Eduard Cristobal-Fransi / Natalia Daries / Jose Ramon-Cardona / Rosa Florensa-Guiu

Nature-Based Tourism 2.0: An Analysis of the Online Presence of National Parks

Abstract

This research examines the digital presence and e-commerce maturity of national parks in seven European countries (Spain, France, Italy, Germany, the United Kingdom, Portugal and Andorra). Using a combined Web Content Analysis (WCA) and Extended Model of Internet Commerce Adoption (eMICA) model, the websites of 87 nature parks were evaluated. The results show that, although all of the surveyed parks have an online presence, their focus is mainly informational. They also exhibit low interactivity, except for those in the United Kingdom, which have the best digital presence. E-commerce maturity is limited, with only a small proportion of sites allowing full online transactions. Four profiles of parks were identified according to their digital presence: online sales-oriented; online presence-oriented; low presence and basic presence. We conclude that national parks need to improve their interactivity and e-commerce functionalities in order to increase visitor engagement and the effectiveness of their digital marketing strategies.

Keywords: national parks, nature-based tourism, e-commerce, web content analysis, eMICA, digital marketing

1. Introduction

Protected areas in national parks are vital for both territorial conservation and sustainable development (Phung et al. 2023), and they also contribute to social welfare through the ecosystem services they provide (León et al., 2015). Tourism development models that target protected areas emphasize the implementation of management strategies based on sustainability, considering economic and social changes and environmental aspects (Font et al., 2016). This sustainability is the element that determines the success and survival of tourist destinations (Marinello et al., 2023). Both the enormous potential of protected areas and the need for good awareness-raising, communication and sensitization tools are undeniable (Singh et al., 2016).

Marketing strategies in the tourism industry include web presence and the use of social media, and they are used mainly to communicate with and provide information to clients (Chu et al., 2020; Khoo et al., 2025). The use of information and communication technologies (ICTs) improves companies' access to foreign markets (Lee & Pang, 2022) and is key to reaching their target audience (Deb et al., 2024). As e-commerce reduces transaction costs and removes geographical barriers, it facilitates connections between users around the world (Cristobal-Fransi et al., 2015; Powers, 2021).

The use of ICTs, specifically the internet, is important for all types of organizations, especially for national parks, which are major tourism resources (Gao et al., 2024). According to Sun et al. (2017), websites are

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currently the most important platforms for promoting an organisation's services and driving profit generation by attracting clients. Therefore, proper design, management, maintenance, positioning and evaluation become imperative in ensuring that the web interface is as attractive as possible and provides the necessary information to clients (Rezaei et al., 2016).

This is the context for the present research, which analyses the web presence and level of maturity regarding the use of e-commerce in national parks in seven European countries (Spain, France, Italy, Germany, the United Kingdom, Portugal and Andorra).

We are aware that the criteria for designating protected areas can vary considerably between countries (Stolton et al., 2013). These differences may influence the development and content of the websites analysed, given that conservation, tourism promotion and public participation priorities vary according to the governance model adopted (Heslinga & Hartman, 2021).

There are two main reasons for conducting such an analysis. The first reason is the important role that the tourism industry plays in the world economy. According to data from UN Tourism (formerly the World Tourism Organization, UNWTO), almost 1.4 billion international tourist arrivals were recorded worldwide in 2024. The contribution of the tourism industry to global GDP was approximately US$10.9 trillion. Meanwhile, tourism's contribution to employment amounted to around 357 million jobs (UN Tourism, 2025). The second reason for this analysis is the importance of nature-based tourism. According to the most recent estimates, nature-based tourism accounts for more than 50% of total global tourism. This includes activities and excursions related to visiting and enjoying natural spaces, biodiversity, protected areas, and wildlife (UN Tourism, 2025). According to the Adventure Travel Trade Association, the sector is worth more than US$ 260 billion annually, and 65% of nature tourists spend more in destinations than in other types of tourism, such as all-inclusive beach holidays (Adventure Travel Trade Association [ATTA], 2023).

Both of the above reasons justify conducting research on the internet presence of national parks through their websites, which are viewed here as promotional and sales tools. This study has several objectives. First, to propose a comprehensive model for evaluating the presence of national parks on the internet, since "there is no universally accepted technique or standard for evaluating websites" (Law et al., 2010). The proposed model is based on the methodology of Web Content Analysis and eMICA (Extended Model of Internet Commerce Adoption). Second, to analyse the websites of national parks in seven European countries and highlight the main differences between them. Third, to provide managers of national parks with recommendations and suggestions for improving their websites. The results obtained will be useful to park managers when it comes to considering and formulating strategies related to the digital marketing of their natural spaces.

