

Tourism as a Driver of Sustainability: Empirical Insights on the Sustainable Development Goals

Miguel Puig-Cabrera

Research Centre for Tourism, Sustainability and Well-being (CinTurs), Universidade do Algarve, Faro, Portugal
University of Seville, Seville, Spain

José António C. Santos

Research Centre for Tourism, Sustainability and Well-being (CinTurs), Universidade do Algarve, Faro, Portugal
Faculty of Tourism, University of Malaga, Spain

Víctor Calderón-Fajardo

Department of Business Management, Faculty of Tourism, University of Malaga, Malaga, Spain

Margarida Custódio Santos

Research Centre for Tourism, Sustainability and Well-being (CinTurs), Universidade do Algarve, Faro, Portugal

Received: 7 October 2024. **Revision received:** 27 October 2025. **Accepted:** 17 November 2025

Abstract

Sustainable tourism has emerged as a key issue in contemporary development agendas due to increasingly urgent global sustainability challenges. Concurrently, the 2030 Agenda for Sustainable Development has intensified the focus on tourism as a means to achieve sustainable development. This research aims to assess the potential of tourism as a systemiser of sustainability to realise the 2030 Agenda for Sustainable Development in a tourist region. It undertook an in-depth correlational analysis of tourism development and sustainable development, based on 232 indicators that monitor the 17 SDGs at the national level. Ultimately, the study highlights necessary directions for tourism policy, which must be oriented towards fostering resilience by 2030 while recovering businesses and society through three dimensions: 1) tourism and people; 2) tourism and the planet; and 3) tourism, prosperity, and global partnerships.

Key Words: regenerative tourism; Agenda 2030 measurement; Sustainable Development Goals; national sustainable tourism performance

JEL Classification: H51, H52, H53

Reference: Puig-Cabrera, M., Santos, J. A. C., Calderón-Fajardo, V., & Santos, M. C. (n.d.). Tourism as a Driver of Sustainability: Empirical Insights on the Sustainable Development Goals. *Journal of Tourism and Services*, 16(31), 1-26. <https://doi.org/10.29036/n3ypjb54>

1. Introduction

Sustainable tourism has emerged as a key issue in contemporary development agendas due to increasingly urgent global sustainability challenges (Brodny & Tutak, 2023; Scheyvens & Cheer, 2022; Scott, 2021). Simultaneously, the 2030 Agenda for Sustainable Development and the 17 Sustainable Development Goals (SDGs) have intensified the focus on tourism as a tool for achieving sustainable development (Alonso-Muñoz et al., 2023; Peña et al., 2023). Corporate social responsibility positively contributes to long-term performance and governance quality, which parallels sustainability mechanisms within SDG-oriented tourism development (Moravec, 2020).

This study aims to assess tourism's capacity to act as a driver of sustainability in achieving the Agenda 2030 objectives at the national level. It is based on a joint open data initiative from the National Institute of Statistics (INE) in Spain (2023a), which utilises 232 indicators to monitor the 17 SDGs at the national level. Consequently, 471 interrelationships between tourism development and sustainability were

tested. The proxy variables for measuring tourism development included tourist arrivals, tourist expenditure, and tourism's contribution to GDP. These relationships were categorised and analysed into three groups: 1) tourism and people; 2) tourism and the planet; and 3) tourism, prosperity, and global partnerships.

The case study focused on Spain, a popular tourist destination, from 2015 to 2021. This research addresses a significant gap in tourism literature, given the limited or non-existent evidence on measuring the impacts of tourism on sustainability (Brida et al., 2023) and the SDGs within a national context. For instance, regarding the effects of tourism development, an inverse relationship between tourism and poverty (SDG-1) was identified, alongside other connections, such as a reduction in public health funding (SDG-3), a decrease in the number of women occupying higher-responsibility positions within public and private entities (SDG-5), and a smaller proportion of agricultural land (SDG-2).

Regarding the relationship between tourism and the planet, the study found a direct bidirectional correlation between tourism development and the proportion of natural protected areas (SDG-15). Conversely, a higher level of tourism development is associated with a more decarbonised society in terms of energy-related behaviour among residents (SDG-7). Concerning the bidirectional correlation between tourism, prosperity, and global partnerships, significant and direct relationships were identified between tourism development, the quantity and proportion of public funds allocated to employment promotion by public administrations in the country, and average income per hour (SDG-8). Additionally, it was found that as tourism develops within Spain, net investment in Official Development Assistance (ODA) and foreign remittances to other countries increases (SDG-16 and SDG-17). This could also serve as an important tool for national authorities in building new transnational alliances to achieve the SDGs. Finally, the study illuminates potential directions for tourism policy, which must be oriented towards developing resilience by the year 2030, recovering businesses and society, and regenerating national destinations, particularly in popular and mass tourism areas (Cárdenas-García et al., 2022).

2. Literature Review: Sustainable Tourism and the 2030 Agenda for Sustainable Development

This literature review focuses on tourism's potential to integrate and support economic, social, and environmental dimensions of sustainability related to the 2030 Agenda for Sustainable Development. Sustainable tourism challenges both present and future generations as it bases its development on a delicate balance between its three dimensions (Matijová et al., 2023).

2.1 Tourism as an Economic Driver: Socioeconomic Impact

Tourism has long been considered an engine for economic growth, both in developing and developed regions. It generates receipts, creates employment, and stimulates local industries. Studies highlight that tourism can directly contribute to poverty alleviation (SDG-1) by offering job opportunities and increasing household incomes, especially in regions with high tourism potential (Chilufya et al., 2019). A study by Croes and Rivera (2017) found that tourism positively impacts income distribution, particularly among low-income communities in Latin American countries. Similarly, Balaguer and Cantavella-Jordá (2002) examined the relationship between tourism expansion and economic growth in Spain and confirmed that a long-run stable relationship between these variables exists. A recent study by Perles Ribes et al. (2024) also confirmed the tourism-led growth hypothesis up to the emergence of the COVID-19 pandemic. The pandemic had catastrophic economic and social effects on the accommodation industry and society at large worldwide (Bartos et al., 2023; Hýžová, Paseková, & Homola, 2024).

Cárdenas-García et al. (2024) investigated the relationship between tourism and regional development in Spain, concluding that tourism contributes positively to human development primarily in regions with high levels of tourism activity. However, the socioeconomic benefits of tourism are not

always distributed equitably. Gender inequality, particularly in tourism employment, has been extensively discussed in the literature. A study by Marfil-Cotilla et al. (2024) demonstrates that despite the overall economic benefits of tourism, women often occupy lower-paying, less secure positions, perpetuating gender disparities (SDG-5). This study underscores the need for gender-inclusive tourism policies (Marfil-Cotilla et al., 2024).

2.2 Tourism and Environmental Sustainability: Tourism's Impact on the Planet

The environmental impact of tourism is another major concern, as tourism-related activities, if not managed appropriately, contribute to overtourism, environmental degradation, biodiversity loss, and climate change (Vargová, Matusiková & Krsák, 2024; Žemla & Szromek, 2023). Despite growing awareness, global tourism policies lack alignment with climate goals, and decarbonisation efforts are insufficient to meet the Paris Agreement targets, making tourism a key challenge for climate mitigation (Gil, Marques & Andrade, 2023; Gössling & Scott, 2024; Streimikiene & Stankunienė, 2024). Numerous studies have explored the impacts of tourism on environmental sustainability, particularly those generated through air travel and energy-intensive activities (Gössling & Peeters, 2015). Recent studies have calculated that tourism accounts for 8-11% of global greenhouse gas emissions, contributing to global warming (Gössling & Scott, 2024; Lenzen et al., 2018). Tourism enterprises can play their role by reducing carbon emissions, energy and water consumption, and waste (Gössling, 2015; Potkány et al., 2024; Santos et al., 2019; Veiga et al., 2018). Environmental management, including circular economy implementation and environmental innovations may provide the most suitable environmental solutions (Dilanchiev et al., 2024; Garcia-Pozo et al., 2019; Gedvilaite & Ginevicius, 2024). To sustain growth, companies must and invest in innovation (Vlach et al., 2025). Some authors sustain that Artificial Intelligence may be crucial for sustainable development (Kwilinski et al., 2024) and sustainable tourism planning (Buitrago-Esquinas et al., 2024). There are cases of best practices among tourism enterprises, such as the production of energy from renewable sources (Bakalár et al., 2023; Jakubelskas & Skvarciany, 2024; Tometzová et al., 2024), potable water from desalination systems (Veiga et al., 2018), or circular economy implementation (Santos et al., 2023). On the other hand, tourism enterprises and destinations can improve their brand image and competitiveness (Santos et al., 2022).

