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Advances in Tourism, Technology and Systems

Selected Papers from ICOTTS 2024,
Volume 2

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Editors

Advances in Tourism, Technology and Systems

Selected Papers from ICOTTS 2024,
Volume 2



Springer

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Preface

This book—*Advances in Tourism, Technology and Systems: Selected Papers from ICOTTS 2024, Volume 2*—from the SIST Series is composed of the best selected papers accepted for presentation and discussion at the 2024 International Conference on Tourism, Technology and Systems (ICOTTS'24). The ICOTTS is a multidisciplinary conference with a special focus on new technologies and systems in the tourism sector and was held between 30 and 31 October 2024. The ICOTTS'24 was supported by the University of Madeira, in Funchal, Portugal and by International Association for Digital Transformation and Technological Innovation (IADITI).

The International Conference on Tourism, Technologies and Systems is an international forum for researchers and professionals in the tourism sector, which enables the discussion of the latest innovations, trends and concerns in several areas, in the Tourism sector, associated with Information Technologies and Systems. It is an event for professionals in the sector, in search of technology solutions, where academics, IT experts and business managers meet to discuss new ideas that help them maximize the potential of tourism business through technology.

The ICOTTS'24 Scientific Committee is composed of a multidisciplinary group of 140 experts who assessed some 296 papers from 28 countries, received for each of the main topics proposed for the conference: (a) Tourism research in providing innovative solutions to social problems; (b) Information and communication technologies in hospitality and tourism industry; (c) Sustainable Tourism; (d) Tourism Trends; (e) Health and wellness Tourism; (f) Tourism Management; (g) Marketing strategies in hospitality and tourism industry; (h) Hospitality, tourism, and food-service environment; (i) Tourism in the different scientific areas; (j) eTourism and Tourism 2.0.

The papers accepted for presentation and discussion at the Conference are published by Springer and will be submitted for indexing by ISI, SCOPUS, EI-Compendex, Google Scholar and Springerlink.

We thank all those who contributed to the ICOTTS'24 conference (authors, committees, workshop organizers and sponsors). We deeply appreciate your involvement and support, which were crucial to the success of the conference.

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Chapter 1

Organizational Climate and Its Influence on Organizational Stress and Affective Well-Being: Evidence from Hospitality Employees



Fátima Fernandes, Márcia Duarte , and Oscarina Conceição

Abstract This study focuses on analyzing the organizational climate in hospitality units in the city of Braga, in the North of Portugal, and investigates how the organizational climate affects the psychological well-being and work stress of employees. The working environment plays a crucial role in employee satisfaction, performance and well-being, with the hospitality sector facing specific challenges related to the organizational climate due to its intensive and service-oriented nature. A quantitative methodology was used, using a questionnaire survey. With a sample of 87 employees from four- and five-star hotels in the city of Braga, the results obtained demonstrate that the organizational climate influences affective well-being and work stress. It appears that in general, the greater the perception of an authentic organizational climate, the greater the affective well-being felt by employees and the lower the stress felt by them. Organizational stress is influenced by certain dimensions, such as opportunities for learning and personal development, open and frank communication with the leaders, work-family conciliation, equity, and credibility and trust in leaders. It was possible to conclude that there are dimensions of the climate that more directly influence affective well-being, such as credibility and trust in leaders and the spirit of camaraderie.

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1.1 Introduction

In the recent years, the hospitality sector has become increasingly dynamic and competitive, with hotels striving to deliver exceptional service to meet customer expectations. In this context, the importance of the human factor as a fundamental element in the strategy of organizations is recognized [1]. Conditions in the goods and services sector are often perceived as unfavorable by employees [2]. Work overload, job insecurity and instability, benefits that are sometimes insufficient, unattractive salaries, promotions considered unfair, precarious conditions and inappropriate behavior between managers and co-workers are some of the situations that negatively affect the organizational well-being of employees [3]. One can add the fact that they must work in shifts, which increases the risk of negative health impacts in both the short and long term [4]. All these factors decrease workplace well-being and increase organizational stress.

The hospitality sector also has similar characteristics, as it presents an environment with high pressure and responsibility. To ensure that employees can carry out their roles effectively, it is crucial for organizations to understand their motivations, challenges, and concerns. This is because the quality of services delivered is closely linked to the overall well-being of the employees [5].

The present study is carried out with the purpose of understanding the impact that the organizational climate has on organizational stress and psychological well-being at work. To this end, it was decided to conduct a case study focused on the hospitality sector in the city of Braga. In this context, the following objectives were established:

1. Analyze the different dimensions of the organizational climate;
2. Analyze the influence of organizational climate on organizational stress;
3. Examine the influence of the organizational climate on affective well-being.

1.2 Theoretical Foundations: Authentizotic Organizational Climate, Organizational Stress and Affective Well-Being

Organizational climate refers to the collective meaning and interpretation of an organization's policies, practices, and procedures as experienced by its employees [6]. It encompasses how employees perceive their work environment. The organizational climate significantly affects employees' attitudes, especially in terms of their sense of belonging, interpersonal relationships, and work performance [7, 8].

The notion of authentizotic organizations was first presented by Kets de Vries [9] and concerns work environments that encourage the desire to stay and grow in the organization. Organizations that have strong authentic characteristics, according to Kets de Vries [9], promote a healthy life, contribute to psychological well-being

and the development of self-esteem. Organizations that seek to have these characteristics help employees to balance their personal and professional lives, consequently reducing stress levels. Rego, together with other authors [10–12], proposed six dimensions of the authentizotic organizational climate, namely: “(I) spirit of camaraderie; (II) credibility and trust in leaders; (III) open and frank communication with the leader; (IV) opportunities for learning and personal development; (V) fairness/justice; (VI) work-family conciliation”.

Employees experiencing high levels of stress, and employees who work in organizations with a negative organizational climate, have little desire to remain in the organization [13]. A positive and conducive climate gives employees ease and comfort, so that they experience a low level of stress, which consequently makes the employee more committed in the organization [14]. Some authors [15–17] found a negative relationship between organizational climate and organizational stress. A negative organizational climate is linked to higher stress levels and the prevalence of undesirable work behaviors [15–17].

Organizational climate is a key factor in companies and a negative organizational climate can trigger work problems, especially work stress, which has consequences such as low satisfaction and low performance, increased turnover, increased absenteeism and consequent job quitting [18]. The way employees perceive authentizotic climate contributes to differences in their stress levels, affective well-being, and self-reported performance [11]. Employees experience increased stress when they feel their leaders are untrustworthy, and lacking of credibility, and when they believe that are insufficient conditions to balance their work and family responsibilities [11]. Opportunities for learning and personal development can lead to stress when employees perceive an imbalance between their work demands and their family life [11].

H1—The Authentizotic Organizational Climate Influences Employees’ Organizational Stress.

According to Warr [19], an individual’s mental health is affected by their work experience and depends on four main factors: competence, autonomy, aspiration and affective well-being. This typology of emotional well-being encompasses both positive and negative aspects related to work. However, Warr [19] especially emphasizes affective well-being as a crucial measure of mental health and psychological balance in the context of work. To evaluate this typology of well-being, Warr [19] proposes the analysis of two bipolar dimensions: depression-enthusiasm and anxiety-comfort.

Unfavorable organizational climates are linked to poor work attitudes and increased job stress, causing discomfort, while organizational climates considered positive are associated with positive attitudes and consequent well-being [20]. Positive organizational climate is directly related to the employee well-being [20]. The organizational climate in the workplace has a significant impact on the employee well-being and for this reason is associated with better performance and greater proactivity at work [21–23].

Organizational factors (e.g., interpersonal relationships, supportive culture, sense of fairness and respect, and worker involvement) influence employees' mental health [24].

Employees who perceive a positive spirit of camaraderie report higher comfort and pleasure. Employees perceiving better opportunities for learning and personal development develop higher enthusiasm and vigor at work [11].

H2—The Authentizotic Organizational Climate Influences Employees' Affective Well-Being.

1.3 Methodology

The questions about authentizotic organizational climate were based on the scale by Rego and Cunha [11], validated for the Portuguese context. The scale has a total of 21 items that are subdivided into 6 categories: "spirit of camaraderie, trust and credibility of the leaders, open and frank communication with the leader, opportunities for learning and personal development, fairness/justice and work-family conciliation" [11]. Cronbach Alphas: spirit of camaraderie (0.85), credibility and trust in leaders (0.87), open and frank communication with the leader (0.82), opportunities for learning and personal development (0.75), fairness/justice (0.59), work-family conciliation 0.83). Confirmatory factor analysis, with varimax rotation, showed that the six-factor model fits the data satisfactorily. Items 4, 6, 8, 14, 16, 19 were eliminated because they had factor loadings on more than one factor.

To measure affective well-being, the Warr scale [19] was used. The scale is composed of two bipolar dimensions: depression-enthusiasm and anxiety-comfort. The scale consists of 12 items, each item being evaluated by an adjective. The items measure six positive feelings and six negative feelings. Cronbach Alpha is 0.91. Confirmatory factor analysis, with varimax rotation, showed that the bipolar dimensions fit the data satisfactorily.

To measure organizational stress, the Cohen and Williamson scale [25] was used, which was validated for the Portuguese context by Mota-Cardoso et al. [26]. The scale has 10 items [26]. Cronbach Alpha is 0.84. The scale was considered one-dimensional. The questionnaire is divided into two parts: 1st the socio-demographic characterization and 2nd the scales used to assess the concepts.

Data collection took place during the months of July, August and September 2023. The sample consists of 87 respondents, from three four- and five-star hotels in the city of Braga. This is a non-probabilistic convenience sample, as it was selected according to the researcher's availability and accessibility. 51.72% of respondents were male and 48.28% were female. 40.23% of respondents are between 20 and 29 years old, followed by 27.59% between 30 and 39 years old. 52.87% have a bachelor's degree, followed by 22.9% of those with associate degree. Regarding seniority in the company, it can be observed that the majority have worked in hospitality units

for between 1 and 4 years (40.23%), followed by 26.44%, who have worked for less than 1 year.

For data analysis, Microsoft Excel and IMB SPSS Statistics were used.

1.4 Results and Discussion

Regression analyzes were carried out, using the stepwise method, to evaluate the effect of organizational climate on organizational stress. Table 1.1 displays the results.

Factor 1—Work-family conciliation ($B = -0.316$; $t = -3.189$; $p < 0.002$). Work-family conciliation explains variance of organizational stress, higher work-family conciliation being associated with lower stress.

Factor 2—Equity/Justice ($B = -0.306$; $t = -3.399$; $p < 0.001$). Equity/Justice explains variance of organizational stress, higher equity/justice being associated with lower stress.

Factor 3—Open and frank communication with the leader ($B = -0.407$; $t = -3.535$; $p < 0.001$). Open and frank communication with the leader explains variance of organizational stress, higher open and frank communication with the leader being associated with lower stress.

Factor 4—Opportunities for learning and personal development; ($B = 0.431$; $t = 3.914$; $p < 0.001$). Opportunities for learning and personal development explains variance of organizational stress, higher opportunities for learning and personal development being associated with higher stress.

Factor 5—Credibility and trust in leaders ($B = -0.224$; $t = -2.027$; $p < 0.046$). Credibility and trust in leaders explain variance of organizational stress, higher credibility and trust in leaders being associated with lower stress.

Table 1.1 Regression analysis for predicting organizational stress

	Non-padronized coefficients		Padronized coefficients	Multicollinearity statistics		
	B	Standard error	Beta	T	Tolerance	VIF
(Constant)	3.774	0.318		11.878		
Factor 1	-0.160	0.050	-0.316**	-3.189	0.719	1.391
Factor 2	-0.152	0.045	-0.306**	-3.399	0.866	1.154
Factor 3	-0.255	0.072	-0.407**	-3.535	0.531	1.881
Factor 4	0.236	0.060	0.431***	3.914	0.582	1.718
Factor 5	0.139	0.069	0.224*	-2.027	0.576	1.737

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Therefore, it can be stated that the stress variable is explained by the authenticzotic organizational climate variable, namely the dimensions of equity/justice, work-family conciliation, open and frank communication with the leader, opportunities for learning and personal development and credibility and trust in leaders.