2. Nature-based tourism

Research on nature-based tourism combines the experiencing of natural environments with conservation, sustainable development and social welfare objectives. Studies focusing on tourism in protected areas have shown that natural and national parks are pillars of nature-based tourism. These areas generate economic benefits for local communities while promoting biodiversity conservation (Navrátil et al., 2016; Thapa et al., 2022).

Other scholars have focused their research on sustainable tourism and ecotourism, exploring how this type of tourism can promote conservation and improve local socioeconomic conditions (Esparza-Huamanchumo et al., 2024). As for studies on the incorporation of digital technologies, these analyse how mobile applications and data analysis have transformed ecotourism management, improved the visitor experience and facilitated environmental education (Silva et al., 2023). Natural parks have a positive psychological impact, given that tourism in natural environments has proven effects on reducing stress, anxiety and depression, and promoting mental well-being (Avecillas-Torres et al., 2025).

The planning of tourism areas and destinations constitutes another fundamental line of research. Several studies have developed specific approaches for the analysis of models of tourism implementation in the territory, including land use and the location of tourism activities (An et al., 2019). This perspective integrates the analysis of the environmental impact of tourism and a cost assessment of interventions, as well as the development of indicator systems for the management of nature-based tourism destinations (Canteiro et al., 2018).

Finally, there is also research that focuses on digital tourism and online marketing. The literature highlights an effective digital presence as being essential in promoting natural destinations. Thus, websites are seen as key tools for providing information, facilitating electronic transactions and encouraging interaction with visitors (Khan et al., 2022; Mitova et al., 2021). The present article is framed within the above context.

3. Internet presence of national parks

The internet has become a vital channel for destination marketing, especially for protected natural areas where accessibility and visitor expectations require precise and updated information (Gretzel et al., 2015; Deb et al., 2024). Official websites serve multiple purposes, acting as sources of information, platforms for booking services, and tools for fostering interaction between park managers and visitors. Moreover, the use of Web 2.0 technologies, including dynamic content, multimedia elements, and user-generated contributions, has been identified as a key factor in enhancing the attractiveness and usability of these sites (Daries et al., 2021; Ahmed & Shaker, 2021).

In the context of national parks, research has emphasised the need to move beyond static informational portals toward more interactive and transactional web environments. Features such as multilingual support, secure payment systems, virtual tours, and real-time feedback mechanisms contribute significantly to the overall digital maturity of park websites (Chiou et al., 2010; Kabassi & Martinis, 2020). Additionally, the integration of big data analytics and artificial intelligence tools offers opportunities to better understand visitor behaviour and personalise online interactions (Zhang et al., 2021; Yung et al., 2021).

Despite these advancements, many national parks still lag in adopting comprehensive digital strategies. Studies comparing the digital presence of European national parks have found significant disparities in the implementation of e-commerce functionalities, user engagement tools, and compliance with web-design best practices (Cristobal-Fransi et al., 2017; Daries et al., 2018). This gap underscores the importance of continued research into how digital transformation can be leveraged to support both conservation goals and visitor satisfaction in protected natural areas.

The online presence of national parks refers to the digital representation of these sites on the internet, including official websites, social media profiles, mobile apps and online booking platforms (Khan et al., 2022). This not only provides information regarding the characteristics of parks but also facilitates the planning of visits and public participation in conservation and environmental education activities (Hausmann et al., 2018).

Website design significantly affects the management of national parks by facilitating communication and interaction among park managers, visitors and other stakeholders (Andreopoulou et al., 2015). Online presence also plays a crucial role in enhancing the visitor experience and tourism promotion of national parks. Research by Mangold et al. (2024) suggests that visitors actively use online resources such as websites and mobile apps to obtain information about hiking trails, recreational activities and services available in parks. Nature-based tourism and online presence have converged in the digital age to transform the way that nature destinations, especially national parks, are promoted, managed and experienced (Mitova et al., 2021).

As a response to the demand for authentic and sustainable experiences, nature-based tourism plays a crucial role in biodiversity conservation and the economic development of local communities (Chung et al., 2018; Xu et al., 2023). In parallel, internet presence has become an essential tool for effectively promoting and

managing nature-based tourism, allowing destinations to reach a global audience and provide key information to travellers (Gretzel et al., 2015).