Although negative concerning the economic and social dimensions of sustainability, the COVID-19 pandemic has rapidly sped up the digital transformation across business and society (Cunha & Urdan, 2023; Fernandes & Gabriel, 2023; Seker et al., 2023; Strapchuk et al., 2025; Lopez et al., 2024; Chao, Di, 2024). An increase in domestic tourism demand, along with the more intensive use and enhancement of distribution and communication channels (Anton Maraña et al., 2023), as well as greener consumer behaviours (Barrantes-Aguilar et al., 2023; de Moura et al., 2023; Fitz-Oliveira et al., 2023), have contributed to improved environmental efficiency (Folgado-Fernández et al., 2023; Streimikiene, 2023).

On the other hand, studies highlight the profound impacts of climate change on tourism. Gössling and Scott (2024) note that extreme weather events, such as heatwaves, floods, and wildfires, are becoming more frequent, causing significant damage to tourism destinations and infrastructure. Winter tourism is facing shorter seasons due to unreliable snowfall while rising sea levels and ocean warming threaten beaches and coral reefs. Climate change also increases travel costs, affects biodiversity, and disrupts socioeconomic stability in tourism-dependent regions. Therefore, Gössling and Scott (2024) emphasize the urgent need for adaptive strategies and mitigation efforts, as the global geography of tourism is expected to shift dramatically.

2.3 Tourism's role in partnerships and sustainable development

Tourism's potential to foster partnerships (SDG-17) and drive inclusive economic growth (SDG-8) has been another area of scholarly interest. The strategic significance of implementing a tourism

planning and development process in destinations is acknowledged, involving the public sector, businesses, third-sector organisations, and residents within their respective territories (Roxas et al., 2020). These partnerships are essential for developing sustainable tourism models that balance economic growth with environmental and cultural preservation.

Governments often collaborate with private enterprises to achieve common goals, such as improving infrastructure like roads, airports, and public transport systems (Rodríguez-Sánchez & Andreu, 2012). In some cases, the implementation of public-private partnerships has led to the economic empowerment of local communities, promoting local culture and crafts and offering a platform for artisans, farmers, and small businesses to showcase and sell their products to a global audience helping alleviate poverty and support sustainable livelihoods (Berawi & Miraj, 2023; Deladem et al., 2020). Tourism growth alone may not be the most suitable strategy to achieve the SDGs. Rather than imposing a one-size-fits-all approach, the SDGs should be achieved by respecting local priorities and developing tourism policies that enhance community well-being while promoting responsible travel and long-term sustainable development (Gallardo-Vázquez, 2023; Hadi et al., 2023; Movono & Hughes, 2022). Additionally, resident support for sustainable tourism development is also a crucial factor (Erul et al., 2024; Sant'Anna & Aguinaldo, 2024; Uslu et al., 2023). The quality of jobs in the tourism industry has been a significant concern, with research indicating that the sector encounters obstacles to providing decent work, including long working hours, seasonal employment, low pay, inadequate social protection, and gender inequality (Santos, 2023). Decent work that offers suitable payment, stable jobs, professional development and equal opportunities is critical to a sustainable tourism agenda (García-Rodríguez et al., 2021).

3. Methods

The primary objective of this research was to assess the potential of tourism to act as a catalyst for sustainability and contribute to achieving the 2030 Agenda for Sustainable Development Goals in a major tourist destination. To achieve this goal, the study drew on a collaborative open data initiative by INE (2023a), utilising 232 indicators to track the progress of the 17 SDGs at the national level. A total of 471 interrelationships between tourism development and sustainability were analysed. Proxy variables for measuring tourism development included tourist arrivals, expenditure, and GDP contribution. The case study focused on Spain, a major tourist destination, during the period from 2015 to 2023. The findings from this in-depth correlational analysis of the 2030 Agenda for Sustainable Development highlighted key areas that need revision in the current sustainability agendas of tourist regions.

3.1 Study area

Spain's tourism tradition is marked by sustained growth in both the number of visitors and tourist spending. According to INE (2023b), the number of international tourists increased by 22.7% between 2015 and 2019, rising from 8.06 million to 9.89 million visitors just before the onset of the COVID-19 pandemic. In terms of tourism earnings, there was a growth rate of 29.4%, from €7.48 billion to €9.68 billion in 2019, prior to the COVID-19 pandemic. Additionally, tourism accounted for up to 11.3% of regional GDP and created 235,412 jobs in 2021 (Exceltur, 2022). These figures underscore Spain's strong ability to attract a high volume of tourists and generate substantial revenue within the sector. This research covers the period from 2015 to 2023, encompassing nearly half of the timeframe of the 2030 Agenda for Sustainable Development since its global adoption in 2015. Furthermore, including the years 2020-2021 allows for comparing any divergences that may have occurred before and after the COVID-19 pandemic.

3.2 The proxy systematisation for measuring the national performance on tourism and sustainability

To assess Spain's sustainable performance in tourism, 232 indicators were selected from a joint open data initiative provided by the Spanish Statistics Institute (INE, 2023). Based on data availability, a total of 157 indicators were ultimately included in the analysis, categorised into three distinct dimensions aligned with the 5Ps model of sustainable development proposed by the United Nations (International Monetary Fund, 2022; Lekagul et al., 2022). Thus, these relationships were divided as follows: 1) tourism and people; 2) tourism and planet; and 3) tourism, prosperity, and global partnerships, as shown in Table 1. As a result, a comprehensive proxy for assessing sustainable performance at the national level was developed.

The proxies for tourism development—tourist arrivals, tourist expenditure, and tourism GDP - were sourced from INE (2023b).

Table 1. Proxy systematisation for measuring the national performance on sustainability

Dimensions	Number of indicators	Sustainable Development Goals (SDGs)
Dimension 1: <i>tourism and people</i>	66	     
Dimension 2: <i>tourism and planet</i>	37	    
Dimension 3: <i>tourism, prosperity, peace, and global partnerships.</i>	54	  

Source: authors' own elaboration.

Dimension 1 encompasses 66 indicators that analyse the interrelationships between tourism and people. It addresses key issues such as poverty (SDG-1), hunger (SDG-2), health (SDG-3), education (SDG-4), gender equality (SDG-5), and socioeconomic inequalities (SDG-10). Dimension 2 comprises 37 indicators that analyse the interrelationships between tourism and the planet. It covers key issues such as industry, innovation, and infrastructure (SDG-9); sustainable cities and communities (SDG-11); climate action (SDG-13); and life on land (SDG-15). Dimension 3 comprises 54 indicators that analyse the interrelationships between tourism, prosperity, and global partnerships. It addresses key issues such as decent work and economic growth (SDG-8); peace, justice, and strong institutions (SDG-16); and partnerships for the goals (SDG-17). Due to the lack of available data, SDG-6, SDG-12, and SDG-14 were not included in this analysis. A comprehensive correlational analysis was conducted based on sustainable performance and tourism development to identify significant relationships, as described in the next section.

3.3 Data collection and treatment

The data described in the previous section were collected and processed to perform a thorough correlational analysis. A total of 471 bivariate analyses were conducted to examine how the interrelationships between sustainable national performance and tourism might highlight critical issues that should be further explored in the sustainability agendas of each country. To assess these relationships, the marginal increase of variables was analyzed, along with the mathematical value of one variable when the other is zero, and whether the relationship is significant enough to warrant discussion. In this study, the findings and discussion are based on statistically significant relationships with p-values less than 0.005. Finally, this analysis represents a pioneering approach to testing how a joint open data initiative, such as the one provided by INE (2023a), can be useful in identifying interrelationships between various sectors and achieving global sustainability goals like the SDGs and the 2030 Agenda for Sustainable Development. Moreover, it serves as a significant tool for guiding policymaking on sustainable development from a holistic perspective.

4. Results and Discussion

This research applied an in-depth correlational analysis of tourism and the 2030 Agenda for Sustainable Development to identify the strengths and weaknesses of Spain's sustainable development model. A total of 471 interrelationships were tested, allowing each specific dimension and SDG to highlight key issues that should be addressed in the sustainability agendas of these territories.

4.1 A correlational understanding between tourism and people

As shown in Table 1, the first dimension of this analysis focuses on the human aspect of tourism, encompassing issues such as poverty and inequality (SDG-1, SDG-10); zero hunger (SDG-2); health (SDG-3); education (SDG-4); and gender inequality (SDG-5). A total of 198 relationships were tested and confirmed within this dimension.