Hypothesis 1, which states that the authenticzotic organizational climate influences employees' organizational stress, is confirmed. Several researchers argue that the organizational climate has a significant impact on employee stress [6, 14, 17, 27–29]. For example, an organizational environment that values effective communication and a collaborative approach to problem solving can help reduce stress among employees. Communication between leaders and employees enables the exchange of feedback, thus facilitating the clarification of content that arises at work, which leads to a consequent increase in the perception of well-being and a reduction in stress [14, 27]. The present study demonstrates this, since, as the variable open and frank communication with the leader increases, stress levels tend to decrease. Open and frank communication with the leader is an important aspect in an authenticzotic organization and must be taken into consideration.

In any organization, all individuals are subjected to several elements that can lead to stress, including the quality of leadership, the type of tasks, the quality of current services and the effectiveness of communication [30]. The quality of communication is one of the points addressed in research that once again highlights the inverse relationship that exists, since as open communication with leaders increases, the level of stress tends to decrease. Employees will experience higher stress when they perceive poor authenticzotic climates. Lack of credibility and distrust in the leader can be a source of stress, because it affects the employee's sense of social support. A low spirit of camaraderie affects work, probably causing work overload and an insufficient support from colleagues when facing tough or challenging tasks, which results in greater work stress [11]. Unfair treatment by leaders is a major cause of organizational stress. Inequalities in treatment and division of rewards increase perceptions of organizational stress [11]. Regarding opportunities for learning and personal development, it appears that the greater these opportunities, the greater the organizational stress experienced. It may be that opportunities for learning and personal development imply a greater investment of time and effort on the part of the individual, a greater difficulty in reconciling work and family, which could cause greater organizational stress.

Regarding the study of the influence of the authenticzotic organizational climate on the depression-enthusiasm subdimension of affective well-being, the results are presented in Table 1.2.

Credibility and trust in leaders factor ($B = 0.513$; $t = 5.517$; $p < 0.01$) is a predictor of enthusiasm. Therefore, it can be stated that the “depression-enthusiasm” variable is explained by the authenticzotic climate variable—credibility and trust in leaders.

Regarding the study of the influence of the authenticzotic organizational climate on the anxiety-comfort subdimension of affective well-being, the results are presented in Table 1.3. The factor credibility and trust in leaders ($B = 0.382$; $t = 3.650$; $p < 0.001$) is a comfort predictor.

Table 1.2 Regression analysis for predicting affective well-being (dimension depression-enthusiasm)

	Non-padronized coefficients		Padronized coefficients	<i>t</i>	Multicollinearity statistics	
	<i>B</i>	Standard Error	Beta		Tolerance	VIF
(Constant)	2.849	0.308		9.256		
Credibility and trust in leaders		0.068	0.513*	5.517	1.000	1.000

* $p < 0.001$ **Table 1.3** Regression analyses for predicting affective well-being (dimension anxiety-comfort)

	Non-padronized coefficients		Padronized coefficients	<i>t</i>	Multicollinearity statistics	
	<i>B</i>	Standard error	Beta		Tolerance	VIF
(Constant)	1.192	0.520		2.294		
Credibility and trust in leaders	0.390	0.107	0.382**	3.650	0.797	1.254
Spirit of camaraderie	0.222	0.109	0.214*	2.046	0.797	1.254

* $p < 0.01$, ** $p < 0.001$

The spirit of camaraderie factor ($B = 0.214$; $t = 2.046$; $p < 0.01$) is also a predictor of comfort. In this way, it can be stated that the comfort variable is explained by variables related to the organizational climate, namely credibility and trust in leaders and the spirit of camaraderie.

Hypothesis 3, which states that the authentizotic organizational climate influences the emotional well-being, is also confirmed. Positive climate perceptions improve psychological well-being and negative perceptions harm it [31]. The study results confirm that organizational climate is a significant predictor of psychological well-being. According to the data obtained, credibility and trust in leaders increases levels of enthusiasm, comfort and general well-being. The spirit of camaraderie among the team is also a prominent factor when it comes to comfort, i.e., it is assumed that the respondents have a sense of belonging to the team considered in the collectivist and community sense, thus existing a feeling of family among the team [10–12]. This conclusion reinforces the argument that the relationships established at work, with leaders, but also with co-workers are crucial for the affective well-being, because they are a source of social support, which is so important for affective well-being.

1.5 Conclusion

The present study reaffirms the role of the organizational climate, i.e., employees' perceptions regarding organizational policies and practices, in organizational stress and emotional well-being.

In relation to organizational stress, the importance of opportunities for learning and personal development offered to employee is evident. The present study highlights that the more opportunities are provided, the greater the organizational stress felt. The human resources manager must develop a training plan that considers the learning and development needs of employees together with the needs of the organization itself. It must, at the same time, provide support to employees in managing their time, organizational stress in periods of greater tension and pressure and organizations must invest in mentoring and coaching programs. Regarding work/family balance, it is known that the hospitality sector is a demanding sector, with long working hours and weekend work, which makes work/family conciliation difficult. The greater the difficulties in the work/family conciliation, the greater the levels of stress experienced by employees. Human Resource Management must invest in family-friendly policies. From an organizational point of view, communication with leaders, credibility and trust in leaders and equity in the treatment and distribution of rewards are factors that could explain organizational stress. These aspects relate to leadership. The importance of open and clear communication of the leader is highlighted, in the image he projects, which will have to be an image of credibility and trust. Trust may also be linked to equity in the treatment, evaluation and distribution of rewards. Transformational leadership highlights the importance of these attributes for leadership effectiveness [27].

Regarding affective well-being, the greater the trust and credibility of the leader and the greater the spirit of camaraderie, the greater the affective well-being felt. Positive interpersonal relationships must be encouraged through practices that promote group cohesion, group spirit and mutual help. These practices can be promoted both inside and outside the company, through team building activities.

One of the limitations of the study is the fact that it focuses on hotels in Braga, which puts the representativeness of the sample into question. Finally, it would be interesting to examine the relationship between organizational climate, employee well-being and stress, and customer satisfaction, using a larger sample, with hotel units from various regions of Portugal.

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Chapter 2

Strategic Drivers of Global Tourism Development: A Logistic Regression Approach to the Travel & Tourism Development Index (TTDI)



Alcina Nunes , Jéssica Alves , and Luís Vaz 

Abstract Tourism has emerged as a vital component of global economic development strategies, making it essential to understand the factors that enhance a destination's competitiveness thoroughly. This study uses the World Economic Forum's Travel & Tourism Development Index (TTDI) to examine the key elements that influence tourism growth and progress on a global scale. The study uses logistic regression analysis to assess how various elements—such as infrastructure, sustainability, natural and cultural resources, human resources, cost, safety, and political stability—affect the TTDI scores of different economies between 2021 and 2024. Our findings highlight the most effective strategies for boosting tourism competitiveness, emphasising the crucial roles of well-trained human resources and robust infrastructure. These results provide valuable insights for policymakers looking to enhance their country's tourism attractiveness and stress the importance of developing strategies tailored to the unique conditions of each economy. This research enriches the broader tourism development literature by offering empirical evidence on the factors most likely to improve TTDI scores.

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2.1 Introduction

Tourism plays a crucial role in developing various societal [1–3]. Numerous studies demonstrate that tourism not only enhances economic growth [4–6] but also promotes and preserves cultural heritage [2, 3, 7], thereby facilitating intercultural exchange. Given its potential, many countries have been striving to adopt tourism expansion as a national strategy to stimulate economic development [8]. However, due to the competitiveness between destinations, although a challenge, it is essential to identify the most effective initiatives and strategies to achieve a certain level of tourism development, considering the unique conditions of each economy [1, 9].

In this context, it is essential to analyse the most effective strategies for ensuring competitiveness in tourism markets and identify the factors underpinning them [10]. Consequently, there is a vast body of scientific literature examining the determinants of a tourist destination's competitiveness, such as infrastructure [10–12], sustainability [10, 13], natural and cultural resources [10, 14, 15], human resources [12, 13], cost [16] and safety and political stability [13, 14, 17], among others.

Concurrently, the Travel & Tourism Development Index (TTDI), developed by the World Economic Forum (WEF), identifies and measures a set of “factors and policies that enable the sustainable and resilient development of travel and tourism, which in turn contributes to the development of a country” [18].

The TTDI is composed of five sub-indices, each related to different domains: “Enabling Environment,” which assesses the general conditions necessary for operating in an economy; “Travel and Tourism Policy and Enabling Conditions,” which analyses specific policies or strategic aspects that directly affect the sector; “Infrastructure,” which examines the availability and quality of physical infrastructure in each economy; “Travel and Tourism Demand Drivers,” which identifies the primary motivations for travel, including natural resources, cultural attractions, and non-leisure activities; and “Travel and Tourism Sustainability,” which considers current or potential sustainable challenges and risks in tourism [18]. This index is relevant in studying tourism competitiveness, being one of the most frequently used for this purpose [8, 17]. However, the existing literature lacks a quantitative analysis of which of these domains is most likely to impact the development level in the tourism sector. It is essential to recognise the factors and domains that influence a tourist destination's competitiveness and development while determining which have the most significant impact.

As tourism is an interdisciplinary field of study, understanding the impact of certain types of domains is also crucial for formulating more effective strategies and more targeted and efficient policies. This research gap emphasises the need for a study that empirically investigates these impacts. Therefore, this study aims to fill it by quantitatively analysing the factors influencing the TTDI. Its main objective is to identify which pillars are most likely to conduct a positive evolution of the TTDI. The results will not only deepen the understanding of the various pillars and their domains in the competitiveness and development of tourism but also have significant practical

implications for planning and promoting tourist destinations and formulating public policies.

The paper is divided into five sections. After this introduction, a theoretical background will be presented, explaining how the TTDI is calculated and the importance of each one of its pillars. Then, the methodology section will describe the econometric method used to analyse the data, ensuring the results are valid and can be reliably replicated. Subsequently, the analysis and discussion of the empirical results will be conducted. To finish, the conclusion remarks will summarise the main findings, implications, and limitations.

2.2 Theoretical Background

Previously, the World Economic Forum established the Travel and Tourism Competitiveness Index (TTCI), an innovative and comprehensive framework designed to facilitate comparisons of travel and tourism competitiveness across various countries and regions. The index encompassed three primary categories: regulatory framework for travel and tourism, business environment and infrastructure, and human, cultural, and natural resources in the sector [19]. In 2021, the World Economic Forum introduced a revised model known as the Travel and Tourism Development Index (TTDI). This updated index adopts a more expansive perspective, integrating sustainability and resilience criteria, which is essential for reshaping the sector after the pandemic and amidst current geopolitical challenges [18].

The final framework is thus composed of five sub-indexes: “Enabling Environment”, “Policy and Conditions Enabling Travel and Tourism”, “Infrastructure”, “Travel and Tourism Demand Drivers”, and “Travel and Tourism Sustainability” (see Table 2.1 adapted from the TTDI report [18]).

These sub-indexes are segmented into 17 pillars, encompassing 112 indicators, each scoring on a scale from 1 (worst) to 7 (best). The TTDI is determined by calculating the arithmetic mean of the 17 component pillars. Although figures for the five sub-indexes are presented, they serve merely for categorisation and presentation. “Each pillar is computed as an unweighted average of its constituent variables” [18].