Various studies have focused on different aspects of nature-based tourism website content. For example, researchers have analysed the motivations of stakeholders in the management of natural forest resources in the UK (Raum et al., 2021), assessed the experiences of park visitors (Lin et al., 2022) and studied the criteria for the success of national park websites (Tsai et al., 2010). Other studies have focused on park visitor-generated content through online reviews (Kredens & Vogt, 2023; Ruhanen, 2019) and even through photographs (Bhatt & Pickering, 2022).

4. Methodology

Although various studies have reported that there is no universally accepted method for evaluating websites (Bauer & Scharl, 2000; Gaur & Kumar, 2018; Pai et al., 2014; Ramon-Cardona et al., 2022), the development of a method to evaluate a website's optimal characteristics is a topic of great interest to both practitioners and researchers alike. The most common techniques have been based mostly on surveys, content analysis and experimental evaluation (Chiou et al., 2010). According to the work of Law et al. (2010), five methodological approaches are most used in the evaluation of websites: 1) the accounting method; 2) the automatic method; 3) the numerical computation method; 4) the user opinion method; and 5) the combined method. We decided to employ the accounting method in the present study.

Website analyses generally use a set of indicators divided into four main groups: technical, commercial, content-related and design-related (Benbunan-Fich, 2001; Chiou et al., 2010; Cristobal-Fransi et al., 2026; Daries et al., 2021). However, a market-oriented approach was chosen for the present research, as this method involves websites being evaluated from the perspective of considering users as potential clients. Our evaluation therefore focuses more on aspects related to the promotion of activities, online transactions and the characteristics of the products and services offered (Álvarez Díaz, 2014), in line with the aims of this study, namely, to analyse the online presence of a sample of European national parks via two models: Web Content Analysis (WCA) and the extended Model of internet Commerce Adoption (eMICA).

The two aforementioned models were adapted to national parks based on a literature review. In addition to analysing the sections and items of the WCA, a descending cluster analysis through the Howard–Harris algorithm (Santesmases Mestre, 2009) was carried out with the data referring to the number of items applied in each section of the model. This was complemented with several tables to determine the different profiles within the national parks analysed. In the case of eMICA, we determined that a website must possess a minimum number of attributes to move from one level to another and consolidate its position (Álvarez Díaz, 2014; Cristobal-Fransi et al., 2023; Daries et al., 2018). Thus, a website can be assigned to a particular level provided that it contains all the minimum variables corresponding to the previous level, taking into account that the scale is dichotomous for all items. Most of the analyses were performed on the results of the WCA, and the use of the eMICA was complementary to this approach because of the interrelationships between the two models (Ramon-Cardona et al., 2022).

To analyse whether the differences between countries in the dichotomous variables were statistically significant in both the WCA and the eMICA, Cramér's V (Cramér, 1946), also known as Cramér's phi and consisting of a χ^2 corrected for sample size (Sheskin, 2011), was used, as it is the most appropriate tool for making comparisons between more than two groups (Cristobal-Fransi, Montegut-Salla, et al., 2020). The distribution is therefore known and derived from the χ^2 distribution (Liebetrau, 1983). As a general rule, a Cramér's V equal to or lower than 0.2 implies a weak association (these Cramér's Vs were removed from the tables), whereas a Cramér's V higher than 0.6 is considered very strong (this result is highlighted in bold in the tables). In the case of continuous numerical variables (e.g., average number of items completed in each

section), Snedecor's F statistic was used, as it is the most appropriate instrument for making comparisons between mean values (Santesmases Mestre, 2009).

Fieldwork was conducted during the first quarter of 2024. The sample used consisted of websites corresponding to all official national parks in Spain, France, Italy, Germany, the UK, Portugal and Andorra; however, in some analyses, Portugal (one park) and Andorra (three parks) were excluded because of their small sample sizes, as they would distort the results. Data were extracted from the lists of national parks on the websites of the respective governments, for example, Ministerio para la Transición Ecológica y el Demográfico del Gobierno de España (https://www.miteco.gob.es/); VisitBritain, the official tourism website of Great Britain (https://www.visitbritain.com/); Office Français de la Biodiversité, ministère de l'Ecologie et de l'Agriculture (https://www.parcsnationaux.fr/fr); the German National Tourist Board (https://www.germany.travel/en/home.html); and Ministero dell'Ambiente e della Sicurezza Energetica (https://www.mase.gov.it/pagina/elenco-ufficiale-delle-aree-naturali-protette-0). We chose to use official government lists as the primary source for identifying the national parks studied, as these lists provide a common and recognized basis for initial selection, although we acknowledge that this does not eliminate possible biases arising from national differences. Official lists may reflect geographical or administrative biases, which may indirectly affect website quality and characteristics (Joppa & Pfaff, 2009).

