)
GDP per Capita	−0.002 (0.000)
CPI	0.005 *** (0.001)
Exchange Rate	0.000 (0.001)
Log Road Infrastructure	0.230 *** (0.047)

Entries report coefficient with robust standard error in parentheses. Significance: *** $p < 0.01$. Dependent variable: log(Inbound). Controls include GDP per capita, CPI, exchange rate, and log road infrastructure. Specification uses CE variables lagged two years (t−2).

Table A4. Model size and fit (t−2).

Spec	N	R^2
Full (t−2)	674	0.975

References

1. Comerio, N.; Strozzi, F. Tourism and its economic impact: A literature review using bibliometric tools. *Tour. Econ.* **2019**, *25*, 109–131. [CrossRef]
2. Pernice, D. Fact Sheets on the European Union. European Parliament. 2023. Available online: https://www.europarl.europa.eu/factsheets/en/sheet/126/tourism (accessed on 16 December 2023).
3. UNWTO. Tourism Dashboard. 2023. Available online: https://www.unwto.org/ (accessed on 16 December 2023).
4. Eurostat. Database on Tourism. 2023. Available online: https://ec.europa.eu/eurostat/web/main/home (accessed on 16 December 2023).
5. Kirchherr, J.; Reike, D.; Hekkert, M. Conceptualizing the circular economy: An analysis of 114 definitions. *Resour. Conserv. Recycl.* **2017**, *127*, 221–232. [CrossRef]
6. Ajzen, I. The theory of planned behavior. *Organ. Behav. Hum. Decis. Process.* **1991**, *50*, 179–211. [CrossRef]
7. Borhan, N.; Arsad, Z. Determining factors affecting tourism demand for Malaysia using ARDL modeling: A case of Europe countries. In Proceedings of the 4th International Conference on Quantitative Sciences and Its Applications (Icoqsia 2016), Bangi, Malaysia, 16–18 August 2016; AIP Publishing: Melville, NY, USA, 2016; Volume 1782.
8. Nguyen, L.P.; Nguyen, H.T. Factors impacting tourism demand: An analysis of 10 ASEAN countries. *J. Asian Financ. Econ. Bus.* **2021**, *8*, 385–393.
9. Medyawati, H.; Yunanto, M. Factors influencing the demand for Indonesian tourism. *Econ. Bus. Q. Rev.* **2022**, *5*, 163–174. [CrossRef]
10. Irandoust, M. On the relation between exchange rates and tourism demand: A nonlinear and asymmetric analysis. *J. Econ. Asymmetries* **2019**, *20*, e00123. [CrossRef]
11. Ongan, S.; Işik, C.; Özdemir, D. The effects of real exchange rates and income on international tourism demand for the USA from some European Union countries. *Economies* **2017**, *5*, 51. [CrossRef]
12. Khoshnevis Yazdi, S.; Khanalizadeh, B. Tourism demand: A panel data approach. *Curr. Issues Tour.* **2017**, *20*, 787–800. [CrossRef]
13. Ekanayake, E.M.; Halkides, M.; Ledgerwood, J.R. Inbound international tourism to the United States: A panel data analysis. *Int. J. Manag. Mark. Res.* **2012**, *5*, 15–27.
14. Borrego-Domínguez, S.; Isla-Castillo, F.; Rodríguez-Fernández, M. Determinants of tourism demand in Spain: A European perspective from 2000–2020. *Economies* **2022**, *10*, 276. [CrossRef]
15. Pivcevic, S.; Kulis, Z.; Seric, N. The pull factors of tourism demand: A panel data analysis for Latin American and Caribbean Countries. In *Faculty of Tourism and Hospitality Management in Opatija, Proceedings of the 2016 Biennial International Congress for the Tourism and Hospitality Industry, Opatija, Croatia, 28–29 April 2016*; University of Rijeka: Opatija, Croatia, 2016; p. 319.
16. Özdemir, D.; Tosun, B. Determinants of tourism demand in context of environmental quality. *Adv. Hosp. Tour. Res.* **2023**, *11*, 294–316. [CrossRef]
17. Chaudhry, I.S.; Nazar, R.; Ali, S.; Meo, M.S.; Faheem, M. Impact of environmental quality, real exchange rate and institutional performance on tourism receipts in East-Asia and Pacific region. *Curr. Issues Tour.* **2022**, *25*, 611–631. [CrossRef]
18. Usman, O.; Bekun, F.V.; Ike, G.N. Democracy and tourism demand in European countries: Does environmental performance matter? *Environ. Sci. Pollut. Res.* **2020**, *27*, 38353–38359. [CrossRef]
19. Tang, J.; Yuan, X.; Ramos, V.; Sriboonchitta, S. Does air pollution decrease inbound tourist arrivals? The case of Beijing. *Asia Pac. J. Tour. Res.* **2019**, *24*, 597–605. [CrossRef]
20. Zhou, X.; Jiménez, Y.S.; Rodríguez, J.V.P.; Hernández, J.M. Air pollution and tourism demand: A case study of Beijing, China. *Int. J. Tour. Res.* **2019**, *21*, 747–757. [CrossRef]
21. Monteiro, A.; Eusébio, C.; Carneiro, M.J.; Madaleno, M.; Robaina, M.; Rodrigues, V.; Gama, C.; Relvas, H.; Russo, M.; Oliveira, K.; et al. Tourism and air quality during COVID-19 pandemic: Lessons for the future. *Sustainability* **2021**, *13*, 3906. [CrossRef]
22. Nikolić, T.M.; Pantić, S.P.; Paunović, I.; Filipović, S. Sustainable travel decision-making of Europeans: Insights from a household survey. *Sustainability* **2021**, *13*, 1960. [CrossRef]
23. Wen, C.; Gao, K.; Chen, X.; Li, K.; Wei, Q.; Song, X. Assessing the linkages among tourism industry, economic output, energy consumption, and environmental quality. *Energy Environ.* **2023**, *35*, 4156–4175. [CrossRef]
24. Zhang, F.; Peng, H.; Sun, X.; Song, T. Influence of tourism economy on air quality—An empirical analysis based on panel data of 102 cities in China. *Int. J. Environ. Res. Public Health* **2022**, *19*, 4393. [CrossRef]
25. Isik, C.; Dogru, T.; Turk, E.S. A nexus of linear and non-linear relationships between tourism demand, renewable energy consumption, and economic growth: Theory and evidence. *Int. J. Tour. Res.* **2018**, *20*, 38–49. [CrossRef]