The “Enabling Environment” sub-index assesses the key conditions necessary for business operations within an economy through 5 main pillars: “Business Environment”, “Safety and Security”, “Health and Hygiene”, “Human Resources and Labour Market”, and “ICT Readiness”. These pillars evaluate policy favourability, safety risks, healthcare infrastructure, skilled labour availability, and ICT development and usage [18].

Business environments are constituted by different external factors, which play a central role in innovation strategies, further contributing to development [20]. Not only is it a concern for firms to know how they can operate [21, 22], but it also proves to be a concern for the state and institutions, as the business environment can have an impact on the entrepreneurship levels of countries [23]. To guarantee

Table 2.1 TTDI framework [18]

Travel and tourism development index framework	Sub-indexes	Pillars
	Enabling environment	Business environment
		Safety and security
		Health and hygiene
		Human resources and labour market
		ICT readiness
	Travel and tourism policy and enabling conditions	Prioritisation of travel and tourism
		International openness
		Price competitiveness
	Infrastructure	Air transport infrastructure
		Ground and port infrastructure
		Tourism service infrastructure
	Travel and tourism demand drivers	Natural resources
		Cultural resources
		Non-leisure resources
	Travel and tourism sustainability	Environmental sustainability
		Socioeconomic resilience and conditions
		Travel and tourism demand pressure and impact

successful tourism implementation and maintenance and contribute to tourism development, regions must promote safe and secure destinations [24], as experiencing crime can affect tourists' destination image. Policymakers and institutions are already addressing the issues [24, 25], which benefit communities and external visitors. For instance, tourists and inhabitants can benefit from implementing smart technologies to decrease city crime through surveillance operations [25]. The covid-19 pandemic represented a significant concern in the literature for health and hygiene in the tourism sector [26], which hindered tourists' travel ability.

The "Travel and Tourism Policy and Enabling Conditions" sub-index assesses the policies and strategic factors affecting the travel and tourism sector in three key areas: "Prioritisation of Travel and Tourism", "International Openness", and "Price Competitiveness". It measures government and investor promotion, the economy's welcome towards visitors, and the cost of travel and investment, considering factors such as government spending, air service agreements, and travel-related costs [18]. Governments and institutions cooperate with foreign entities to achieve better economic results by establishing trade and plurilateral agreements, which typically

involve different sectors. The travel and tourism industry can benefit from regional and global agreements, although regional agreements have better results [27]. Agreements are also highly beneficial for regions as they increase tourism flows, favouring development in territories that typically lack natural resources [28, 29]. Another important aspect the regions and tourism businesses must define is price, an essential indicator for destination management organisations that can affect local entities' economic sustainability [30]. Price contributes to the destinations' competitiveness levels, which are also influenced by external factors, such as policies, cooperation between industries, and innovation [31].

The "Infrastructure" sub-index evaluates an economy's physical infrastructure through three main areas: Air Transport, Ground and Port, and Tourist Service Infrastructures. It assesses air connectivity, ground and port transportation efficiency, and the availability and competitiveness of tourism services, including accommodation and car rentals [18]. Tourism relies on a well-connected transport infrastructure network, allowing travellers to hop between destinations [23]. Tourist arrivals and departures can occur through sea, ground, and airport infrastructures. Air transportation and traditional rail generally play a central role in tourist arrivals and can be supported by high-speed rail networks [32, 33]. Cruise ports also support transportation, mainly in European territories, although mass usage of these infrastructures can negatively impact coastal communities and cities [34]. Air transportation is first seen in the literature as a foundation that establishes tourism demand, leading to increased tourist arrivals [35]. However, new transportation infrastructure is not linked to increased tourism arrivals. If transportation infrastructure already exists, tourists will seek the most beneficial option related to factors such as time, distance, cost, environmental impact, and mode of transportation [36]. Combining the different types of transportation is highly beneficial for achieving international markets, as it positively increases tourism competitiveness [23]. The links between transportation and tourism are evident even at the stock market level, where market turmoil can be caused by incidents in the airline industry [37].

The "Travel and Tourism Demand Drivers" sub-index identifies the primary motivations for travel, focusing on three key areas: "Natural Resources", "Cultural Resources", and "Non-Leisure Resources". It evaluates the attractiveness of landscapes and natural parks, the promotion of cultural heritage and events, and factors driving business, academic, and medical travel [18]. Developing tourism in various regions can significantly benefit local communities and aid in resource preservation. Natural resources are crucial assets for destinations and play a role in the strategic planning and development of mountainous regions in Europe [38]. While some regions face challenges in establishing tourism, external organisations can provide essential support in designing and implementing tourism strategies [39]. Prestigious recognition, such as inclusion in the World Heritage List, can enhance a destination's competitive brand and positively impact tourist decisions [40]. These awards can drive tourism demand, creating new trends and influencing tourists' decisions [39].

Culture significantly influences tourism arrivals, with cultural attractions drawing many visitors [2]. Tourists attending cultural events tend to spend more than local

attendees, contributing to regional economic growth [41]. Cultural destinations promote employment, social cohesion, and sustainable development, especially in developed countries [42]. These destinations offer immersive experiences that help tourists connect deeply with the region [43]. The demand for cultural destinations is increasing as tourists seek enriching experiences, memorable discoveries, and historical insights [44, 45]. Different cultural experiences attract diverse market segments: younger tourists often prefer music events and nightlife, while older tourists gravitate towards museums and heritage sites [46]. At last, non-leisure resources include various forms of tourism, such as business, educational, and medical tourism. Medical tourism involves travelling primarily to receive treatment for a diagnosed condition [47]. Business tourism has expanded since the 1980s, driven by globalisation, which has increased international business travel and professional events [48, 49]. Educational tourism focuses on travel for learning purposes. Blends leisure and education, generating economic benefits from spending on accommodation, food, activities, and sometimes tuition, as well as boosting entertainment and leisure expenditures [50].

The “Travel and Tourism Sustainability” sub-index addresses sustainability challenges in the travel and tourism sector, focusing on “Environmental Sustainability”, “Socioeconomic Resilience and Conditions”, and “Travel and Tourism Demand Pressure and Impact”. It evaluates environmental protection and climate change preparedness, socioeconomic well-being and workforce diversity, and factors indicating overcrowding risks, demand volatility, and the distribution of economic benefits to local communities [18]. Pressure from the population has led policymakers and businesses to think about sustainability. Tourism comprises several industries, such as food and accommodation, leading to multiple high impacts on the sustainability of regions and communities [51, 52]. Accordingly, initiatives that aim to guarantee a more sustainable lifestyle have been rising, such as the definition of the Sustainable Development Goals [52] or the promotion of a circular economy, which aims to reduce waste and keep materials and products in use through regeneration [53]. Businesses are entities that can also play a role in reducing the impacts of tourists, particularly at the environmental level. Dolnicar [54] identified that by brands designing active touch-points, tourists can behave more sustainably. Although achieving sustainability can be a utopian sentiment, tourism can significantly impact regions and communities and needs to be sustainable to reduce potential impacts [55].

2.3 Methodology

This study investigates which percentual changes in the values observed for the 17 pillars that compose the Travel & Tourism Development Index (TTDI) with more probability improved (or not) the index value of the economies listed on the TTDI rank between 2021 and 2024. Identifying and measuring the pillars that more probably cause an improvement in the index value gives information on which policies and measures the tourism stakeholders may undertake. Indeed, the logistic regression

models are commonly used to identify the probability of an event occurrence—in this study, the probability odds of an economy's increase in the TTDI between 2021 and 2024. The logistics model computes the ratio between the probability of an economy's TTDI improvement and the probability of an economy's TTDI not improving between 2021 and 2024, considering the TTDI pillars as independent variables.

To identify which pillar(s) of the TTDI are statistically significant and explain how countries can improve the index value, a binomial logit model is constructed with the positive change in the index being the dependent variable and the pillars of the TTDI the independent variables.

The equation below represents the logit model:

$$P(Y = 1) = \frac{e^{Y_i}}{1 + e^{Y_i}}$$

where $Y_i = \beta_{0i} + \beta_1 \text{Pillar}_{1i} + \beta_2 \text{Pillar}_{2i} + \dots + \beta_{17} \text{Pillar}_{17i} + \varepsilon_i$, Y_i is a dependent dichotomous variable assuming the value zero ($Y = 0$) if the TTDIs did not improve from 2021 to 2024 and the value one ($Y = 1$) if the TTDI improved, $\text{Pillar}_{1i}, 2i, \dots, 17i$ are the 17th 2021–2024 percentual differences on the TTDI's pillars that converge to compute the index, β_0 is the coefficient of the constant term, $\beta_{1i}, 2i, \dots, 17i$ are the maximum likelihood estimated coefficients, ε is the error term, and $i = 1, 2, \dots, n$ are the 119 countries in the database [56].

A one-unit percentual increase of a specific TTDI pillar multiplies the odds by the value. Thus, the influence of a pillar is measured in terms of the odd's variation. Pearson's and Hosmer–Lemeshow tests are presented to quantify the model's goodness of fit. Moreover, it presents a McFadden Pseudo R^2 coefficient, a mathematical measure of the % of variance that is explained, the log pseudolikelihood and the Wald Test to test the joint significance of the variables in the model [56].

2.4 Results

Table 2.2 presents the absolute (N) and relative number (%) of countries that observed a positive change in the TTDI from 2021 to 2024 by income group. Are considered by the World Bank's four income groups. The 119 economies included in the rank are split into high, upper-middle, lower-middle, and low-income economies.

Table 2.3 allows to identify which pillars were significant in explaining the probability of an economy improving its TTDI index, based on the percentual changes observed from 2021 to 2024. The table's analysis will focus on interpreting the odds ratios, their statistical significance, and the overall model fit. The odds ratios represent the change in the results' odds due to a one-unit percentual increase in one pillar, holding all other pillars constant. The statistical significance indicates the reliability of these predictors.

Table 2.2 Absolute and relative distribution of economies by positive and non-positive change in the TTDI by income group

Income group		% Difference in the TTDI		Total
		Positive ($Y = 1$)	Non-positive ($Y = 0$)	
High-income economies	<i>N</i>	20	26	46
	%	16.81	21.85	38.66
Upper-middle Income economies	<i>N</i>	19	16	35
	%	15.97	13.45	29.41
Lower-middle income economies	<i>N</i>	19	15	34
	%	15.97	12.61	28.57
Low-income economies	<i>N</i>	3	1	4
	%	2.52	0.84	3.36
Total economies	<i>N</i>	61	58	119
	%	51.26	48.74	100.00

One of the critical assumptions to apply in logistic regression is the absence of serious multicollinearity amongst the independent variables. Therefore, the variance inflation factors (VIF) were estimated and several models combining different pillars have been computed. The model's choice relied on the AIC and BIC information criteria. It was decided to present the results of the model that withdraws the three pillars regarding T&T Sustainability since it was the one presenting the best-fit results, avoiding, at the same time, problems of severe multicollinearity among variables.

Table 2.3 gives that the business environment, health and hygiene, natural resources, and non-leisure resources pillars do not present statistical significance in explaining the probability of improving the TTDI. All the other pillars considered in the presented model are statistically significant. A one-unit percentual increase in their value increases the odds of an economy improving its score on the TTDI. The pillar measuring the human resources and labour market has the most significant influence on the probability of an economy improving its TTDI—a one-unit percentual increase in this pillar significantly increases the odds by 63.9%. Enhancing human resources and the labour market has the most substantial impact on TTDI. This pillar's influence indicates the critical role of skilled labour and effective labour market policies in developing the tourism sector. Investing in education, training, and labour policies supporting tourism can significantly improve TTDI scores.

Follows the safety and security pillar (40.3%), the tourist service infrastructure (37.5%), the ground and port infrastructure (34.1%), the prioritisation of T&T (33.1%), the price competitiveness (30.8%), ICT readiness (28.9%), International openness (24.4%), air transport infrastructure (23.2%), and cultural resources (21.1%).