These seven countries were selected for the following factors: a) Their representative ecological diversity; b) Their importance to European tourism; c) Their different approaches to national park management; and d) The availability of reliable data on their digital presence.

4.1. Web content analysis

The literature was reviewed to define a Web Content Analysis (WCA) model for national parks (Álvarez Díaz, 2014; Camprubí & Coromina, 2016; Kabassi & Martinis, 2020; Lee & Morrison, 2010; Tsai et al., 2010). The developed model considers the elements a national park should have on its website to offer its users the information they need and allow them to carry out e-commerce activities, as well as to make contact through a secure platform that guarantees compliance with the quality standards of a website (Table 1).

Table 1
Web Content Analysis Model

Dimensions	Definition	Authors
Information	Evaluates the information available on national park websites and how easy it is for users to find it.	Álvarez Díaz (2014), Chiou et al., (2010), Cristobal-Fransi et al., (2026), Daries et al., (2018), Escobar-Rodríguez and Carvajal-Trujillo (2013), Lee and Morrison (2010), Liao et al., (2006), Ramon-Cardona et al., (2022), Robbins and Stylianou (2003)
Communication	Measures the website's ability to interact with clients, whether through communication mechanisms, Web 2.0 resources or availability of information in different languages.	Álvarez Díaz (2014), Chiou et al. (2010), Cristobal-Fransi et al., (2026), Daries et al., (2018), Escobar-Rodríguez and Carvajal-Trujillo (2013), Khare et al., 2020; Lee and Morrison (2010), Ramon-Cardona et al., (2022), Walcott (2007)
E-commerce	Assesses the website's competence to conduct secure business activities.	Álvarez Díaz (2014), Chiou et al. (2010), Cristobal-Fransi et al., (2026), Daries et al., (2018), Escobar-Rodríguez and Carvajal-Trujillo (2013), Lee and Morrison (2010), Ramon-Cardona et al., (2022), Ting et al. (2013)
Additional functions	Measures the website's ability to provide security through data protection elements and certifications and the use of the mobile version of the website or apps.	Álvarez Díaz (2014), Cristobal-Fransi et al., (2026), Daries et al., (2018), Ramon-Cardona et al., (2022), Ting et al. (2013), Walcott (2007)

Source: Authors' own work.

The developed WCA model is structured into four blocks of analysis: Information, Communication, e-Commerce and Additional Functions (Table 1). A series of elements or items that are considered useful or attractive to a website user were identified (Álvarez Díaz, 2014; Lee & Morrison, 2010; Ramon-Cardona et al., 2022). These items were selected from the literature review, and new elements were added to adapt them to the case of national park websites.

The web content analysis involved eight steps (Neuendorf, 2018). First, to formulate the research questions, we considered that those websites that had adopted e-commerce to a more advanced degree would make greater use of different web-based possibilities. Second, we identified variables related to the information, communication, e-commerce and additional functions afforded by the websites. Third, we defined categories and units of measurement for analysing all of the websites, which involved identifying the unit of analysis (i.e. national parks in these seven European Countries) and defining the categories - that is, the different items that determine the web presence of such national parks. Fourth, to create the coding scheme, we produced a code book containing the categories and how they were measured. All items were included in the four mentioned dimensions (i.e. information, communication, e-commerce and additional functions). Fifth, for the purposes of sampling, we selected websites belonging to official lists in these seven European countries. Sixth, the code book was tested by two trained coders, who evaluated the websites. Seventh, coding for the sample was performed independently of the code book. Eighth and last, the data were analysed by evaluating the presence or absence of certain characteristics and aggregating the data in tables and graphs.

4.2. The eMICA model

Websites evolve in a dynamic way. The Model of Internet Commerce Adoption (MICA), developed by Burgess and Cooper (1998), posits that when implementing websites, companies often start on the internet through a single webpage. This presence then becomes increasingly complex as new processes are incorporated. MICA consists of three stages (web-based promotion, information transmission and the business transaction process), which indicate where a business is in e-commerce development and reflect the evolution of the company from a static internet presence to a dynamic website through increasing levels of interactivity (Burgess, 2016).