26. Dinu, A.M. The importance of transportation to tourism development. *Acad. J. Econ. Stud.* **2018**, *4*, 183–187.
27. Nguyen, Q.H. Impact of investment in tourism infrastructure development on attracting international visitors: A nonlinear panel ARDL approach using Vietnams data. *Economies* **2021**, *9*, 131. [CrossRef]
28. Ahmed, M.; Anwar, M.A. The nexus between terrorism, infrastructure and tourism industry in Pakistan. *Int. J. Econ. Empir. Res.* **2016**, *4*, 25–31.
29. Khan, I.U.; Kalirajan, K. The impact of trade costs on exports: An empirical modeling. *Econ. Model.* **2011**, *28*, 1341–1347. [CrossRef]
30. Gołembski, G.; Majewska, J. The impact of transport infrastructure on international inbound tourism–A gravity model for Poland. *Int. J. Contemp. Manag.* **2018**, *14*, 135–154. [CrossRef]
31. Mazzola, F.; Cirà, A.; Ruggieri, G.; Butler, R. Air transport and tourism flows to islands: A panel analysis for southern European countries. *Int. J. Tour. Res.* **2022**, *24*, 639–652. [CrossRef]
32. Zhang, J.; Zhang, Y. Tourism, transport infrastructure and income inequality: A panel data analysis of China. *Curr. Issues Tour.* **2021**, *25*, 1607–1626. [CrossRef]
33. Ouariti, O.Z.; Jebrane, E.M. The Impact of Transport Infrastructure on Tourism Destination Attractiveness: A Case Study of Marrakesh City, Morocco. *Afr. J. Hosp. Tour. Leis.* **2020**, *9*. Available online: https://www.ajhtl.com/uploads/7/1/6/3/7163688/article_36_vol_9_2__2020_morocco.pdf (accessed on 16 December 2023).
34. Manniche, J.; Larsen, K.T.; Broegaard, R.B. The circular economy in tourism: Transition perspectives for business and research. *Scand. J. Hosp. Tour.* **2021**, *21*, 247–264. [CrossRef]
35. Sharma, C.; Pal, D. Exchange rate volatility and tourism demand in India: Unraveling the asymmetric relationship. *J. Travel Res.* **2020**, *59*, 1282–1297. [CrossRef]
36. Vargas-Sánchez, A. The unavoidable disruption of the circular economy in tourism. *Worldw. Hosp. Tour. Themes* **2018**, *10*, 652–661. [CrossRef]
37. Axhami, M.; Ndou, V.; Milo, V.; Scorrano, P. Creating value via the circular economy: Practices in the tourism sector. *Adm. Sci.* **2023**, *13*, 166. [CrossRef]
38. Scheepens, A.E.; Vogtländer, J.G.; Brezet, J.C. Two life cycle assessment (LCA) based methods to analyse and design complex (regional) circular economy systems. Case: Making water tourism more sustainable. *J. Clean. Prod.* **2016**, *114*, 257–268. [CrossRef]
39. Popescu, C.; Hysa, E.; Kruja, A.; Mansi, E. Social innovation, circularity and energy transition for environmental, social and governance (ESG) practices—A comprehensive review. *Energies* **2022**, *15*, 9028. [CrossRef]
40. Wooldridge, J.M. *Econometric Analysis of Cross Section and Panel Data*, 2nd ed.; MIT Press: Cambridge, MA, USA, 2010.
41. Hausman, J.A. Specification tests in econometrics. *Econometrica* **1978**, *46*, 1251–1271. [CrossRef]
42. Driscoll, J.C.; Kraay, A.C. Consistent covariance matrix estimation with spatially dependent panel data. *Rev. Econ. Stat.* **1998**, *80*, 549–560. [CrossRef]
43. Arellano, M.; Bond, S. Some tests of specification for panel data: Monte Carlo evidence and an application to employment equations. *Rev. Econ. Stud.* **1991**, *58*, 277–297. [CrossRef]
44. Nickell, J.A. Biases in Dynamic Models with Fixed Effects. *Econometrica* **1981**, *49*, 1417–1426. [CrossRef]
45. Rocca, L.H.D.; Zielinski, S. Community-based tourism, social capital, and governance of post-conflict rural tourism destinations: The case of Minca, Sierra Nevada de Santa Marta, Colombia. *Tour. Manag. Perspect.* **2022**, *43*, 100985. [CrossRef]
46. Alonso-Muñoz, S.; Torrejón-Ramos, M.; Medina-Salgado, M.-S.; González-Sánchez, R. Sustainability as a building block for tourism–future research: Tourism agenda 2030. *Tour. Rev.* **2022**, *78*, 461–474. [CrossRef]
47. Khaidi, S.M.; Abu, N.; Muhammad, N. Tourism demand forecasting–a review on the variables and models. *J. Phys. Conf. Ser.* **2019**, *1366*, 012111. [CrossRef]
48. Shang, Y.; Zhou, L.; Qian, F.; Xie, Y. Role of green finance in renewable energy development in the tourism sector. *Renew. Energy* **2023**, *206*, 890–896. [CrossRef]
49. Prayogo, A.W.; Haryanto, T. Effects of international tourism revenue, trade openness, formation of physical capital, and consumer price index on Indonesias gross domestic product. *Int. J. Manag.* **2020**, *11*, 2103–2111.
50. Ndou, V.; Mele, G.; Del Vecchio, P. Entrepreneurship education in tourism: An investigation among European Universities. *J. Hosp. Leis. Sport Tour. Educ.* **2019**, *25*, 100175. [CrossRef]
51. Shodiyev, K. Contribution of ICT to the tourism sector development in Uzbekistan. *Acad. Int. Multidiscip. Res. J.* **2021**, *11*, 457–461. [CrossRef]
52. Karabulut, G.; Bilgin, M.H.; Demir, E.; Doker, A.C. How pandemics affect tourism: International evidence. *Ann. Tour. Res.* **2020**, *84*, 102991. [CrossRef]
53. Brida, J.G.; Gómez, D.M.; Segarra, V. On the empirical relationship between tourism and economic growth. *Tour. Manag.* **2020**, *81*, 104131. [CrossRef]
54. Hysa, E.; Kruja, A.; Rehman, N.U.; Laurenti, R. Circular economy innovation and environmental sustainability impact on economic growth: An integrated model for sustainable development. *Sustainability* **2020**, *12*, 4831. [CrossRef]