In the aftermath of a global pandemic, safety and security are paramount for tourism development. This includes both physical protection and measures to protect

Table 2.3 Results of the binary logistic model using the TTDI's pillars

Pillars	Odd ratio	Robust standard error	Statistical significance	VIF
Constant	0.532	0.721		
Business environment	1.138	0.183		1.41
Safety and security	1.403	0.149	***	1.83
Health and hygiene	1.041	0.124		1.52
Human resources and labour market	1.639	0.235	***	1.95
ICT readiness	1.289	0.167	**	1.75
Prioritisation of T&T	1.331	0.095	***	3.26
International openness	1.244	0.167	**	1.40
Price competitiveness	1.308	0.135	***	2.33
Air transport infrastructure	1.232	0.098	***	1.80
Ground and port infrastructure	1.341	0.167	*	2.28
Tourist service infrastructure	1.375	0.099	***	2.69
Natural resources	1.125	0.136		1.44
Cultural resources	1.211	0.090	**	1.21
Non-leisure resources	1.048	0.047		1.18
N = 119		Wald chi ² (14) = 32.28***		
McFadden Pseudo R ² = 0.6264		Log pseudolikelihood = − 30.801		
Goodness of fit tests				
Pearson chi ² (104) = 99.84		Hosmer–Lemeshow chi ² (8) = 4.17		

Notes Pillars regarding T&T Sustainability: Environmental Sustainability, Socioeconomic Resilience and Conditions, and T&T Demand Pressure and Impact are not included due to multicollinearity; Statistical significance at: *** 1% significance level, ** 5% significance level, * 10% significance level

tourists from health risks. The pandemic affected several dimensions of the tourism industry, especially human resource management [57] and information technologies-based products and service models [58]. However, some destinations still lack essential services, such as access to drinking water, sanitation, and proper waste management [59]. Some tourists are also seeking tourism related to this pillar, namely elderly tourists, a share of the population expected to increase. This type of tourist aims to access quality healthcare services, an essential characteristic of regions and destinations [60].

Government prioritisation of travel and tourism reflected in policies, funding, and promotional activities, also significantly boosts TTDI scores. It shows the importance

of strategic focus and resource allocation towards tourism development. Additionally, high-quality tourist services infrastructure, including hotels, restaurants, and recreational facilities, greatly enhances the attractiveness of a destination. Moreover, information and communication technology readiness is crucial for modern tourism. Enhancements in ICT infrastructure, such as Internet connectivity and digital services, support tourism activities and improve TTDI scores. Still, it is important to notice that competitive pricing in travel and tourism services attracts more tourists. Economies that offer good value for money are more likely to see improvements in their TTDI scores, indicating the importance of affordability in tourism services. Furthermore, international openness significantly impacts tourism development. Economies that are more accessible to international tourists see better TTDI scores. Compared with the previously mentioned pillars, the less relevant one in the model is the pillar of cultural resources since rich cultural resources attract tourists interested in heritage, history, and cultural experiences. Investments in preserving and promoting cultural assets are relevant to the international tourism and travel framework.

Putting together the pillars that constitute each sub-index, it is possible to observe (Table 2.4) the importance of the business environment. A 1% improvement on the sub-index's pillars increases the probability of an economy improving its TTDI score by 2, 6 times more. This is particularly true for the high-income, lower-middle, and low-income economies, where the likelihood of improvement increases approximately 5 times more and 3 times more, respectively. These results prove that understanding and being aware of the business environment in which firms operate is essential to making critical strategic decisions, such as conducting business abroad [22] or making internal operations upgrades, such as environmental purchasing [21].

In upper-middle-income economies, the importance of the travel and tourism policy and enabling conditions sub-index should be noted. A 1% improvement in the sub-index's pillars increases the probability of an economy improving its TTDI score by 3.8 times more. The travel and tourism sustainability sub-index is not included in the model due to multicollinearity issues and may be considered in the model's constant. Even if not statistically significant for the complete set of economies and most income groups (except for high-income economies), the constant values present a majority odds smaller than one, indicating this sub-index negatively influences the probability of the TTDI increase.

2.5 Conclusion Remarks

The analysis indicates that to improve their Tourism & Travel Development Index scores, countries should focus on enhancing their human resources and labour market, ensuring safety and security, and investing in tourist service infrastructures. Additionally, prioritising travel and tourism at the governmental level, maintaining price competitiveness, improving ICT readiness, fostering international openness, and

Table 2.4 Results of the binary logistic model by income group using the TTDI's sub-indexes and predictors

Sub-indexes	All	High-income	Upper-middle income	Lower-middle and low-income
Odd ratio and statistical significance				
Constant	0.619	0.113**	4.158	0.87
Enabling environment	2.651***	5.174***	1.995*	3.220*
Travel and tourism policy and enabling conditions	1.953***	2.829**	2.343*	2.321***
Infrastructure	1.923***	3.754**	1.549	2.191***
Travel and tourism demand drivers	1.315***	1.568**	1.209	2.045
<i>N</i>	119	46	35	38
McFadden Pseudo R^2	52.87	59.79	51.530	65.64
Wald χ^2	23.63***	9.00*	6.06	14.51***
Log pseudolikelihood	− 38.858	− 12.664	− 11.739	− 8.885
Pearson χ^2	133.76 ($p = 0.100$)	29.81 ($p = 0.902$)	68.31 ($p < 0.001$)	22.62 ($p = 0.912$)
Hosmer–Lemeshow χ^2	14.42 ($p = 0.071$)	2.22 ($p = 0.974$)	9.72 ($p = 0.285$)	4.86 ($p = 0.772$)

Notes The travel and tourism sustainability sub-index is not included due to multicollinearity; Statistical significance at: *** 1% significance level, ** 5% significance level, * 10% significance level

developing air transport and cultural resources are critical strategies. By comprehensively understanding the crucial predictors that influence the TTDI, policymakers and stakeholders within the tourism sector can formulate more targeted and effective strategies. This will not only improve their rankings in the TTDI but also foster the development of sustainable tourism practices. By addressing factors such as economic impacts, environmental considerations, social and cultural implications, and infrastructure quality, these stakeholders can create initiatives promoting responsible tourism, enhancing visitor experiences, and preserving local resources and communities. It is important to note that the analysis period (2021–2024) occurs during the covid-19 pandemic, which may limit the ability to apply the results to a different context. Moreover, the variability in data quality between economies, particularly in low- and middle-income economies, may compromise the conclusions and limit the research. Excluding sustainability-related variables due to multicollinearity also presents analytical limitations, as these variables are crucial for developing sustainable tourism.

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Chapter 3

Improving Visitor Experience in Cultural Tourism Through a Virtual Reality Tour



Victoria Apajalahti, Célia Rafael, Maria Sofia Lopes, and Ana Pires

Abstract Virtual reality provides different ways to connect and interact with the history and heritage of a destination, bringing new possibilities to cultural tourism experiences. This paper explores how virtual reality products affect the visitor experience in cultural tourism through a case study conducted at VR Tours Lisbon, a virtual reality flight over 12 cultural sites within the city area. The objective of the research was to examine how visit intention, perceived enjoyment/emotional involvement, content quality and education are perceived by visitors during the VR experience. These items were measured through a quantitative survey. The study found positive results for all measured items. All sites involved had an increased intention to visit, with the highest percentage for the sites with which the respondents had the least prior familiarity. Additionally, very good feedback was received on the experiential value of taking a VR tour before visiting a destination, perceived enjoyment, curiosity to learn new things and providing a good learning experience. The visitor experience in cultural tourism was found to be enhanced by motivation to learn more about the culture and history of the destination, introducing them to new sites, increased visit intention and evoking positive emotions. These results show that immersive technologies such as VR can be used in tourist attractions and destinations to enhance the tourist experience and to increase knowledge of and empathy with the local culture.

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3.1 Introduction

Virtual reality (VR) offers different kinds of connection with the cultural heritage and, therefore, has the potential to contribute to increase cultural awareness, to innovate heritage destinations management, and even to reduce overcrowding. Hence, VR can be an important tool in cultural tourism contexts. Together with the research and awareness about it, its use in cultural tourism is increasing [9, 11]. VR experiences are usually designed to be both entertaining and educating, making it interesting for cultural tourists [4, 20].

Combining the natures of tourism, experiences, the experience economy and virtual reality, tourism and especially cultural tourism provides a great platform for the adaptation and utilization of VR products. Tourism is part of the experience economy, where unforgettable experiences are sold instead of products and services. [21, 24]. Experiences, according to Pine and Gilmore [21] are built on 4E's: education, entertainment, aesthetics, and escapism. These are all features that virtual reality can offer. Cultural tourism can be a great platform for virtual reality as by nature cultural tourism is often educational and could be considered to have momentum as a growing number of people are seeking to enhance their travel experiences through learning opportunities that add personal meaning and cultural awareness [12].

Virtual reality and immersive experiences are used for multiple purposes in tourism. In the cultural tourism industry, they are mostly used for education, entertainment [22] and marketing [18].

Virtual reality is used as a valuable tool to improve the customer experience in cultural tourism destinations, sites and museums. VR is used to enrich the customer experience in the destinations through different types of VR tours and experiences, often showcasing the destination and/or its history [10] (Bideci and Bideci 2023).

This paper presents the findings of a case study conducted at VR Tours Lisbon in the autumn of 2023. VR Tours Lisbon offers visitors the sensation of flying over some parts of Lisbon and specific cultural sites through VR.

The aim of this research is to understand the perspectives of the participants in this VR tour with respect to: sensations experienced, entertainment, learning with the experience and perceptions about the effect of the tour in the connection with the destination.

This study used a quantitative survey to assess visitors' perceived enjoyment of the VR tour, the sensations experienced during the virtual reality experience, content quality perception, education and perception of tour's effect in visit intention towards cultural sites connected with the VR experience.

This paper is structured by starting with a literature review on virtual reality and immersive experiences, cultural tourism and the importance of visit intention, education, content and emotions. This is followed by a section on the research methods and measurements. The results are then presented and discussed. The paper ends with a discussion and a conclusion.

3.2 Literature Review

3.2.1 *Virtual Reality and Cultural Tourism*

Virtual reality (VR) can be used in cultural tourism to give better and enhanced experiences especially through its immersive qualities [14]. The concepts of education, entertainment and escapism that a fully immersive VR experience can harness are recognised to result in better visitor experiences and an elevated visit intention towards cultural destinations [2, 14, 19].

Cultural tourism, accounting for 40% of all tourism, involves visiting destinations to experience tangible and intangible cultural attractions, which enhances cultural awareness and sustainability [27, 28]. This form of tourism includes a wide range of activities, from historic monuments to contemporary art [1, 23]. It's considered an important aspect of tourism due to its educational and experiential value. Richards [23] distinguishes between specific cultural tourists, motivated primarily by culture, and general cultural tourists, who engage with cultural activities incidentally.

Virtual reality and other immersive technologies are being adapted to products in the cultural sector and tourism to enhance the visitor experience but also as a tool to preserve culture and history [2, 5, 11]. This highlights the variety of VR and its potential for cultural tourism. The evolving concept of culture in tourism is shifting towards global and everyday practices, moving beyond just historical heritage.

3.2.2 *Virtual Reality, Immersive Experience and Visit Intention*

Virtual reality (VR) and immersive technologies like augmented reality (AR) and mixed reality (MR) enhance visitor experiences by providing immersive, interactive environments. These technologies are increasingly used in cultural tourism to offer experiences that go beyond reality, allowing users to engage with places, history, and culture in a more interactive way [5, 14].