MICA has been widely applied in different areas of the tourism sector, including destinations (Burgess et al., 2011; Doolin et al., 2002), gastronomy (Daries et al., 2018), snow tourism (Cristobal-Fransi et al., 2017), golf courses (Daries et al., 2021), travel agencies (Ahmed & Shaker, 2021; Lin et al., 2009), accommodations (Ting et al., 2013), health tourism (Cristobal-Fransi et al., 2026; Joukes & Gerry, 2010) and even nature-based tourism (Sangpikul, 2010). These studies have helped improve the initial model through the development of an extended Internet Commerce Adoption Model (eMICA), adding several layers of sophistication and adapting the MICA model to the particularities of the Internet (Table 2). This model, which is based on a phased assessment, allows websites to be analysed on a scale ranging from a basic level to a more advanced level of processes, which constitute the top level for a website.

The first stage comprises two levels (a basic level and a more advanced level of information), referred to as "promotion", which represents the initial stage of website development. During this phase, the website provides essential details about the company and the products or services it offers. The second phase, called "provision" or information transmission, marks a stage of consolidation. This phase is divided into three levels - low, medium or high interactivity - focusing on structuring interactivity to enable e-commerce functionality. Finally, the third phase signifies the web's operational maturity and is labelled "processing" or the commercial transaction stage (e-commerce), as it facilitates online transactions (Table 2).

Table 2
Extended e-commerce adoption model

eMICA		Examples of functionality
Phase 1. Promotion	Level 1 Basic information	Name, history, origins, physical address, contact details and activities carried out.
	Level 2 Rich information	Email and/or contact form, information about products, events, trade fairs, website languages, certifications, news and online promotions.
Phase 2. Provision	Level 1 Low interactivity	Rates, links to other websites, links to social networks, links to external video platforms, promotions, online surveys.
	Level 2 Medium interactivity	FAQs, site maps, webcam, brochure download, search bar, email news feed, online shop as a showcase, chat bot.
	Level 3 High interactivity	Exclusive web area for client consultation, chat, discussion forums, multimedia, possibility of collecting online comments, voting on quality, satisfaction with products offered, virtual tour, mobile web version or own app.
Phase 3. Process		Complete purchasing process, secure transactions, digital signature and encryption, interaction with the server, database consultation, order status and tracking. Existence of a private registration area.

Source: Based on Burgess et al. (2011).

5. Results

In this work, the WCA and eMICA were applied to the websites of 87 national parks in seven European countries (Spain, France, Italy, Germany, the United Kingdom, Portugal and Andorra) (Annex I), with the aim of assessing the online presence of these entities. In some country comparisons, only the five largest countries were considered to avoid bias due to the small sample sizes of Portugal and Andorra.

5.1. Web content analysis (WCA)

A first reading of the WCA results (Table 3) shows that national parks in Spain have the fewest items (44.7%), except in terms of certifications (WCA-FA2), whereas those in the United Kingdom have the highest level of compliance (54.6%), standing out in various sections of Information (WCA-I2 and WCA-I2) and Communication (WCA-C1, WCA-C2 and WCA-C4). The national parks of France (49.7%), Germany (48.9%) and Italy (49.7%) are at or very close to the sample average. The national parks in Portugal and Andorra presented an above-average online presence (56.9% and 53.6%, respectively). These differences may be explained by differences in the criteria used by different countries to designate protected areas, as official lists may reflect geographical or administrative biases, such as a preference for remote or less accessible areas, for example (Heslinga & Hartman, 2021).

Table 3
Web content analysis (average items)

Variable	Items	Total (n = 87)	Spain (n = 16)	UK (n = 15)	France (n = 11)	Portugal (n = 1)	Germany (n = 16)	Italy (n = 25)	Andorra (n = 3)	Snedecor's F
WCA-I1	9	6.506	6.688	6.800	6.182	7.000	6.563	6.240	7.000	1.927Φ
WCA-I2	6	3.609	3.438	4.200	3.727	3.000	3.563	3.320	4.000	
WCA-I3	5	3.012	3.125	2.933	3.636	3.000	2.875	2.800	3.000	
WCA-I4	4	1.874	0.313	2.200	2.091	4.000	2.875	1.840	2.000	15.288***
WCA-C1	6	1.437	0.875	2.267	1.000	2.000	1.438	1.520	1.000	5.511***
WCA-C2	8	2.805	2.563	3.200	2.091	4.000	2.625	2.960	4.000	2.280*
WCA-C3	1	0.920	0.813	1.000	1.000	1.000	1.000	0.840	1.000	
WCA-C4	1	0.586	0.375	0.933	0.000	1.000	0.625	0.680	1.000	6.949***
WCA-EC	3	0.931	0.500	1.067	1.636	0.000	0.000	1.480	0.667	3.637**
WCA-FA1	3	2.954	3.000	3.000	3.000	3.000	3.000	2.840	3.000	
WCA-FA2	4	0.655	1.063	0.267	1.000	1.000	0.313	0.680	0.667	6.309***
WCA-FA3	1	0.069	0.063	0.000	0.000	0.000	0.063	0.160	0.000	
Total	**51**	**25.356**	**22.813**	**27.867**	**25.364**	**29.000**	**24.938**	**25.360**	**27.333**	