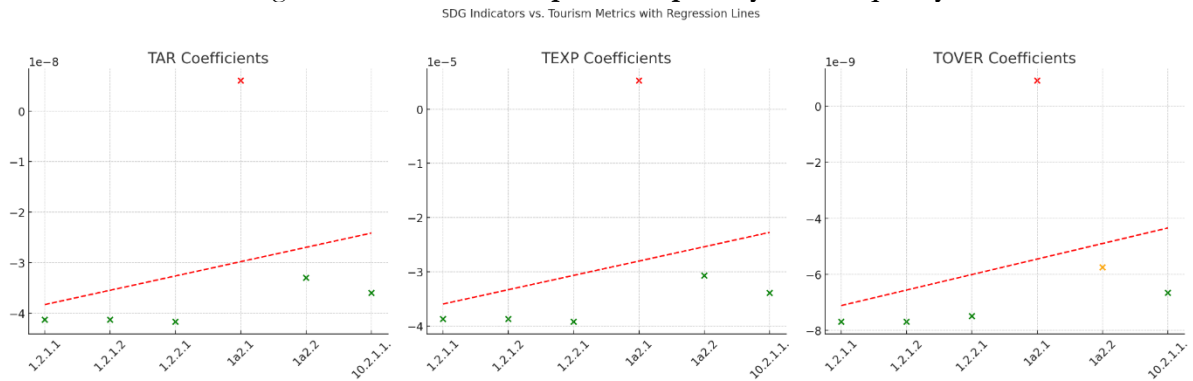
4.1.1 Poverty and inequality interactions (SDG-1 and SDG-10)

In the context of poverty and inequality, an examination of the relationships between tourist arrivals (TAR), tourism income (TEXP), and socioeconomic indicators reveals a compelling narrative. As illustrated in Figure 1, a scatter plot with regression lines shows that increases in TAR and TEXP are systematically associated with a reduction in the proportion of individuals at risk of relative poverty and social exclusion. This trend is particularly evident when examining national thresholds. Specifically, as TAR increases, there is a significant reduction in the proportion of individuals at risk of relative poverty, based on the national threshold (1.2.1.1), as indicated by a coefficient of $-4.13\text{e-}08$ and a statistically significant P-value of 0.005^{***} . This inverse relationship is visually confirmed by the downward trend in the scatter plot.

Similarly, the analysis reveals that households characterised by low work intensity (1.2.2.4) experience a decline in their proportion as tourism GDP increases. This highlights the potential of tourism as a lever for economic and social improvement. Furthermore, the developmental progress in tourism is reflected in increased per capita income growth for the economically disadvantaged 40% of the population (10.1.1.3, Coef: $2.95\text{e-}06$, P-value: 0.004^{***}) and a higher share of GDP attributable to wage earners (10.4.1.1, Coef: $1.33\text{e-}07$, P-value: 0.000^{***}). These findings align with the scholarly discourse, particularly Soriano et al. (2023), which emphasises tourism's significant role in reducing

poverty and inequality at a national level. However, the complexities of poverty and inequality, as multidimensional constructs (Nunkoo et al., 2023), require a more critical perspective. Puig-Cabrera & Foronda-Robles (2020) demonstrate that tourism's benefits are not evenly distributed across all societal strata. This disparity calls for a deeper understanding of the underlying dynamics, as the scatter plots illustrate.

Figure 1. **Tourism development vs poverty and inequality**



Source: authors' own elaboration.

The need for strong community involvement and a robust macro-environment, as emphasized by Hoque et al. (2022), becomes undeniably clear in light of these findings. A holistic approach is essential for fully leveraging tourism's potential to significantly benefit the most vulnerable segments of the population. In synthesising these insights, it becomes clear that poverty and inequality are intricately linked to tourism within the framework of the 2030 Agenda. The scatter plots and their regression lines illustrate the heterogeneous nature of this relationship and the significant, albeit varied, impact of tourism across different Sustainable Development Goal (SDG) indicators.

This intricate landscape calls for tourism policies and practices to be meticulously crafted and targeted to address specific sustainable development objectives effectively. Furthermore, the green points indicating significant relationships in the scatter plots underscore the need for more focused research efforts. Understanding the underlying dynamics and leveraging tourism as a catalyst for positive transformation is not merely an academic endeavour but a pressing imperative for policymakers and stakeholders alike.

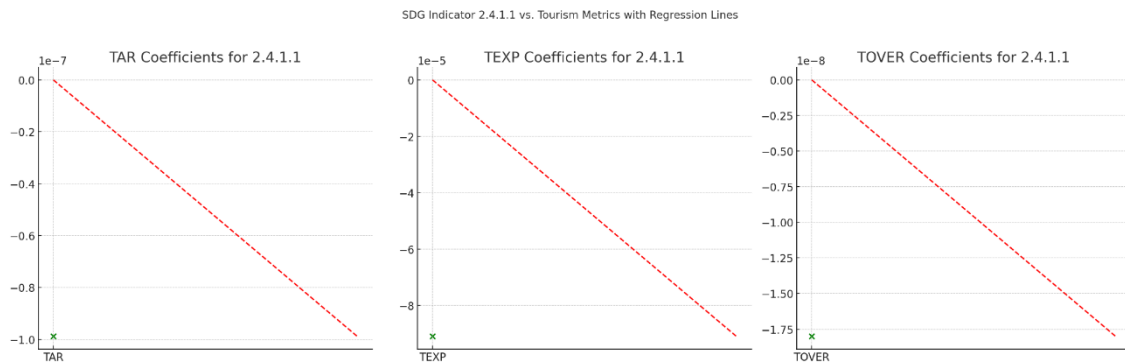
4.1.2 Zero hunger (SDG-2)

The global agenda has increasingly prioritised sustainable agriculture, a key focus of the Sustainable Development Goals (SDGs), particularly SDG 2, which addresses the complexities of hunger and malnutrition. The Food and Agriculture Organization (FAO, 2018) has emphasised the importance of sustainable agricultural practices in effectively combating these widespread challenges. The present study has undertaken an in-depth examination of the complex relationship between tourism growth and agricultural practices, specifically focusing on SDG indicator 2.4.1.1, which measures the proportion of agricultural land used for productive and sustainable farming. As illustrated in Figure 2, the findings reveal a significant inverse correlation between tourism development and the extent of land allocated for sustainable agriculture. This is evidenced by negative coefficients for Tourist Arrivals (TAR, Coef: -9.88e-08), Tourist Expenditure (TEXP, Coef: -0.0000909), and Overnight Stays (TOVER, Coef: -1.80e-08), with corresponding p-values of 0.003, 0.004, and 0.002, respectively.

The scatter plot in Figure 2 indicates a potential shift in land use patterns in areas with significant tourist traffic, moving from conventional farming to tourism-centric development. This notable correlation underscores the possible tension between sustaining agricultural productivity and promoting

tourism growth, a key issue highlighted in academic discussions by researchers such as Wanner et al. (2021). This debate, focused on resource allocation and land use choices, has been a longstanding point of contention, particularly in regions where tourism is dominant (Linda et al., 1995). Policymakers and stakeholders must understand these dynamics to effectively balance tourism's economic benefits with the necessities of sustainable agriculture and food security. The present study advocates for comprehensive strategies that acknowledge the complex impacts of tourism on agricultural land use and the broader implications for achieving the SDGs.

Figure 2. **Tourism development vs zero hunger**



Source: authors' own elaboration.

Our regression analysis of tourism metrics - TAR, TEXP, and TOVER - against the SDG 2.4.1.1 indicator consistently reveals an inverse relationship, as illustrated in Figure 2. As tourism-related metrics increase, there is a notable decline in the land dedicated to productive and sustainable agriculture. These negative coefficients suggest a potential conflict, indicating that the growth of the tourism industry may be at odds with efforts to maintain or enhance agricultural practices. The p-values for each coefficient, all below the 0.05 threshold, confirm the statistical significance of these findings. This strong significance indicates a robust and reliable link between the rise in tourism activities and the reduction of land allocated for sustainable agriculture.

These findings suggest that regions experiencing a surge in tourism may face challenges in maintaining or improving sustainable agricultural practices. This issue could stem from various factors, such as the redirection of land from farming to tourism, shifts in the labor market, or changing community priorities. The negative implications for SDG 2.4.1.1 underscore the potential conflict between the goals of economic growth through tourism and the pursuit of environmental sustainability. Consequently, these results call for contextually aware and proactive strategies to harmonise the dual goals of promoting tourism development and sustaining agricultural practices. The data visualised in Figure 2 illustrates the trends clearly and highlights the intricate and interconnected nature of these goals, emphasising the need for careful, coordinated, and strategic planning and implementation.