Immersive experiences are classified into fully immersive, semi-immersive, and non-immersive categories, each providing different levels of engagement [2, 22]. Fully immersive VR, experienced through head-mounted displays, aligns a user's movements with the virtual world, enhancing visit intentions to physical sites [14, 15, 16]. Semi-immersive and non-immersive experiences also play significant roles in cultural engagement.

Immersive experiences, such as VR tours, boost visitation and revisitation by enhancing the perceived enjoyment and visual appeal of the destination. These factors positively affect visit intentions and behavioral intentions towards cultural sites [13, 19]. The content quality and perceived ease of use also contribute significantly to a user's intention to visit [13, 19].

While emotional involvement doesn't directly affect visit intention, the perceived enjoyment of VR experiences does. Users tend to focus more on the hedonistic value, such as aesthetic enjoyment, rather than utilitarian benefits [6, 19]. This highlights the importance of creating visually appealing and enjoyable VR content to enhance travel intentions [17].

3.2.3 Emotional Involvement, Perceived Enjoyment and Educational Content

Emotional involvement in VR experiences refers to how emotionally engaged users feel with the content, such as feeling part of the virtual environment [19]. Perceived enjoyment is the extent to which users find the activity inherently enjoyable, independent of performance outcomes [7]. The aesthetics of the content and the confirmation of user expectations greatly influence these factors [6].

Educational aspects in VR experiences enhance appreciation of the aesthetic elements and the sense of escapism [15, 16]. Visual attractiveness and well-structured narratives positively impact emotional engagement and perceived enjoyment [19]. This combination of education and entertainment (edutainment) is crucial for successful visitor experiences in cultural contexts [4].

Education in tourism involves creating new knowledge and understanding through experiences. VR provides an interactive way of learning, making educational content more engaging and enjoyable [15, 16]. This blend of education and entertainment, known as edutainment, is vital for effective cultural tourism experiences [4].

The quality and narrative of VR content significantly influence the learning experience by enhancing sensations of immersion and enjoyment [20]. Users new to VR technology often report more positive experiences regarding content quality. Learning through VR is interactive and engaging, leading to positive educational outcomes [15, 16].

3.3 Methods

This study was conducted at VR Tours Lisbon, which is an existing private tourism company that offers a virtual flight over twelve popular cultural sites in Lisbon's greater area. During the time of the study the company was located in the centre of Lisbon, the capital of Portugal. Since then, it has moved to other premises within the city. It shared premises with the city's Visitor Information Centre and the Lisbon Story Centre, which is an interactive museum about the city's history.

The VR flight the company offers lasts 20 min and is a guided tour experienced through an HMD and headphones while standing on a custom "jet pack". The content is a 360° 11K video over cultural sites within the city area including some UNESCO

(United Nations Educational, Scientific and Cultural Organization) protected sites like “Torre de Belém”. The content does not allow interaction but as it is a 360° device it allows navigation by looking into different directions to see the full content. The VR flight takes the customer high over the city aiming to give a sense of flying. The jetpack, to which the customer is attached, rotates and shakes in accordance with the content, while a guided narration describes what can be seen through headphones.

The data was collected at VR Tours Lisbon during 18 days between September 2023 and February 2024. Visitors who took part in the VR Tours activity in this period were invited to participate in the survey right after their experience. For customers to be included in the study, they had to be either visitors or tourists to the Lisbon area and to have completed the VR tour. Furthermore, local residents, and individuals who were unable to complete the tour due to illness or other reasons were excluded from the study. The questionnaire was pretested with a group of people to ensure clarity and then refined before being applied. In total 42 answers were collected and accepted. Data was analysed with Excel and IBM SPSS Statistics.

Based on the product’s characteristics, visit intention, perceived enjoyment/emotional involvement, content quality, and education were measured quantitatively through 17 items. These items, shown in Table 3.1, used a 7-point Likert scale from strongly disagree (1) to strongly agree (7). Adapted from Chung et al. [6] and Lee et al. [15, 16], the survey measured emotional involvement and learning effects. Conducted in English and Portuguese, the survey was available online and in print on-site for those without mobile or internet access.

Emotional involvement was measured using six items: two on the enjoyability of the VR experience [6, 15, 16] and four on users’ sensations during the immersive experience, including comfort, fear, safety, and nausea, due to VR’s common physical effects. This was to gauge emotional responses like comfort, amusement, fear, or safety in the fully immersive, control-relinquishing experience.

To assess the VR Tour’s content and educational potential, nine items were used. These measured increased knowledge about Lisbon, inspiration for travel plans, stimulated curiosity, and learning value. Two items evaluated connection with Lisbon’s people, culture, and history, while others assessed the perceived value of VR Tours before visiting a site. Satisfaction with the visual, audio, and physical elements of the VR experience was also measured.

Visit intention was measured with two question groups: one asking if customers had visited the landmarks in the VR Tour and the other if their interest in visiting each showcased site had changed, including pictures for clarity.

To assess the existence of relationship between the sensations felt by visitors and their perceptions about the VR tours content and education potential, Spearman coefficient was applied, for all pair of items represented in Table 3.1, using IBM SPSS Statistics.

Table 3.1 Categories and measurements

Categories	Measurements
Sensations during the virtual reality (VR) visit [6, 15, 16]	1. Experiencing Lisbon through virtual reality was enjoyable 2. The VR experience was fun 3. I felt comfortable during the VR experience 4. I felt sick during the VR experience 5. I felt scared during the VR experience 6. I felt safe during the VR experience
Content experienced during the visit in virtual reality (VR) [6, 15, 16]	7. The VR experience made me more knowledgeable about Lisbon 8. The VR tour stimulated my curiosity to learn new things 9. VR provided a good experience for learning 10. I understand the local culture and local people better because of this tour 11. This experience has motivated me to find more about the history and culture of Lisbon 12. I see value in doing a VR Tour before visiting the destination/site 13. The virtual tour gave me an overview of Lisbon 14. The virtual tour provided relevant information of Lisbon for my travel plans 15. I am satisfied with the visual, physical, and audio aspects of the virtual tour
Visit intention	16. Choose the monuments you've already visited before the Virtual Reality (VR) tour 17. My desire to visit destination after the VR Tour has... Increased / decreased / not changed

3.4 Results and Discussion

This section presents the results of the questionnaires, beginning with a description of the demographic profile of the respondents and their connection to Lisbon and virtual reality. Finally, the results of the measured items are presented using graphs as support.

The visitor’s connection to Lisbon and virtual reality as well as the source of how they found out about the tour were measured to understand the profiles, knowledge of the visitors and motivations to visit VR Tours. Table 3.2 presents the frequency and percentage of respondents who had previously visited Lisbon and the respondents’ previous experience with virtual reality. Over 70% of the respondents were first time visitors to Lisbon and nearly the same percentage (69%) had prior experience with virtual reality. The same percentage, 69%, found out about the VR Tours through

Table 3.2 Respondents connection to Lisbon and VR

Question	Response	Freq.	(%)
Have you visited Lisbon before?	No	30	71.4
	Yes	12	28.6
Source of information about VR tours	While visiting the Lisbon Story Centre	29	69.0
	Social media/Internet	5	11.9
	Tourist information office	4	9.5
	I was recommended	3	7.1
	Lisbon card	1	2.4
Previous experience with VR	Yes	29	69
	No	13	31

visiting the Lisbon Story Centre. The next most popular sources for the product were social media/internet (11.9%) and tourist information office (9.5%).

3.4.1 Perceived Sensations, Content, and Learning from the VR Experience

An overwhelming majority of respondents (95%) found the experience enjoyable, making it the measurement with the highest rate of agreement in the whole study.

The VR experience also successfully evoked positive sensations among visitors. A significant percentage of respondents reported feeling comfortable (85.7%), safe (92.9%), and having fun (92.8%) during the VR tour. Despite these positive reactions, 19.1% of respondents expressed dissatisfaction with the visual, physical, and audio aspects of the virtual tour.

The VR tour proved to be highly motivating, with 76.2% of respondents expressing a desire to participate in additional VR activities because of this experience.

As the virtual tour gave a guided tour of the city and its cultural sites, the change in understanding of local culture and people was measured. 64.3% of respondents felt that the VR experience helped them better understand the local culture and people, while 19% remained neutral on this topic. Figure 3.1 represents results related to content, education, and satisfaction.

In terms of providing an overview of Lisbon, a significant portion (61.9%) strongly agreed that the virtual tour achieved this, with the total agreement reaching 92.9%.

Furthermore, 83.3% of respondents found that the tour provided relevant information for their travel plans.

When it comes to the perceived value of VR tours, half of the respondents strongly agreed that they saw value in doing a VR tour before visiting a destination or site. In addition, 28.6% agreed and 14.3% somewhat agreed that there is value in taking

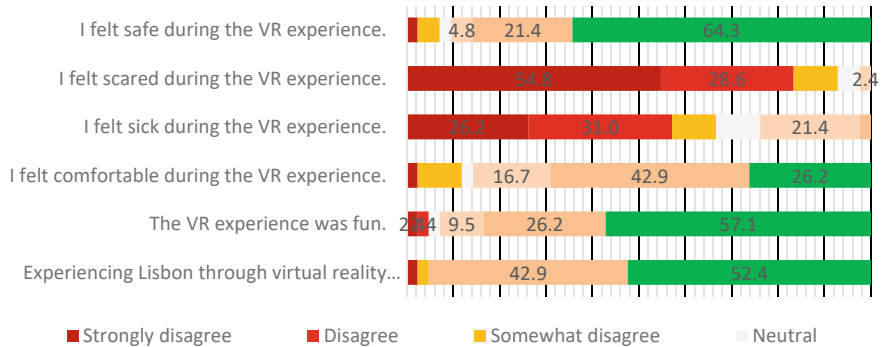


Fig. 3.1 Sensations during the virtual reality (VR) visit

a VR tour before visiting a destination or site, Additionally, 85.7% noted that the experience made them more knowledgeable about Lisbon.

The visitors were asked about how the tour affected their experience in learning and the results came off positive as 45.2% agreed, 33.3% strongly agreed, and 14.3% somewhat agreed that VR provided a good learning experience. 88.1% reported that the tour had stimulated their curiosity to learn new things.

Finally, 88% of the respondents agreed that the VR experience motivated them to learn more about the history and culture of Lisbon (Fig. 3.2).

Spearman’s rank correlation was computed to assess the relationship between each sensation and each item about VR content and education. Significant correlations are represented in Fig. 3.3. There was a positive significant correlation between the sensations of enjoyment, fun, comfort and safety and all items corresponding to the VR content and education ($0.434 \leq r \leq 0.891$; $p < 0.001$). There was a negative significant correlation between having felt scared during the experience and all items

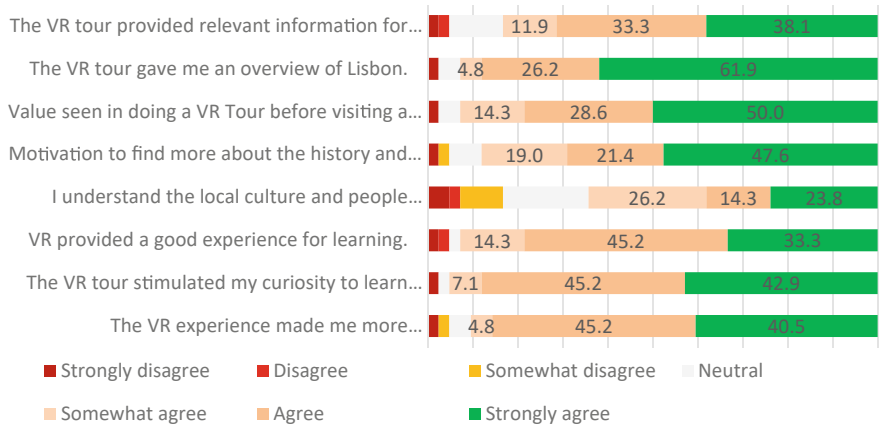


Fig. 3.2 Education, content, and satisfaction

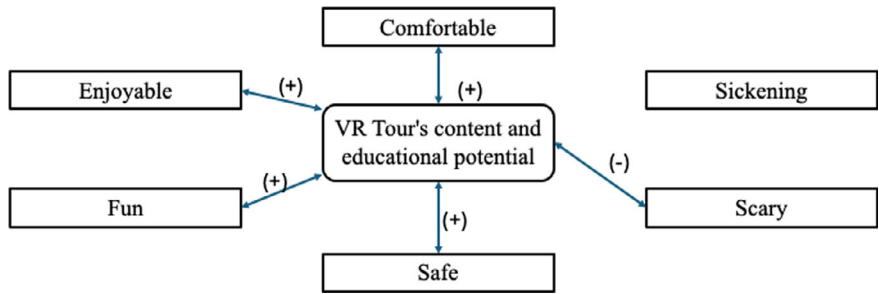


Fig. 3.3 Correlation sensations versus VR content and education

measuring VR content and education ($-0.492 \leq r \leq 0.336$; $p < 0.05$). There was no significant correlation between feeling sick during the experience and VR content and education items.