P value: Φ p < 0.1; * p < 0.05; ** p < 0.01; *** p < 0.001
Source: Authors' own work.

In a more detailed analysis (item by item), although all 87 national parks were analysed (the aggregated data by country are shown in Annex II), the country comparison was limited to the 83 national parks of Spain, France, Italy, Germany and the United Kingdom (Table 4) to avoid bias due to the small sample sizes of Portugal and Andorra. Table 4 shows only percentages and Cramer's V (calculated on absolute values) for simplicity of reference.

Table 4
Web content analysis (item analysis)

	Spain	UK	France	Germany	Italy	Cramér's V
INFORMATION VARIABLE						
1. Basic information about the national park						
I.1.1- Description of the national park	100.00%	100.00%	100.00%	100.00%	100.00%	
I.1.2- Information on the park's location	93.75%	100.00%	18.18%	68.75%	64.00%	0.557***
I.1.3- Contact: telephone number, fax or e-mail address	68.75%	86.67%	100.00%	93.75%	100.00%	0.394***
I.1.4- Images of the park	100.00%	100.00%	100.00%	100.00%	100.00%	
I.1.5- Information on the activities being carried out	81.25%	100.00%	100.00%	93.75%	64.00%	0.408***
I.1.6- Communication of news/events	100.00%	100.00%	100.00%	100.00%	96.00%	
I.1.7- Links to websites of public tourism organizations	100.00%	93.33%	100.00%	100.00%	100.00%	0.235*
I.1.8- Opening hours and timetable	18.75%	0.00%	0.00%	0.00%	0.00%	0.396***
I.1.9- Entrance fees	6.25%	0.00%	0.00%	0.00%	0.00%	0.226*
2. Facilities of the national park						
I.2.1- Map of the park	81.25%	93.33%	100.00%	93.75%	96.00%	0.231*
I.2.2- Information on service and leisure areas	81.25%	100.00%	100.00%	93.75%	48.00%	0.537***
I.2.3- Online booking tool for visiting appointments	43.75%	20.00%	0.00%	18.75%	32.00%	0.306**
I.2.4- Virtual tour	6.25%	6.67%	9.09%	0.00%	4.00%	
I.2.5- Information on the park's routes and resources	81.25%	100.00%	100.00%	93.75%	88.00%	0.248*
I.2.6- Information on how to get around the park	50.00%	100.00%	63.64%	56.25%	64.00%	0.353***
3. Surrounding area of the national park (zone of influence)						
I.3.1- Tourist information about the area	93.75%	93.33%	100.00%	81.25%	96.00%	0.231*
I.3.2- Information on access to the park	56.25%	86.67%	81.82%	81.25%	76.00%	0.240*
I.3.3- Information on atmospheric conditions	50.00%	13.33%	0.00%	50.00%	36.00%	0.387***
I.3.4- Information on other national parks	18.75%	0.00%	100.00%	0.00%	8.00%	0.818***
I.3.5- Links to other related businesses	93.75%	100.00%	81.82%	75.00%	64.00%	0.350***
4. Promotion						
I.4.1- Promotions: special events, advertising campaigns, etc.	18.75%	93.33%	100.00%	93.75%	88.00%	0.712***
I.4.2- Incentives: loyalty cards, "friends of" associations, etc.	0.00%	26.67%	0.00%	50.00%	8.00%	0.496***
I.4.3- Resources: webinars, podcasts, magazines, newsletters, etc.	12.50%	66.67%	9.09%	68.75%	60.00%	0.504***
I.4.4- Press area	0.00%	33.33%	100.00%	75.00%	28.00%	0.662***
COMMUNICATION VARIABLE						
1. Interaction with clients						
C.1.1- Email and telephone number of the park on the homepage	68.75%	86.67%	100.00%	93.75%	100.00%	0.394***
C.1.2- Chat bot	0.00%	6.67%	0.00%	0.00%	0.00%	0.235*
C.1.3- WhatsApp/Instant messaging systems	0.00%	0.00%	0.00%	0.00%	4.00%	
C.1.4- Restricted user access area	12.50%	33.33%	0.00%	31.25%	12.00%	0.303**
C.1.5- Possibility to receive complaints, comments or suggestions	6.25%	53.33%	0.00%	6.25%	16.00%	0.479***
C.1.6- FAQs section	0.00%	46.67%	0.00%	12.50%	20.00%	0.430***
2. Web resources						
C.2.1- Blog	18.75%	46.67%	0.00%	0.00%	8.00%	0.469***
C.2.2- Video on the homepage	12.50%	13.33%	0.00%	6.25%	12.00%	
C.2.3- Google My Business profile	6.25%	0.00%	0.00%	0.00%	0.00%	0.226*
C.2.4- Links to social networks	87.50%	100.00%	100.00%	75.00%	92.00%	0.297**
C.2.5- Links to external video platforms	62.50%	60.00%	100.00%	62.50%	68.00%	0.271*
C.2.6- Newsletter subscription	18.75%	66.67%	9.09%	68.75%	44.00%	0.449***
C.2.7- Possibility to share content with other users	50.00%	33.33%	0.00%	50.00%	72.00%	0.456***
C.2.8- SEM Campaigns	0.00%	0.00%	0.00%	0.00%	0.00%	