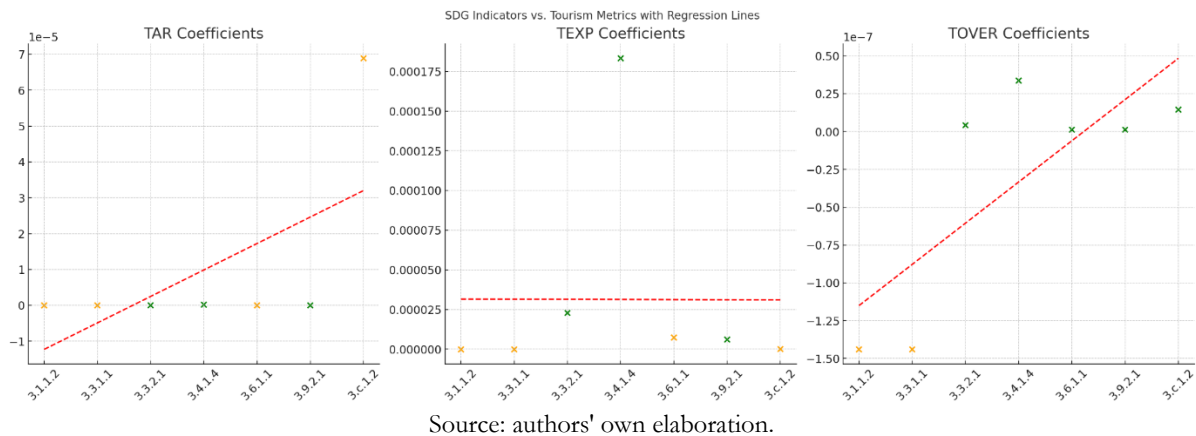
4.1.3 Health (SDG-3) and education (SDG-4)

In the domain of health and education, our research reveals significant associations between national public spending on health and tourism development, as illustrated in Figure 3. Notably, tourism development correlates with a reduced number of health workers in childbirth and emergency services. Furthermore, a direct association has been observed between tourism development and increased mortality rates from chronic respiratory diseases and traffic accidents. In terms of infections, while no relationship was found with new HIV cases, a direct correlation was observed with the rise in tuberculosis incidence. This finding underscores the importance of monitoring the spread of infectious diseases in

tourist areas, echoing concerns raised by Antabe & Ziegler (2020) and highlighting the challenges in achieving SDG 3 (Ala'a, 2019; Imo & Ekechukwu, 2024; Selvanathan et al., 2022).

An intriguing pattern emerges from the negative coefficients for Tourist Arrivals (TAR), Tourist Expenditure (TEXP), and Overnight Stays (TOVER), as shown in Figure 3. As tourism metrics increase, there is a slight decrease in the proportion of births attended by skilled health personnel, though the significance is marginal (p-values around 0.069 and 0.065). This subtle relationship suggests that increased tourism activity may not directly lead to improved healthcare delivery, particularly in maternal care. Conversely, the negative coefficients suggest a potential decrease in new HIV diagnoses with increased tourism, a finding that is marginally significant and somewhat counterintuitive, given the typical association between increased tourism and higher risks of disease transmission. This may indicate improved healthcare and awareness in regions with high tourism, although the relationship is not strongly supported (p-value ~ 0.069).

Figure 3. Tourism development vs health access



In contrast, the positive coefficients for tuberculosis incidence suggest a slight increase with rising tourism metrics, which is statistically significant (p-values: 0.010 to 0.016). This may be attributed to increased exposure and transmission opportunities in tourist areas, indicating potential public health challenges. Similarly, positive and significant coefficients (p-value < 0.01) reveal a strong association between increased tourism and higher mortality rates from chronic respiratory diseases, possibly driven by environmental factors, increased pollution, or lifestyle changes in tourism-centric regions. Moreover, the positive coefficient for Tourist Arrivals (TAR), with marginal significance (p-value: 0.079), suggests a possible increase in traffic-related mortality as tourist arrivals rise. This may be due to heightened vehicular activity and potential safety concerns in regions with high tourism. The relationship between Tourist Expenditure (TEXP) and Overnight Stays (TOVER) is less clear, indicating the need for further analysis.

Interestingly, the positive and significant coefficients across all tourism metrics (p-values: 0.014 to 0.020) indicate a notable association between increased tourism and higher mortality from unintentional poisonings. This finding reflects broader safety and public health concerns in areas with high tourist activity. The direct relationship between mortality rates from food poisoning and tourism development in Spain further underscores this issue. Increased demand for food and beverages, along with potential exposure to unsafe or irresponsible consumption practices, may contribute to this trend. Collectively, these findings highlight the complex interplay between health, tourism, and public spending, necessitating a multifaceted approach to understanding and managing these dynamics. Finally, with marginal significance, the positive coefficients for Tourist Arrivals (TAR) and Tourist Expenditure (TEXP) suggest a slight increase in healthcare personnel as tourism increases. This may respond to the higher

demand for healthcare services in tourist areas, driven by the growing population and health needs. However, the marginal significance levels indicate that this relationship is weak and requires further investigation.

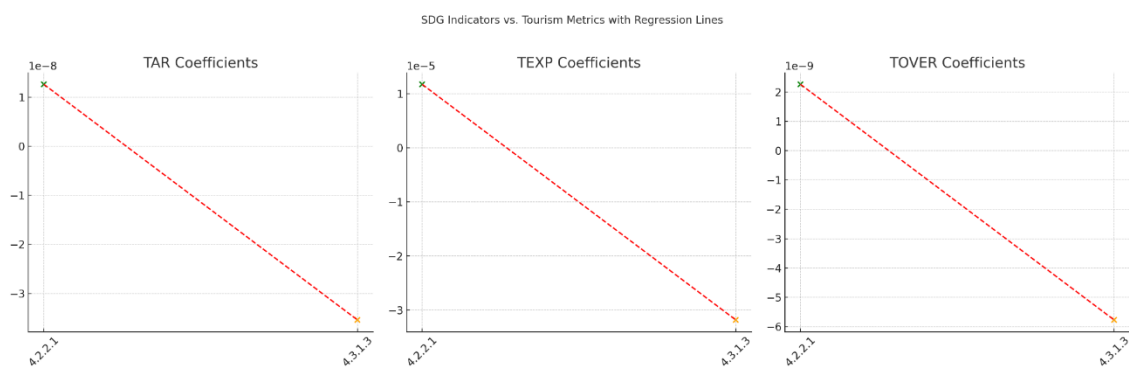
In light of these complex interrelationships, the present study highlights the need for further investigation into health monitoring tools in relation to tourism development. Additionally, it raises important questions about how variations in public health spending should align with increased tourism and whether part of this spending should be allocated toward implementing a tourist tax within the region (Cárdenas-García et al., 2022). These results, intricately depicted in Figure 3, underscore the necessity for integrated and strategic approaches to address the multifaceted impacts of tourism on public health and resource allocation.

In the educational sphere, the present study has meticulously examined how key educational indicators are influenced by tourism development in the specified research area. These interactions are visually represented in the scatter plot of Figure 4. Specifically, we observed a positive correlation between the net enrollment rate at age 5 (indicator 4.2.2.1) and tourism development, while an inverse relationship was found with other indicators, such as the proportion of 25–64-year-olds engaging in education or training over the past four weeks (indicator 4.3.1.3).

Building on the foundational research by Moreno (2019), which explored the impact of tourism development in Spain on education, it was found that areas with heightened tourist activity tend to employ more individuals in low-skilled tourism jobs and experience higher dropout rates. This observation is crucial, highlighting the need for well-crafted public policies that ensure access to quality education at all ages, fostering personal and human development alongside regional tourism growth, in alignment with the objectives of SDG 4.

The analysis of each SDG indicator revealed distinct patterns. For early childhood education (indicator 4.2.2.1), a significant positive relationship with tourism metrics (Coef: $1.26\text{e-}08$, P-value: 0.008^{***} ; Coef: 0.0000117 , P-value: 0.007^{***} ; Coef: $2.26\text{e-}09$, P-value: 0.006^{***}) suggests that tourism may support or be associated with higher enrollment rates, possibly through economic upliftment. In contrast, for adult education and training (indicator 4.3.1.3), negative coefficients (Coef: $-3.54\text{e-}08$, P-value: 0.070^{**} ; Coef: -0.0000318 , P-value: 0.081^{*} ; Coef: $-5.77\text{e-}09$, P-value: 0.098^{*}) imply a potential trade-off or shift in focus as tourism increases. While these coefficients are less significant, they reveal relationships that warrant deeper exploration.

Figure 4. Tourism development vs education access



Source: authors' own elaboration.