3.4.2 Changed Perceptions Based on the VR Experience

The respondents were requested to indicate which of the 12 cultural sites of Lisbon presented by the VR tour they had already visited and, for each site, if their intention to visit it had changed after the VR tour experience. Figure 3.4 represents the changes in visit intention per site, considering only the respondents who had not visited the site previously. The cultural sites that saw the highest increase in interest were those that had low pre-visit rates. The VR Tour had increased the desire to visit most sites as seen in Fig. 3.4. Sites that saw the highest increase in interest were “Quinta da Regaleira” (83.3%), “Palácio de Monserrate”(73.8%), and “Baía de Cascais” (71.4%). These same sites were among the least visited sites. “Praça do Comércio” (35.7%), “Sé de Lisboa” (42.9%), “Ponte 25 de Abril” and “Padrão dos Descobrimentos” (47.6%) had the lowest percentages in visit intention.

Since VR Tours Lisbon was located next to “Praça do Comércio”, in total 90.5% reported to have visited it crediting the highest rate of visitation. The next most visited site was “Castelo de São Jorge” where over half of the respondents (54.8%) had been, followed by “Sé de Lisboa” (42.9%). Sights located in the Belem neighbourhood hosting many popular and UNESCO protected sights had the following highest numbers of visitors including “Torre de Belém” (38.1%), “Padrão dos Descobrimentos” (35.7%), “Mosteiro dos Jerónimos” (35.7%) and “Ponte 25 de Abril” (31.0%) located on the way to Belém. “Cristo Rei” and “Baía de Cascais” had been visited by 11.9% and “Maat” and “Quinta da Regaleira” by 9.5% of the respondents. “Palácio de Monserrate” was the least visited destination with only 4.8% visit percentage.

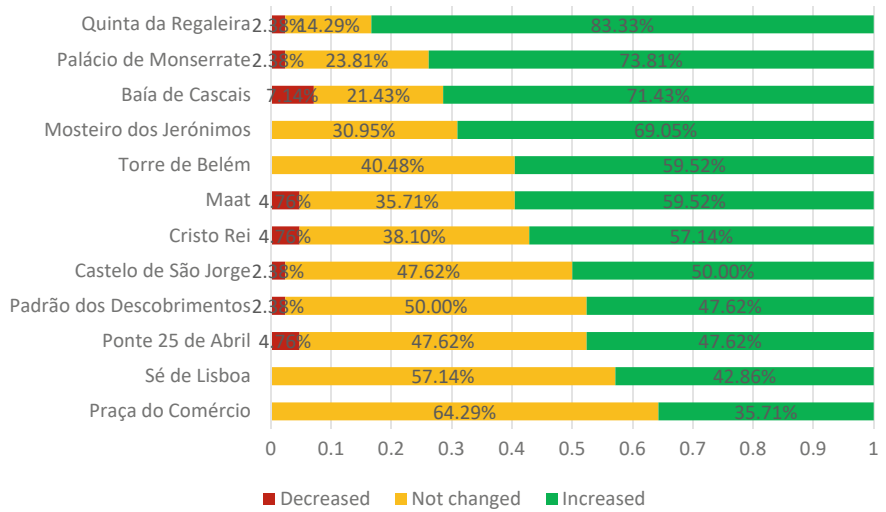


Fig. 3.4 Change in visit intention by non-visitors

3.4.3 Final Discussion

This study confirmed that VR experiences in cultural tourism evoke positive sensations and high satisfaction, aligning with Tussyadiah et al. [26] and Chung et al. [6].

There was a positive correlation between “positive” sensations and the perception about VR content and education, confirming the potential of VR in cultural tourism both for entertainment and education. The VR tour effectively provided an overview of Lisbon, with visitors recognizing the pre-visit benefits of VR tours, as supported by Fan et al. [8] and Su et al. [25]. Tourists appreciated the educational and entertaining aspects, helping them plan and learn about the destination, increasing their desire to visit cultural sites first experienced in VR.

The tour increased the desire to visit all tested cultural sites, particularly lesser-known ones further from the city center, which aligns with Marasco et al. [19]. VR Tours Lisbon was more attractive to first-time visitors, with 70% discovering the tour on-site, suggesting potential for attracting more visitors.

The study found the site mainly attracts working people, with fewer retired or studying visitors, possibly due to the lack of discounted rates for special groups. Further investigation is needed to understand if social and demographic factors influence the experience, as Richards [23] concluded.

A VR product showcasing cultural sights while being fun and educational is effective for providing an overview of a destination and aiding trip planning. Participants valued the entertainment and educational aspects but less so the understanding

of local culture. Improving content on local culture and people could enhance the educational value, supporting cultural awareness and sustainability [4] (UNESCO 2022).

3.5 Conclusion

Virtual reality products such as VR Tours Lisbon can have positive effects on the visitor experience in cultural tourism by providing fun but educating experiences about local cultural sights, making the customers more curious to learn about the local culture and history, introducing them to new sites and increasing visit intention, attracting a variety of visitors, offering new types of experiences, evoking positive sensations, and increasing their learning about a culture. The aim of this study was to understand how a virtual reality product in cultural tourism is experienced by the visitors, with respect to enjoyment, sensations, education/learning and how it is perceived to affect the rest of the trip to the destination.

The VR tour was considered fun and educational and perceived as causing an increase in the intention to visit some cultural sites in the destination. These results highlight the potential of technology in destination and cultural tourism marketing and management to improve visitor experience. However, there are limitations to the study that need to be taken into consideration. The sample size of the study was small. Even though the answers were collected during a longer period it is possible that it does not represent the target group fully or might be biased in other ways. The findings are not necessarily generalisable to other settings or groups and the study needs to be replicated with a larger sample size preferably in the same and other similar destinations. Finally, the reliance on a specific theoretical framework may limit the interpretation of the findings.

Previous studies focused on VR products that were showing one cultural location or museum. In this work we studied a different kind of product that provides a tour in a large area of a big city, showing different possibilities for the use of VR by destination management organizations. For instance, VR can be used to showcase multiple cultural sites within one city. This study supports that this kind of experience is also perceived positively by the participants, leading to changes in their visit intentions/plans, confirming the positive effect of virtual reality to visitor experience in cultural tourism in a new setting.

Understanding customer perceptions and the impact of VR, visitor experience and visit intent can help to understand how VR and other technologies can be used for cultural preservation and awareness.

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Chapter 4

A Spatial Decision Support System to Assess the Nature-Based Tourism Development Potential in the Centro Interior Region of Portugal



Luís Quinta-Nova 

Abstract With its potential to conserve environmental values, integrate local communities, boost sustainable development, generate jobs, improve infrastructure, and support the local economy, nature-based tourism is a significant source of income for local communities, stimulating entrepreneurship and economic diversification. Based on this principle, this study aims to assess the potential of existing natural resources in the Centro Interior region that can anchor the creation of tourism products that respect the fundamental criteria of nature-based tourism. Identifying areas suitable for developing tourism activities and their constraints was based on integrating a set of criteria using multicriteria spatial analysis tools in a GIS environment. The following descriptors were integrated: the bird and plant richness, target species of plants and animals, protected areas, landscape diversity, hemeroby level, geologic values, road network, accommodation offer, existing water bodies and watercourses, and pedestrian routes. The criteria were classified into three suitability levels by applying the Hierarchical Analytical Process. The results indicate the region's favorable conditions for engaging in nature-based activities. The study, with its comprehensive analysis, suggests that the information produced could prove valuable in formulating new policies to enhance the value of natural assets through tourism, empowering stakeholders and policymakers to make informed decisions for the Centro Interior region.

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4.1 Introduction

A wide range of definitions exist for nature-based tourism; however, the literature indicates a consensus regarding nature-based tourism as a form of tourism that uses natural resources in a wild or undeveloped form. Nature-based tourism is traveling to enjoy undeveloped natural areas or wildlife. In essence, nature-based tourism involves responsible travel to natural areas, preserving and protecting the environment, and enhancing the well-being of residents [1]. It emphasizes engaging in recreational, sporting, and educational activities that involve contact with nature, with the primary objective of valuing environmental resources to prevent depletion, pollution, soil erosion, and habitat loss.

As an alternative tourism practice, nature-based tourism encompasses exploring natural spaces while emphasizing the harmonious relationship between biophysical values, cultural heritage, and rural livelihood. Therefore, being considered a sustainable tourism practice [2]. Nature-based tourism also offers opportunities for tourists to satisfy their curiosity and learn about landscapes, flora, fauna, and local habitats while promoting closer engagement with the local community [3].

In the recent years, the demand for sustainable tourism has significantly increased, making it the fastest-growing segment within the global tourism industry. This growth, which is significant and promising, can be attributed to shifts in consumer preferences toward sustainable practices.

With approximately 24.7% of its national territory classified as protected areas, Portugal possesses both the quantity and quality of fundamental resources for nature tourism [4]. This area, covered with protected areas, contributes to the country's potential for nature-based tourism, aligning with the growing demand for nature-based tourism experiences.

Nature-based tourism is often credited with various positive impacts, including its contributions to local communities' economic and social development, environmental preservation through the rational use of natural resources, and promotion and preservation of cultural values in destinations [1, 5]. Another indirect impact of nature-based tourism worth noting is its role in raising awareness, providing education through tourism development, and fostering positive attitudes toward conservation [6].

Nature-based tourism implemented in predominantly rural areas with low economic and social density plays an important role in territorial development. In fact, promoting visits to places of high environmental value, promoting the economy and some employment, and promoting the appreciation of endogenous products contribute to increasing the territorial identity and self-esteem of its populations.

However, due to tourism's complexity as an activity, it is crucial to consider its potential risks, including the negative impacts on ecosystems, soil, vegetation, water, air quality, and wildlife [7, 8]. Several studies have suggested approaches to promote sustainable management models for tourism in protected natural areas. These models aim to minimize the adverse effects on the environment and resident populations

while ensuring the equitable distribution of benefits generated by tourism activities [7, 8].

To highlight the positive impacts and mitigate the negatives, this tourist activity must be well planned and regulated to synchronize the actions carried out by public and private entities.

Multicriteria analysis methodologies have also been widely used to identify and assess the suitability for land use using Geographic Information Systems (GIS) in conjunction with Multi-Criteria Decision Analysis (MCDA) methods. This tool enables the adjustment of land uses to facilitate nature-based tourism based on criteria that ensure its sustainable utilization. The analysis considers the interplay of various economic, social, environmental, and infrastructure variables [1, 9–13].

Only a few studies have focused on assessing Portugal's or Spain's suitability for nature-based and rural tourism. However, notable efforts have been made to address this research gap [14–16].