Table 4 ***(continued)***

3. Mobile adaptation						
C.3.1- Responsive design	81.25%	100.00%	100.00%	100.00%	84.00%	0.309**
4. Language skills						
C.4.1- Content available in more than one non co-official language	37.50%	93.33%	0.00%	62.50%	68.00%	0.565***
E-COMMERCE VARIABLE						
E-commerce						
EC.1.1- Online payment	31.25%	46.67%	54.55%	0.00%	52.00%	0.411***
EC.1.2- Secure online transactions	12.50%	40.00%	54.55%	0.00%	52.00%	0.463***
EC.1.3- Interaction with the server: database query	6.25%	20.00%	54.55%	0.00%	44.00%	0.470***
ADDITIONAL FUNCTIONS VARIABLE						
Information security						
FA.1.1- Legal notice	100.00%	100.00%	100.00%	100.00%	96.00%	
FA.1.2- Privacy policy - GDPR	100.00%	100.00%	100.00%	100.00%	92.00%	0.239*
FA.1.3- Secure Website: HTTPS	100.00%	100.00%	100.00%	100.00%	96.00%	
2. Certifications						
FA.2.1- Universal Accessibility Certification ISO 17001	0.00%	0.00%	0.00%	0.00%	0.00%	
FA.2.2- Quality management ISO 9001 or Q de Calidad	100.00%	26.67%	0.00%	0.00%	4.00%	0.867***
FA.2.3- Environmental Management ISO 14001 or EMAS	0.00%	0.00%	0.00%	0.00%	16.00%	0.343**
FA.2.4- Other certifications and/or accreditations	6.25%	0.00%	100.00%	31.25%	48.00%	0.661***
3. Mobile App						
FA.3.1- Own app	6.25%	0.00%	0.00%	6.25%	16.00%	0.244*

Note. Very high Cramer's V values. P values are in bold: * $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$
Source: Authors' own work.

The information variable analyses the mechanisms established by management to inform users about the main characteristics, facilities, environment and product promotions of national parks (Table 4). The dissemination of information through the website differs depending on the variable analysed. In general, elements such as a description of the park (I.1.1), images of the park (I.1.4), communication of news and events (I.1.6), information on routes and resources (I.2.5) and tourist information (I.3.1) were typically found to be present on park websites. On the negative side, there was little information on opening hours (I.1.8), entrance fees (I.1.9) or virtual tours (I.2.4). Nor was there much information available on other parks in the area (I.3.4) or incentives for visitors (I.4.2).

Furthermore, depending on the country, a different situation was observed for most of the items referring to the information variable, with differences in the information on other national parks (I.3.4), information on promotions (I.4.1) and the existence of a press area (I.4.4). In general, national parks should strengthen their efforts with respect to the information variable and go beyond basic information about the park, as the elements above are decisive when users are deciding whether to visit and in their online purchasing behaviour (Kabassi et al., 2019).