These findings collectively highlight the multifaceted impact of tourism on various aspects of sustainable development. They emphasise the need for sophisticated policy approaches to balance and optimise these effects. The positive correlation with early childhood education suggests the potential benefits of tourism in promoting economic upliftment and improving access to education. Conversely,

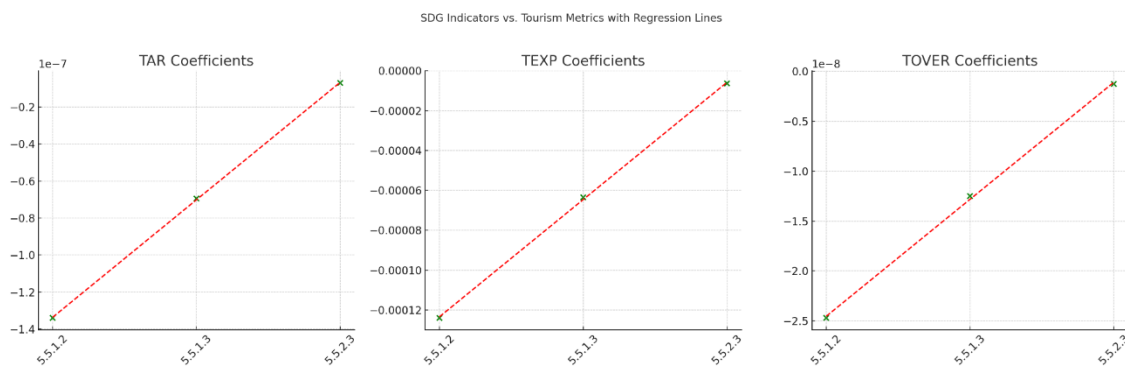
the negative association with adult education and training indicates that increased tourism may divert attention or resources away from adult continuing education.

As illustrated in the scatter plot of Figure 4, the varied impacts of tourism development on different educational indicators call for a comprehensive approach to policy formulation. This approach should seek to capitalise on the positive effects of tourism for enhancing education while addressing any negative impacts, particularly in adult education and training. By adopting a balanced and informed strategy, it is possible to align the region's tourism development with the ambitious goals of SDG 4, ensuring quality education and promoting lifelong learning opportunities for all.

4.1.4 Gender equality (SDG-5)

As posited by Alarcón and Cole (2021), the realisation of a sustainable tourism development model depends on achieving full gender equality in the region. This study, through a detailed analysis depicted in the scatter plot of Figure 5, provides empirical evidence that as tourism increases in the area of study, there is a notable decline in women's political representation in regional and local government and in self-employment ventures. Specifically, the proportion of council positions and mayorships held by women in regional and local governments decreases with rising tourism. Similarly, the proportion of women entrepreneurs diminishes. Conversely, the employment rate of women correlates positively with increased tourism development in the region.

Figure 5. Tourism development vs gender equality



Source: authors' own elaboration.

These findings point to a persistent gender gap within the tourism sector (Rodríguez et al., 2022; Sánchez et al., 2022), which could exacerbate inequalities and hinder women's professional advancement. Freund & Hernandez-Maskivker (2021) emphasise that women are often underrepresented in managerial and leadership roles within tourism and frequently relegated to lower-paying, lower-skilled positions. Typically, the most lucrative jobs in the sector are dominated by men, while women are concentrated in service-oriented roles that offer flexible schedules, allowing them to balance work and personal responsibilities. Therefore, it is crucial to integrate gender equality into the planning and management of tourism development, ensuring substantial representation and influence of women in both public and private sectors.

The scatter plot in Figure 5 illustrates the observed negative correlations and raises critical questions about the impact of tourism on women's representation in governance and entrepreneurship. While tourism is often promoted as a driver of economic development, these findings suggest potential adverse effects on gender equality. The significant inverse relationships across multiple indicators (5.5.1.2, 5.5.1.3, and 5.5.2.3) with tourism metrics, all with p-values of 0.000*** or below 0.030**, reveal a pervasive and concerning pattern.

This analysis reveals a consistent and statistically significant inverse relationship between tourism activity and women's representation in governance and entrepreneurship. The negative coefficients for these indicators suggest that as tourism flourishes, women's participation in these critical areas declines. These findings underscore the need for a more refined approach to tourism development - one that explicitly incorporates gender equality objectives and seeks to unravel the underlying mechanisms driving these correlations. In summary, while tourism can bolster economic development, it is essential to consider and address its potential impacts on gender equality. The correlations presented in Figure 5 emphasize the need for a proactive, inclusive, and gender-sensitive framework in tourism planning and development. Such an approach would not only support the sustainable growth of the tourism sector but also ensure that this growth contributes positively to the broader societal goal of gender equality.

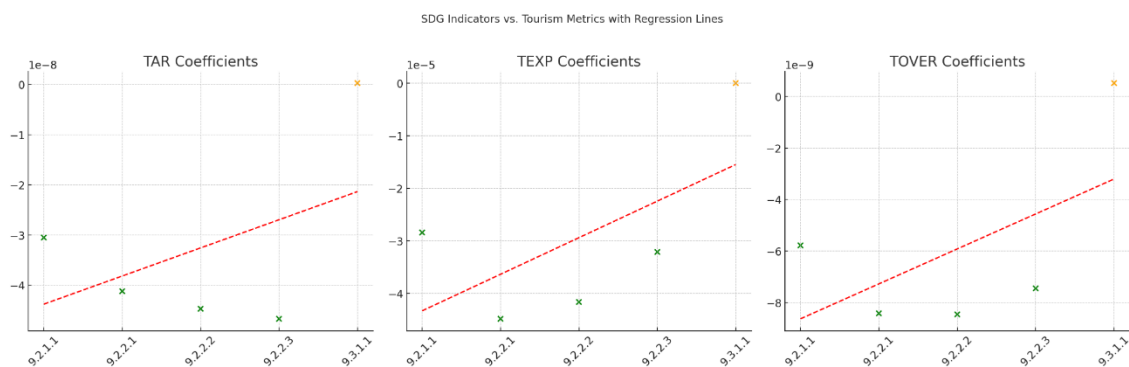
4.2 A correlational understanding between tourism and planet

The second dimension of this analysis focuses on the linkages between tourism and the planet, encompassing industry, innovation, and infrastructure (SDG-9); sustainable cities and communities (SDG-11); climate action (SDG-13); and life on land (SDG-15). A total of 111 relationships were tested and confirmed within this dimension.

4.2.1 Industry, innovation, and infrastructure (SDG-9)

This analysis explores the intricate linkages between tourism and planetary well-being, covering critical areas such as industry, innovation, and infrastructure (SDG-9); sustainable cities and communities (SDG-11); climate action (SDG-13); and life on land (SDG-15). A total of 111 relationships have been rigorously tested and confirmed across these dimensions. In the realm of industry, innovation, and infrastructure (SDG-9), the scatter plots presented in Figures 6 and 7 reveal these interactions. For instance, tourism development is found to have an inverse relationship with the value added by the manufacturing sector (9.2.1.1, Coef: $-3.05e-08$, p-value: 0.004**) and its contribution to GDP, as well as employment within this sector (9.2.2.1, Coef: $-4.12e-08$, p-value: 0.004***). These dynamics highlight the economic fragility of an over-reliance on tourism, underscoring the need for broader economic diversification to enhance resilience during crises (Croes et al., 2023; Puig-Cabrera et al., 2023).

Figure 6. Tourism development vs innovation and infrastructure (I)



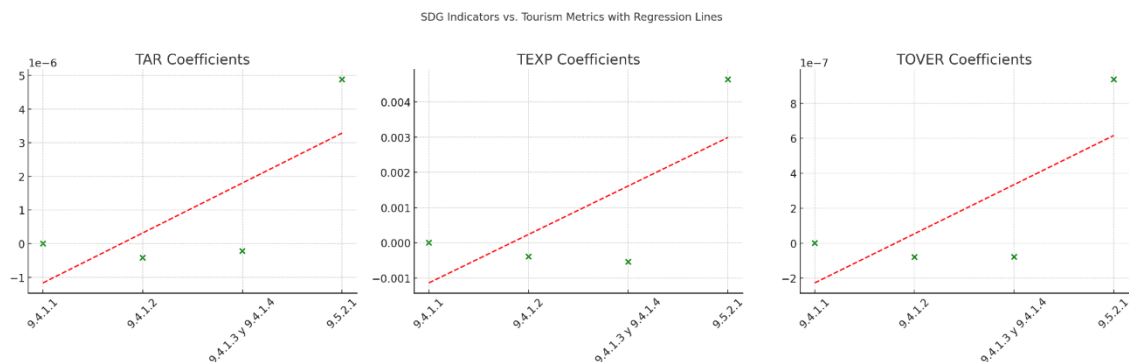
Source: authors' own elaboration.

Conversely, a positive association emerges between the strength of small and medium-sized enterprises (SMEs) in the manufacturing industry and tourism development, as indicated by the proportion of total value added by small businesses (9.3.1.1, Coef: $2.76e-10$, p-value: 0.082*). This suggests that local producers in the current tourism model are essential components of the destination's value chain and may play a more significant role than larger corporations. By utilizing local products and

services, tourism destinations can reduce their dependence on imported goods and large companies, potentially benefiting the local economy and fostering sustainable community development, in line with insights from Nhamo et al. (2020) and Scheyvens & Laeis (2022).