55. Alola, U.V.; Cop, S.; Adewale Alola, A. The spillover effects of tourism receipts, political risk, real exchange rate, and trade indicators in Turkey. *Int. J. Tour. Res.* **2019**, *21*, 813–823. [CrossRef]
56. Mamirkulova, G.; Mi, J.; Abbas, J.; Mahmood, S.; Mubeen, R.; Ziapour, A. New Silk Road infrastructure opportunities in developing tourism environment for residents better quality of life. *Glob. Ecol. Conserv.* **2020**, *24*, e01194. [CrossRef]
57. Kanwal, S.; Rasheed, M.I.; Pitafi, A.H.; Pitafi, A.; Ren, M. Road and transport infrastructure development and community support for tourism: The role of perceived benefits, and community satisfaction. *Tour. Manag.* **2020**, *77*, 104014. [CrossRef]
58. Shehzad, K.; Liu, X.; Rauf, A.; Arif, M.; Mazhar, S.; Sohail, N.; Amin, W. Revolutionising tourism development in China: An effective role of ICT and Western Silk Road project. *Asia Pac. J. Tour. Res.* **2020**, *24*, 965–977. [CrossRef]
59. Li, T.; Shi, H.; Yang, Z.; Ren, Y. Does the belt and road initiative boost tourism economy? *Asia Pac. J. Tour. Res.* **2020**, *25*, 311–322. [CrossRef]