Evaluating the tourism potential within a specific area is a crucial initial step in devising effective strategies for regional development. Furthermore, this evaluation should mark the initial phase of any tourism planning procedure. This assessment is intricately linked to analyzing quantitative and qualitative factors that impact tourism activities.

The criteria most used in studies that applied spatial multicriteria methods to assess the nature-based tourism potential can be included in the following categories: landscape and vegetation value [15, 16]; high conservation value, and biodiversity associated with protected areas [15, 17, 18]; physical natural values [15, 17]; and supporting infrastructures and touristic equipment [15, 17, 19].

4.2 Materials and Methods

4.2.1 Study Area

For this study, the municipalities of Centro Interior were considered base units. Using the ArcGIS program, we identified the suitability of nature tourism activities by integrating biophysical factors and supporting the development of tourist activities based on nature-based tourism principles.

The Centro Interior is a region located in eastern Portugal that includes two main administrative divisions at a sub-regional level: Beira Baixa and Beiras/Serra da Estrela (Fig. 4.1). The region covers an area of 10,919 km² and has a population of 325,086 inhabitants. Its elevations range from 103 to 1993 m.

It corresponds to a territory with a considerable area of natural value, such as the Serra da Estrela, Tejo Internacional, Douro Internacional Nature Parks, and the Serra da Malcata Nature Reserve, created to protect flag species like the Spanish imperial eagle and the Iberian lynx. Those protected areas are also important due to their eco-botanical interest, for their geomorphology and geology give them unique

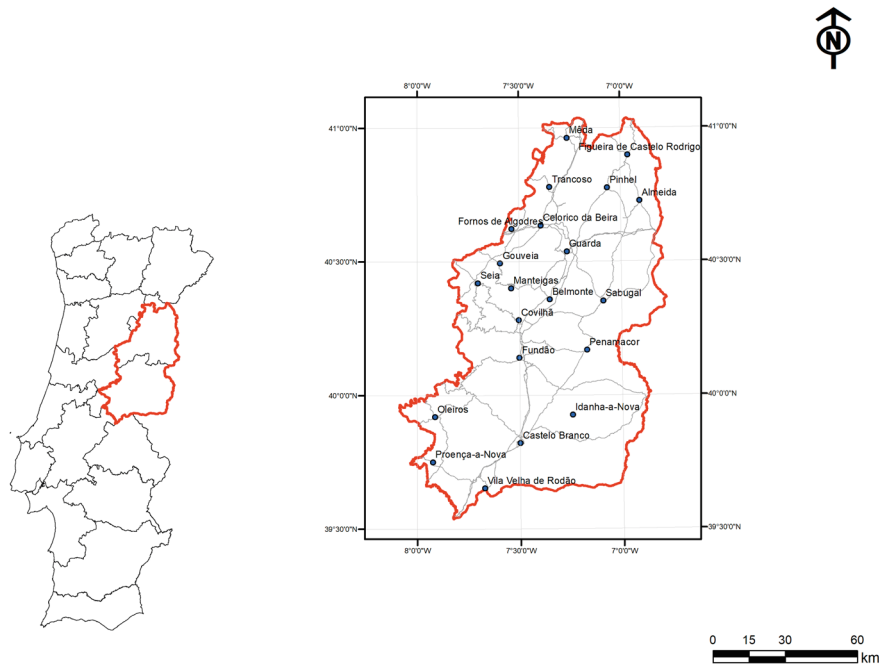


Fig. 4.1 Location of the study area

characteristics of their regional surroundings. This region also displays a variety of rock formations of high scenic value dating from different geological periods, such as the Portas de Ródão Natural Monument.

The region’s diversity of resources highlights its high potential for developing a wide range of tourist products, including nature and rural tourism.

The evolution of the number of visitors to protected areas in the region has shown an upward trend in recent years, with some variations due to specific events such as the covid-19 pandemic.

4.2.2 Criteria Selection

The criteria to quantify the territory’s suitability for nature-based tourism considered all the features and natural resources for activities based on nature, as well as infrastructure and equipment that allow better use of the territory (Table 4.1).

Table 4.1 Criteria for determining suitability for nature-based tourism activities

Criteria	Description
Nature conservation	Area classified as a protected area or as Natura 2000 site (km ²)
Target bird species	Number of target species of the EU Birds Directive (#)
Landscape diversity	Diversity measure calculated from the Shannon–Weaver diversity index to the LULC Map (#)
Landscape value	The area occupied by agroforestry and natural and semi-natural habitats (ha)
Hemeroby level	Degree of human influence on the landscape (#)
Geologic value	Number of sites with geological value (#)
Water bodies area	Area occupied by water surfaces (ha)
Accommodation offer	Number of beds in rural tourism accommodation (#)
Pathway network	Density of roads and rural pathways (km/km ²)
Pedestrian routes	Number of certified hiking trails (#)
Floristic richness	Number of identified plant species (#)
Protected plants	Number of identified IUCN-protected species (#)

4.2.3 Data Sources and Analysis

Different spatial and attribute datasets were created and assembled from the following sources:

- Land use–Land cover (LULC) map—COS 2018 (Direção-Geral do Território—DGT).
- Official Administrative Map of Portugal—CAOP 2022 (Direção-Geral do Território—DGT).
- OpenStreetMap—Road network (The OpenStreetMap Foundation).
- Protected Areas and Natura 2000 Network maps (Instituto de Conservação da Natureza e Florestas—ICNF).
- Flora-On: Flora de Portugal Interativa (Sociedade Portuguesa de Botânica—SPB).
- Bird species distribution in Portugal—Natura 2000 Network (Instituto de Conservação da Natureza e Florestas—ICNF).
- Sites with geological value (PROGEO).
- Number of beds in rural tourism residences (Turismo de Portugal).
- Certified pedestrian routes (Federação de Campismo e Montanhismo de Portugal—FCMP).

Datasets were used to generate 12 criteria with different measurement scales. The landscape-derived criteria maps were generated from the land LULC map.

The relative diversity of landscape classes within sample areas was determined using Shannon’s Diversity Index—SDI [20]. This relative patch density measure considers both the number of classes and the abundance of each class.

The landscape value is associated with sustainable agrosystems and natural ecosystems that are highly ecologically attractive to ecotourists. For that purpose, the areas with agrosilvopastoral uses or other traditional uses in extensive mode, as well as natural and semi-natural habitats, were considered of high value for developing nature-based tourism activities.

4.2.4 *Analytic Hierarchy Process*

First, a spatial database was created with all vector and raster layers and data models corresponding to the selected criteria. Subsequently, the factors had to be standardized. Therefore, all vector themes were converted to raster format, and the ArcGIS reclassification tool was used to assign suitability values for each criterion.

The pairwise comparison matrix was created to determine the relative importance of each criterion. After generating all pairwise comparison matrices, the vector of weights is calculated according to Saaty's eigenvector method. This is followed by two steps to calculate weights: First, normalizing the pairwise comparison matrix. Then, the weight for each criterion is computed.

The weighting linear combination approach produces a composite suitability map in the suitability assessment stage. All spatial layers were converted into raster models. The reclassification tool was employed to classify all layers to a standardized measurement suitability scale between 1 and 3. The weighted overlay technique combined all weighted spatial layers and produced the nature-based tourism suitability map using the GIS-based AHP extension developed by Marinoni [21].

4.3 Results and Discussion

Table 4.2 presents the criteria values for each municipality, while Fig. 4.2 displays the cartographic representation of these criteria. This visualization highlights some differences in the characterization of the municipalities within the Centro Interior region, generally indicating higher values for those located along the borders, where a higher surface of land is classified as a protected area.

Table 4.3 gives the pairwise comparison matrices' results, indicating each criterion's scores and weights. In the analysis performed, the value of the consistency ratio (RC) obtained was 0.02 ($RC < 0.1$).

Figure 4.3a presents a mapping of suitability for Nature-based tourism activities, highlighting areas with greater suitability that correspond to protected areas and Nature 2000 sites.

After reclassifying the layers obtained into suitability categories (Fig. 4.3b), it was found that the municipalities with the highest suitability for developing Nature-based tourism activities are Idanha-a-Nova, Castelo Branco, and Covilhã. These municipalities are characterized by high-value landscapes, a dominance of agroforestry

Table 4.2 Criteria values for nature-based tourism suitability evaluation

Municipality	Conserv. nature (km ²)	Target birds	Land. div.	Land. val (km ²)	Hem. Lev.	Geo. sites
Almeida	107.69	10	2.30	174.67	3.42	1
Belmonte	0.00	4	2.50	24.21	3.97	0
Castelo Branco	174.43	14	2.56	294.79	3.84	1
Celorico da Beira	95.273	8	2.16	49.93	3.66	0
Almeida	143.63	8	2.20	54.82	3.61	3
Figueira de Castelo Rodrigo	266.85	13	2.42	94.58	3.70	1
Fornos de Algodres	0.00	2	2.12	19.47	3.57	0
Fundão	80.42	8	2.43	80.19	3.94	0
Gouveia	154.35	6	2.12	37.07	3.56	0
Guarda	148.44	6	2.37	204.96	3.42	0
Idanha-a-Nova	151.48	15	2.49	452.55	3.78	6
Mêda	6.30	7	2.52	54.43	3.63	1
Manteigas	121.98	6	1.83	11.04	3.08	4
Oleiros	0.00	5	1.26	450.75	3.48	0
Penamacor	191.83	11	2.46	117.77	3.66	0
Pinhel	53.59	8	2.41	100.78	3.58	0
Proença-a-Nova	0.00	9	1.70	24.02	3.75	0
Sabugal	497.34	6	2.35	257.38	3.27	0
Seia	244.24	6	2.06	36.00	3.40	5
Trancoso	0.00	4	2.29	59.77	3.61	0
Vila Velha de Ródão	15.82	11	2.22	35.61	3.97	4
Municipality	Water bod. (km ²)	Acc. offer	P. Net (km/ km ²)	Target plants	Flor. rich.	Ped. routes
Almeida	0.78	134	219.05	6	507	2
Belmonte	0.37	218	93.90	0	115	1
Castelo Branco	14.46	518	398.98	7	718	9
Celorico da Beira	0.24	385	182.59	9	480	4
Almeida	2.69	1829	271.63	14	458	11
Figueira de Castelo Rodrigo	2.89	166	155.33	5	532	3
Fornos de Algodres	0.09	456	105.34	2	55	2
Fundão	3.31	908	289.91	6	474	9
Gouveia	0.48	481	138.32	10	229	3

(continued)

Table 4.2 (continued)

Municipality	Water bod. (km ²)	Acc. offer	P. Net (km/ km ²)	Target plants	Flor. rich.	Ped. routes
Guarda	0.95	521	407.06	7	579	4
Idanha-a-Nova	13.28	793	329.60	7	670	9
Mêda	0.40	228	158.17	3	396	2
Manteigas	0.10	493	50.32	16	511	16
Oleiros	6.25	131	187.99	3	520	4
Penamacor	3.45	246	119.93	3	385	1
Pinhel	2.40	119	216.11	4	437	0
Proença-a-Nova	4.16	121	203.92	2	475	7
Sabugal	7.70	313	302.28	6	744	8
Seia	1.59	882	236.72	19	754	14
Trancoso	0.61	190	207.68	5	337	1
Vila Velha de Ródão	7.95	94	167.74	6	512	5

land uses, remarkable levels of biodiversity, and the presence of sites of geo-touristic value.

The results allow us to verify that the areas with higher potential for nature-based tourism are related to spaces with high natural value and protected natural areas. This reveals that measures for the protection and conservation of nature have a beneficial effect on sustainable tourism. Nature-based tourism is also an activity that could positively impact income generation for their protection.

It should also be noted that the highest tourist value is strongly associated with agrosilvopastoral systems, characterized by their multifunctionality and where sustainable tourist activities can be developed beyond their use for recreation and leisure.