Figure 6 illustrates these correlations, revealing negative coefficients associated with various SDG 9 indicators. For example, employment in the manufacturing sector as a proportion of total employment (9.2.2.2, Coef: -4.47×10^{-8} , p-value: 0.000***) and the manufacturing sector's employment as a proportion of total hours worked (9.2.2.3, Coef: -4.67×10^{-8} , p-value: 0.000***) both demonstrate significant inverse relationships with tourism metrics. These findings underscore the need for regions to consider diversifying their economic activities to avoid over-dependence on tourism.

Figure 7. **Tourism development vs innovation and infrastructure (II)**



Source: authors' own elaboration.

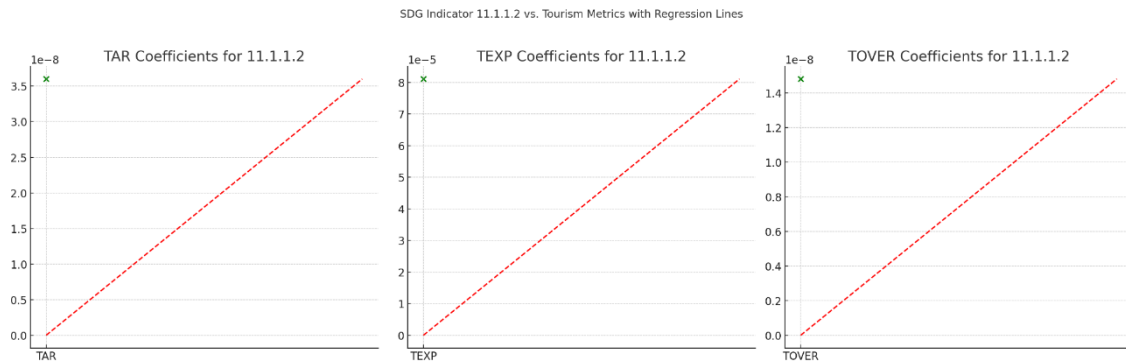
Figure 7 further elucidates the environmental and socioeconomic impacts. The negative coefficient for CO₂ emissions from the manufacturing sector per unit of GDP (9.4.1.2, Coef: -4.21×10^{-7} , p-value: 0.000***) suggests that tourism may be associated with lower pollution levels in this sector. Concurrently, the positive relationship with the number of researchers per million inhabitants (9.5.2.1, Coef: 4.88×10^{-6} , p-value: 0.028**) indicates potential socioeconomic benefits, likely reflecting investments in innovation and infrastructure in tourism-centric regions. The scatter plots in Figures 6 and 7 elucidate tourism's complex and multifaceted impacts on sustainable development. They underscore the need for strategic and balanced approaches in tourism planning and development to harness its potential benefits while addressing associated challenges. This includes fostering economic diversification, supporting local industries, and ensuring environmental sustainability, all essential for achieving the broader goals of SDG-9 and its related targets.

4.2.2 Sustainability of cities and communities (SDG-11), climate action and affordable energy (SDG-7 and SDG-13), and life on land (SDG-15)

This study has thoroughly examined the complex interrelationships between regional tourism development and Spain's environmental and social fabric. The scatter plot in Figure 8 illustrates these relationships, visually representing the data.

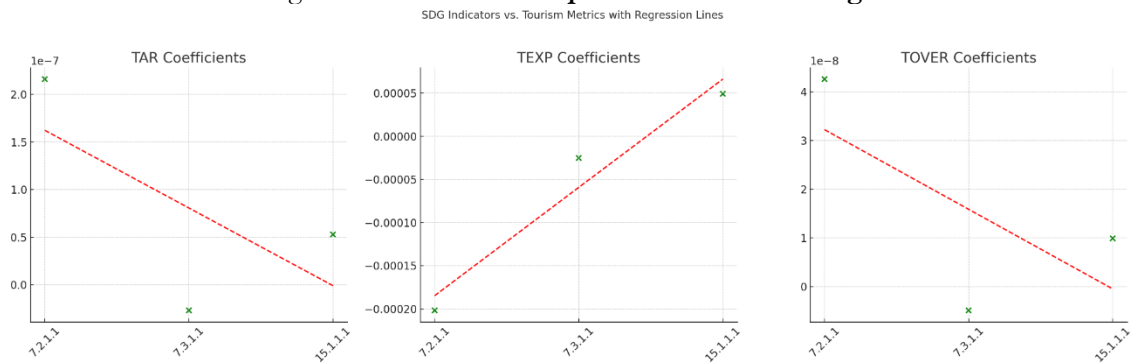
A significant finding pertains to the relationship between tourism development and the proportion of forested land relative to total surface area, including protected areas. This correlation may reflect a growing appreciation for and promotion of natural heritage, aligning with tourism models that emphasise these assets (Xu et al., 2009). However, this positive trend also raises a critical debate regarding land use, underscoring the need for strategic limitations and restrictions aligning with the territory's desired vision. The increasing importance of natural areas for destination competitiveness and sustainability is noted in the literature (Blanco-Cerradello et al., 2018; Oviedo-García et al., 2019), suggesting a balance between preservation and tourism development.

Figure 8. Tourism development vs sustainable cities and communities



Source: authors' own elaboration.

Figure 9. Tourism development vs climate change



Source: authors' own elaboration.

In the realm of pollution, the study uncovers a dual aspect concerning environmental and acoustic dimensions. Notably, significant inverse relationships were found between CO₂ emissions (using 1990 and 2005 as base years) and tourism development in the area. This may indicate that certain forms of tourism are associated with reduced emissions or reflect a shift in tourism activities. Conversely, a direct association was identified between CO₂ emissions per unit of GDP and increased tourism development in Spain. This paradox can be attributed to phenomena such as second homes (Staunstrup et al., 2023), tourist accommodations (Theisen et al., 2022), and energy-intensive tourism (Frantál & Urbánková, 2017), characterised by unsustainable practices. This is particularly notable in a tourism model reliant on high energy intensity and fossil fuels, leading to increased CO₂ emissions and more pollution-prone behaviours among citizens (Han, 2021). These findings emphasise the need for regional tools to assess the carbon footprint of tourism and identify primary CO₂ sources for effective mitigation strategies.

Moreover, a significant positive correlation was found between all examined tourism metrics and the proportion of individuals experiencing noise disturbances in their homes (11.1.1.2, Coef: 3.60e-08, p-value: 0.000***; Coef: 0.0000811, p-value: 0.000***; Coef: 1.48e-08, p-value: 0.000***). This insight, as illustrated in Figure 8, suggests that while tourism can provide economic benefits, it may also exacerbate environmental and social challenges, particularly noise pollution. Such issues are critical for maintaining residents' quality of life and ensuring sustainable tourism development. The scatter plot in Figure 8 not only visualizes the data but also symbolises the complex and intertwined nature of these issues. The results underscore the necessity for a multifaceted approach to tourism development that actively incorporates environmental preservation strategies, CO₂ emission reduction, and noise pollution mitigation. This holistic approach is essential for fostering a tourism model that supports economic growth while safeguarding the region's environmental integrity and social well-being.

In the realm of energy efficiency, this study offers valuable insights into the direct interrelationship between tourism and the proportion of renewable energy produced. As illustrated in the scatter plot of Figure 9, the significant positive coefficients for the proportion of renewable energy in electricity production (7.2.1.1, Coef: 2.16×10^{-7} , P-value: 0.023**; Coef: -0.0002019, P-value: 0.021**; Coef: 4.26×10^{-8} , P-value: 0.008***) suggest that tourism destinations with higher visitor numbers tend to be more energy-efficient. This correlation may stem from a growing commitment among businesses to adopt sustainable practices for cost reduction, enhance sustainability, and attract tourists who are increasingly aware of the importance of sustainability (He et al., 2022; Tang et al., 2018).

Concurrently, the research uncovers numerous interrelationships indicating that tourism development is associated with an increased proportion of individuals experiencing noise disturbances in their homes from the neighbourhood or external sources. This indicator, significant in its own right, reflects how tourism can adversely affect residents' quality of life, potentially shaping their perception of tourism in the region. The issue of noise pollution in tourism areas is well-documented (Asensio et al., 2020; Sánchez-Sánchez et al., 2019), highlighting the need for updated public policies that address the various types and intensities of acoustic pollution prevalent in the region.

The analysis presented in Figure 9 reveals the complexity of the relationships between tourism activities and environmental sustainability indicators. While the association between tourism and improved energy efficiency is evident, as demonstrated by the negative coefficients for energy consumption per unit of GDP (7.3.1.1, Coef: -2.68×10^{-8} , P-value: 0.001***; Coef: -0.0000252, P-value: 0.0001**; Coef: -4.87×10^{-9} , P-value: 0.000***), its relationship with other indicators, such as the proportion of forest area (15.1.1.1, Coef: 5.29×10^{-8} , P-value: 0.000***; Coef: 0.0000492, P-value: 0.000***; Coef: 9.91×10^{-9} , P-value: 0.000***), is more complex.

These findings emphasise the importance of implementing context-specific strategies and policies to effectively leverage tourism for environmental sustainability. It is crucial to ensure that tourism growth is supported not only by utilising renewable energy but also by preserving natural resources. The scatter plot in Figure 9 illustrates the trends and symbolises the intricate relationship between tourism, energy efficiency, and environmental sustainability. This underscores the need for a balanced, strategic approach to tourism planning and development that harmonises economic benefits with environmental preservation and the quality of life for residents.

4.3 A correlational understanding between tourism, prosperity, and global partnerships

The second dimension of this analysis focuses on the linkages between tourism and prosperity and global partnerships, including decent work and economic growth (SDG-8), peace, justice, and strong institutions (SDG-16), and partnerships for the goals (SDG-17). A total of 162 relationships between sustainable development performance and tourism development were tested and confirmed.

4.3.1 Decent work and economic growth (SDG-8)

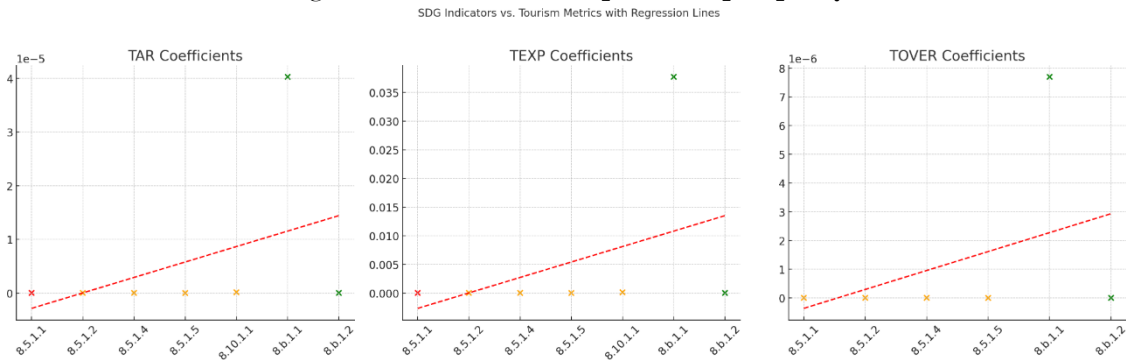
In this scholarly inquiry, our analysis has revealed direct and statistically significant relationships between tourism development in the study region and various socioeconomic indicators, as visually illustrated in the scatter plot in Figure 10.

A particularly noteworthy finding is the positive correlation between tourism development and the average income per hour of work (8.5.1.1, Coef: 1.08×10^{-8} , P-value: 0.119; Coef: 0.0000104, P-value: 0.104; Coef: 2.18×10^{-9} , P-value: 0.069*). This trend is especially pronounced for hours worked by individuals with disabilities (8.5.1.4, Coef: 1.21×10^{-8} , P-value: 0.063*; Coef: 0.0000115, P-value: 0.054; Coef: 2.39×10^{-9} , P-value: 0.069**), suggesting that the tourism sector may serve as a catalyst for creating accessible job opportunities for these groups.

Furthermore, the study identified significant and direct relationships between tourism development and the quantity and proportion of public funds allocated to employment promotion by

national public administrations (8.b.1.1, Coef: 0.0000403, p-value: 0.007***; Coef: 0.0377297, p-value: 0.006***; Coef: 7.70e-06, p-value: 0.006*** and 8.b.1.2, Coef: 7.36e-09, p-value: 0.016**; Coef: 6.89e-06, p-value: 0.015**; Coef: 1.35e-09, p-value: 0.011***). These findings prompt critical contemplation on whether tourism is being leveraged as a quick and convenient means to generate regional employment. However, the need for professionalisation and career development in tourism (Maggi & Vroegop, 2023) and addressing the talent shortage in this sector (Sigala, 2021) are essential considerations for competent authorities to ensure sustainability.

Figure 10. **Tourism development vs prosperity**



Source: authors' own elaboration.

The scatter plot in Figure 10 highlights the complex and varied relationships between tourism activities and socioeconomic indicators. While tourism's influence on public spending for employment promotion is unequivocally positive, its impact on average income and other factors, such as banking accessibility (8.10.1.1, Coef: 1.38e-07, P-value: 0.083*; Coef: 0.0001221, P-value: 0.099*; Coef: 0.116, P-value: 0.116), appears less clear and likely context-dependent. These findings underscore the critical need to consider a comprehensive range of socioeconomic factors when assessing the impact of tourism. They highlight the importance of developing targeted strategies to ensure tourism contributes positively to local economies and communities. The positive correlation with income for individuals with disabilities, in particular, emphasises the potential for tourism to promote inclusivity and accessibility in the job market.

The scatter plot in Figure 10 illustrates the relationship between tourism, employment, and national development. It emphasises the need for a comprehensive approach to tourism planning and development that harmonises economic growth with social inclusion and sustainability. This approach should actively incorporate strategies for professionalisation in the tourism sector, ensure equitable income distribution, and leverage public funds effectively to promote employment while addressing the broader socioeconomic impacts of tourism.

4.3.2 Peace, justice and strong institutions (SDG-16) and partnerships for the goals (SDG-17)

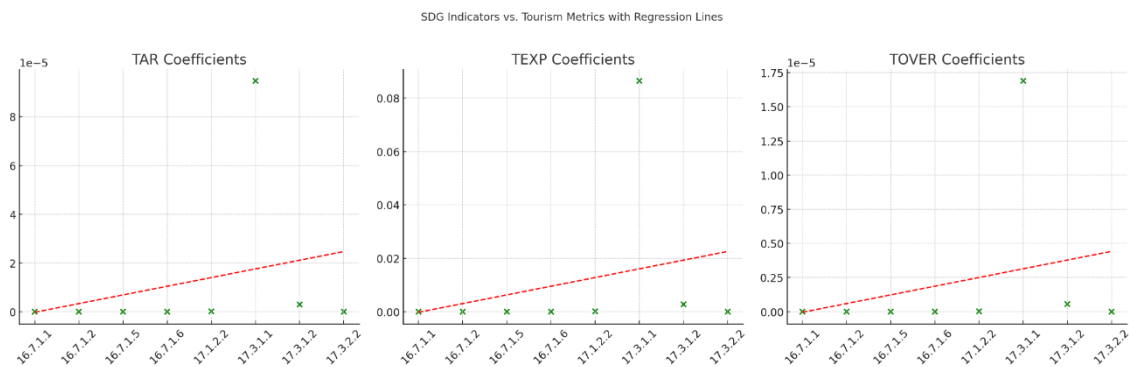
This academic investigation has rigorously examined the intricate relationships between tourism development and various socioeconomic and gender-specific indicators, as illustrated in the scatter plot in Figure 11.

A crucial finding of this work is the direct and significant relationship between tourism development and net direct investment in Official Development Assistance (ODA) for recipient countries (17.3.1.1, Coef: 0.0000947, p-value: 0.001***; Coef: 0.0864203, p-value: 0.001***; Coef: 0.0000169, p-value: 0.001***). ODA is a pivotal mechanism through which developed countries provide financial and technical assistance to foster economic and social improvements in developing nations. The positive correlation observed suggests that regions with higher levels of tourism activity may be

contributing more substantially to, or benefiting more from, these international aid flows. This underscores tourism's potential as an influential force in global partnerships to achieve the Sustainable Development Goals (Hou, 2017).

Additionally, the study identified significant relationships between regional tourism development and the volume of remittances sent to other countries (17.3.2.2, Coef: 2.30e-09, p-value: 0.000***; Coef: 2.10e-06, p-value: 0.000***; Coef: 4.10e-10, p-value: 0.000***). This suggests that regions with higher tourism activity may influence socioeconomic growth in recipient countries, aligning with previous research (Kumar, 2014; Mora-Rivera et al., 2019). Therefore, ODA and foreign remittances could serve as instrumental tools for regional authorities to forge new transnational alliances and achieve the SDGs.

Figure 11. **Tourism development vs partnerships**



Source: authors' own elaboration.