This study quantitatively evaluated the potential of nature-based tourism based on a set of criteria, some of which had already been used in previous studies. However, it was innovative in showing the potential of ecotourism, including other criteria related to landscape quality.

4.4 Conclusions

The AHP has demonstrated its effectiveness in evaluating the suitability for nature-based tourism development in the Centro Interior region by enabling the integration of multiple essential criteria to determine potential. It serves as a valuable interactive

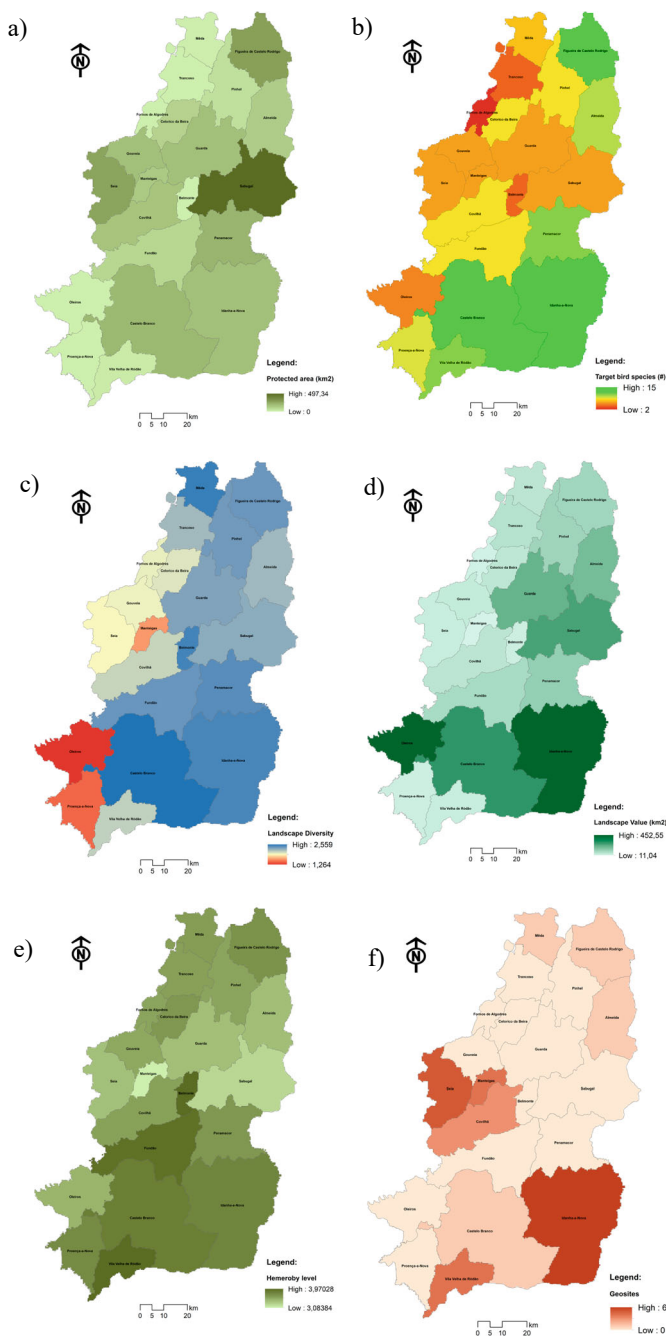


Fig. 4.2 Cartography of criteria: **a** nature conservation value (km²); **b** bird richness; **c** landscape diversity; **d** landscape value (km²); **e** hemeroby level; **f** geologic value (number of geological sites); **g** water bodies (km²); **h** accommodation offer (number of beds); **i** pathway network (km/km²); **j** protected plant species; **k** floristic richness; **l** pedestrian routes

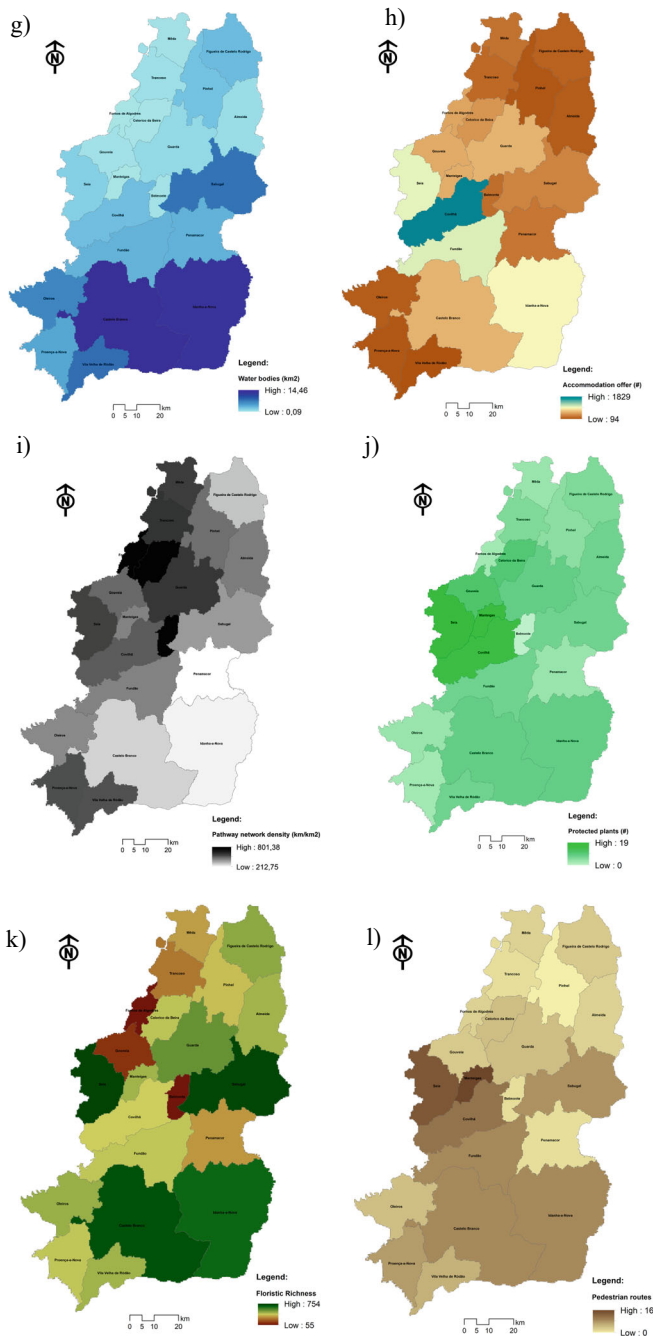


Fig. 4.2 (continued)

Table 4.3 Criteria weight and rating for nature-based tourism suitability analysis

Criteria	Weight w_{ij}	Classes	Score
Nature conservation value	0.164	$\geq 100 \text{ km}^2$	3
		$< 100 \text{ km}^2$	2
		0	1
Target birds (Directive Birds–EU)	0.164	≥ 11 species	3
		8–10 species	2
		< 7 species	1
Target plant species (Directive Habitats–EU)	0.164	≥ 10	3
		5–9	2
		< 5	1
Landscape value	0.164	$\geq 250 \text{ km}^2$	3
		100–249 km^2	2
		$< 100 \text{ km}^2$	1
Floristic richness	0.072	≥ 600	3
		400–599	2
		< 400	1
Accommodation offer	0.072	≥ 500 beds	3
		250–499 beds	2
		94–249 beds	1
Geologic value	0.072	3 or more sites	3
		1 or 2 sites	2
		No sites	1
Landscape diversity	0.032	≥ 2.25	3
		1.75–2.24	2
		< 1.75	1
Water bodies area	0.032	$\geq 7.5 \text{ km}^2$	3
		2.5–7.4 km^2	2
		$< 2.5 \text{ km}^2$	1
Pathway network	0.016	$\geq 500 \text{ m/km}^2$	3
		300–499 m/km^2	2
		$< 300 \text{ m/km}^2$	1
Pedestrian routes	0.016	9–16	3
		4–8	2
		< 3	1
Hemeroby level	0.016	3.08–3.49	3
		3.50–3.97	2

tool for territorial analysis. Additionally, AHP is well-suited for ensuring sustainable activities, allowing for qualitatively examining resources' nature, quantity, and significance.

Therefore, this study can help managers and decision-makers develop regional strategies for selecting nature-based tourism sites based on their potential and formulate local-level management programs for nature-based tourism development.

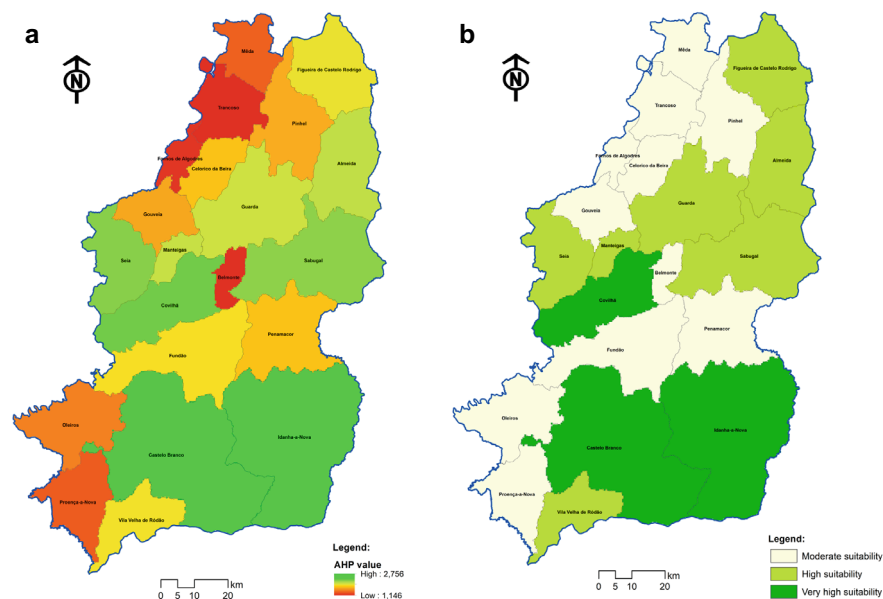


Fig. 4.3 Suitability for nature-based tourism activities: **a** AHP scores; **b** classification of municipalities 'suitability for nature-based tourism

Given the complexity of tourism, it is crucial to account for its potential negative impacts. Thus, promoting tourism must adhere to sustainability principles, emphasizing the importance of effectively controlling and managing tourist numbers and their distribution. This need has been identified as a critical factor in addressing unsustainable practices.

Promoting tourism in areas with potential should align with the intended use while ensuring sustainable resource use, supporting local economies, involving local communities in planning and management, and educating both consumers and entrepreneurs on environmental preservation.

Regarding study limitations, there is a lack of data about nature-based tourism accommodation facilities outside protected areas. This data gap occurs because nature-based tourism in Portugal is more regulated and monitored in those areas. For this reason, we chose to consider the rural tourism classification, which is broader territorially.

Considering the need for more quantitative analyses of nature-based tourism development, further comparative research is suggested, including comparing different tourism typologies to evaluate their potential.

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Chapter 5

Gazelle Companies in the Ecuadorian Tourism Sector in the Period 2015–2022



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Abstract This article seeks to determine the relevant factors to determine whether a tourism company is high growth or not. To do this, financial ratios of the companies in this sector in the period 2015–2022, and variables specific to the company and the region where they are located, were used. A gazelle company was defined as one that initially had less than 10 employees and grew by seven employees in a period of three years. Through logit and probit regressions due to the binary dependent variable, it was determined that ROA, short- and long-term debt, region, liquidity, average collection period, size and tangibility influence the possibility of tourism companies being gazelle companies. The presence of high growth tourism companies is significant for the sector and identifying these is an important fact because it allows

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