Conversely, the analysis reveals a consistent negative correlation between tourism activity and the ratio of women in various public sectors (16.7.1.1, Coef: -4.81e-10, p-value: 0.000***; 16.7.1.2, Coef: -3.11e-10, p-value: 0.000***; 16.7.1.5, Coef: 7.20e-10, p-value: 0.000***; 16.7.1.6, Coef: -5.40e-10, p-value: 0.000***). These findings suggest socioeconomic dynamics in which tourism may influence or reflect gender employment patterns in public sectors, raising important considerations about its implications for gender equality.

Furthermore, positive and significant relationships are observed between tourism metrics and public revenue from taxes (17.1.2.2, Coef: 1.33e-07, p-value: 0.000***; Coef: 0.0001225, p-value: 0.000***; Coef: 2.29e-08, p-value: 0.000***), suggesting that regions with higher tourism activity may contribute more significantly to public financial resources. These correlations underscore tourism's multifaceted impacts, positioning it as a potential lever for economic enhancement while also raising important considerations regarding its implications for gender equality and public sector employment.

In conclusion, the scatter plot in Figure 11 not only visually represents the data but also symbolizes the complex interplay between tourism, economic aid, remittances, and gender dynamics in public employment. These findings emphasize the need for targeted strategies to ensure that tourism contributes positively to local economies, international aid, and communities while also addressing broader socioeconomic and gender-related impacts. This approach should actively incorporate measures to enhance gender equality in public employment and leverage tourism as a tool for sustainable economic development.

5. Conclusion

The main aim of this research was to assess the potential of tourism as a systemiser for sustainability in achieving the 2030 Agenda for Sustainable Development in a popular tourist region. To accomplish this, the study analysed a total of 471 bidirectional correlations, including: 1) tourism

development and people; 2) tourism development and the planet; and 3) tourism development, prosperity, and global partnerships. The revealed interrelationships between tourism and the 2030 Agenda for Sustainable Development were connected in a discursive manner, allowing for the review and re-evaluation of sustainable agendas in tourist regions concerning various priorities.

Several important issues were revealed concerning the significance of the interrelationships between tourism development and people, such as the potential contribution to reducing poverty and inequalities (SDG-1 and SDG-10). Regarding health (SDG-3) and education (SDG-4), the identified inverse relationship between public spending on health and tourism development suggests the need to reconsider the allocation of public funds among priority sectors, such as health, and to evaluate whether a tourism tax could help mitigate this situation. This should be done while also considering other potential factors, such as the spread of diseases or mortality causes related to tourism. Concerning education, the results highlighted the need to guide public policies that ensure quality education for all ages, facilitating effective personal and human development that aligns the region's tourism development with the Agenda 2030 goals. Additionally, the decrease in women occupying higher-responsibility positions within public and private entities necessitates reviewing whether the tourism sector provides equitable opportunities for women. Finally, there is a need to continue the ongoing debate regarding land use and allocating economic resources to tourism in relation to other activities (specialisation vs. economic diversification). Regarding the interrelationships between tourism and the planet, this study identified significant correlations between regional tourism development and the proportion of forested land relative to the total surface area, including various types of protected areas (SDG-15).

In terms of pollution, two important aspects were revealed: on one hand, the CO₂ emissions per unit of GDP from resident units are directly associated with an increase in the volume of tourism in the Valencia Region (SDG 11 and SDG 13). This warrants further investigation to identify contributing factors, such as second homes, tourist accommodations, and energy-intensive tourism, so appropriate measures can be implemented. On the other hand, tourism directly correlates with the proportion of renewable energy produced (SDG-7). These findings suggest that tourism destinations with higher visitor numbers may be more energy efficient due to the performance of tourism businesses. Therefore, it is a priority to better understand the tourism footprint of both tourists and companies. On the other hand, this research revealed a significant number of interrelationships suggesting that tourism development is associated with a higher proportion of individuals experiencing noise disturbances in their homes from the neighbourhood or external sources (SDG-11). Therefore, it is essential to implement updated public policies addressing the various types and intensities of acoustic pollution in the region.

Concerning the correlation between tourism, prosperity, and global partnerships, significant and direct relationships were identified between tourism development and the quantity and proportion of public funds allocated to employment promotion by public administrations in the region, as well as the average income per hour, particularly for individuals with disabilities (SDG-8). This underscores the potential importance of regional authorities in formulating labour policies that focus on the tourism sector to promote social inclusion and accessibility. Therefore, professionalisation and career development in tourism should be prioritised by competent authorities as key elements for sustainability, addressing the growing talent shortage in this sector to achieve sustainable human development.

Furthermore, the study highlights the need to promote gender equality, decent work, and inclusion in tourism by offering fair pay, leadership opportunities for women, and jobs for people with disabilities. Supporting small and medium-sized tourism enterprises and strengthening international partnerships can also help create more balanced and inclusive growth. Overall, these measures can help Spain's tourism sector evolve toward a more resilient, equitable, and regenerative model by 2030.

Additionally, as tourism develops within Spain, it also increases net investment in Official Development Assistance and foreign remittances to other countries (SDG-16 and SDG-17). This represents an important tool for regional authorities to build new transnational alliances and achieve the SDGs. However, it is important to note that the correlational analysis does not imply causality. Thus, the

quantitative approach of this study should be regarded as a potential research avenue for further exploration of each SDG. Another limitation is that, due to the lack of available data, SDG-6, SDG-12, and SDG-14 were not included in this analysis.

Finally, this work outlines a series of pathways that should be incorporated into any regional sustainability agenda. As a future research direction, each pathway to sustainability and the 2030 Agenda for Sustainable Development should be further analyzed to establish a more precise cause-and-effect relationship, providing deeper insights into the identified correlations. Additionally, these measures should be approached from a sustainable to a regenerative perspective, allowing the overall tourism development model to contribute to correcting and/or replacing any damaged components within the regional value chain of this sector.

Acknowledgements

This research is supported by National Funds provided by FCT—Foundation for Science and Technology through project UIDB/04020/2020 with <https://doi.org/10.54499/UIDB/04020/2020>.

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Brief description of Author/Authors:

Miguel Puig-Cabrera

ORCID ID: <https://orcid.org/0000-0003-4524-9830>

Affiliation: Research Centre for Tourism, Sustainability and Well-being, Universidade do Algarve, Campus de Gambelas, 8005-139 Faro, Portugal, <https://www.cienciavita.pt/portal/4816-E98C-E353>

Email: mpcabrera@ualg.pt

Miguel Puig Cabrera is an Integrated Researcher at the Research Centre for Tourism, Sustainability and Well-being (CINTURS) at the University of Algarve (Portugal) and a Lecturer at the University of Seville, Spain. His research focuses on specialisation and smart development of the territory, tourism, poverty alleviation, socioeconomic inequalities, and quality of life. He holds a PhD in Geography, a Master's in Economics and Development, and a Degree in Tourism.

José António C. Santos

ORCID ID: <https://orcid.org/0000-0002-2675-3487>

Affiliation: School of Management, Hospitality and Tourism; Research Centre for Tourism, Sustainability and Well-being, Universidade do Algarve, 8005-139, Faro, Portugal, <https://esght.ualg.pt/bio/jasantos>

Email: jasantos@ualg.pt

José António C. Santos (PhD) is a Coordinating Professor at the School of Management, Hospitality and Tourism (ESGHT) and an integrated researcher of CINTURS at the University of Algarve. He is also head of the department, journal editor, and the chair of the TMS conferences. He supervises postdoctoral, doctoral, and master's students and is conducting research in: sustainability in tourism and hospitality, sustainable event management, gastronomy and tourism, and heritage interpretation.

Víctor Calderón-Fajardo, University of Malaga (Spain)

ORCID ID: <https://orcid.org/0000-0002-4662-9694>

Affiliation: Department of Economics and Business Administration, University of Malaga, Malaga, Spain.

Email: vcalderonfa@uma.es

Víctor Calderón-Fajardo is a full-time researcher at the Department of Economics and Business Administration at the University of Malaga (Spain). He holds a Master's in Tourism Management and Marketing, a Degree in Tourism, and a Degree in Management and Public Administration.

Margarida Custódio Santos

ORCID: <https://orcid.org/0000-0003-3383-5699>

Affiliation: School of Management, Hospitality and Tourism; Research Centre for Tourism, Sustainability and Well-being, Universidade do Algarve, 8005-139, Faro, Portugal, <https://esght.ualg.pt/bio/mmsantos>

Email: mmsantos@ualg.pt

Margarida Custódio Santos holds a PhD in Tourism, a Master's in Management and Development in Tourism, a Degree in Marketing, and a Bachelor's in Tourism Information. Currently, she is a Coordinating Professor and serves as the director of the Postgraduate Course in Digital Marketing at the School of Management, Hospitality, and Tourism - University of the Algarve. She is currently responsible for the Research Line in Tourism, Territories, and Environment at CINTURS. She supervises postdoctoral, doctoral, and master's students.