The communication variable is made up of those tools that increase interaction with the customer through the website and other digital marketing elements. It also includes the ability to offer content in several languages and the responsiveness of the content on different devices (Table 4). The values for items related to communication were lower than those found for the information variable. In general, the national park websites did not use all possible avenues to establish a full dialogue with their users, although they did have significant results in some aspects. The most common form of interaction with clients was through the traditional channels of telephone and e-mail (C.1.1).

For the remaining customer interaction items, the level of presence was low or very low. With respect to the use of web resources, the results revealed that national parks make extensive use of social networks (C.2.4) and links to video platforms (C.2.5). The low presence on Google My Business (C.2.3) and the

lack of SEM campaigns (C.2.8) also stood out. These results are in line with works focusing on the use of new tools in tourism marketing that facilitate user interaction, such as virtual reality (Yung et al., 2021), gamification (Malik et al., 2026) or artificial intelligence (Bulchand-Gidumal et al., 2024). There were also differences by country in this variable, with the UK and Germany having the highest number of items and France having the lowest. Information and communication dimensions are important for park management. User engagement and digital behaviour are determining factors in evaluating the effectiveness of websites. Digital interactions (comments, reviews, user-generated content, etc.) influence tourism decision-making (Mathew & Soliman, 2021). Social networks transform tourism behaviour: many studies have highlighted how Instagram, Facebook or TikTok affect travel decisions (Wang & Yan, 2022). Other elements present in these dimensions, such as short videos, livestreaming or augmented reality, can also be considered to encourage greater online participation through dynamic content (Soliman et al., 2017; Wang & Jiao, 2024).

Content in more than one language was not found to be widespread. There is certainly room for improvement here, as only 56.6% of the websites analysed offered information in at least two different languages, with Germany (62.5%), Italy (68.0%) and the United Kingdom (93.3%) the countries with the highest percentages (Table 4). The importance of this item is even greater if we consider that the International Ecotourism Society (TIES) reports ecotourism and other forms of nature-based tourism, accounting for 20% of global tourism and 7% of total international travel expenditure (The International Ecotourism Society [TIES], 2015). Therefore, the use of more than one language on websites represents a clear competitive advantage, and not investing in this field is a mistake currently being made by 43.3% of the national parks analysed.

Analysis of the e-commerce variable revealed similar weights for the presence of online payments (EC.1.1), secure online transactions (EC.1.2) and interaction with the server (EC.1.3), but with large differences depending on the country, ranging from total absence in Germany to 54.6% in France (Table 4). Hence, there is still much room for improvement. These results are in line with those obtained in previous studies conducted in Bulgaria (Mitova et al., 2021), Greece (Kabassi & Marinis, 2020) and Thailand (Sangpikul, 2010).

A national park can benefit from e-commerce in several ways, which can significantly improve its management and tourist attractiveness. E-commerce allows visitors to purchase tickets and tour packages directly from the park's website. This facilitates visit planning, reduces lines at physical ticket offices and increases advance sales (Law et al., 2010). Natural parks can promote and sell local products and handicrafts through their website, which benefits local communities and offers visitors a way to take home a souvenir of the place (Bricker et al., 2022). E-commerce also makes it possible to offer accommodation in or near the park, as well as reservations for guided activities or outdoor sports. This makes it easier for visitors to plan their entire stay (Díaz-Pérez et al., 2021). Finally, e-commerce allows data on visitor behaviour to be collected, which can help personalise the experience and improve park management (Zhang et al., 2021).

The last of the variables analysed included aspects that may be relevant for a website to have an optimal online presence. This element is divided into three sections: information security, certifications and mobile application availability (Table 4). Although information security elements were very much present on the websites of the national parks analysed (FA.1.1, FA.1.2 and FA.1.3), the section on certifications showed very uneven behaviour. There was little presence of recognised certifications (FA.2.1, FA.2.2 and FA.2.3), and only the category of other certifications (FA. 2.4) stood out, with 34.9%. This last item encompassed a wide variety of elements, such as awards of different kinds or simple commendations. At the country level, the national parks in Spain and Italy presented the highest values (Table 4).

Finally, regarding the availability of a mobile app (FA. 3.1), very few of the parks analysed were found to provide this resource, and the few that did are located mainly in Italy. This is a worrying finding, as mobile devices have become indispensable access points for e-commerce (Crawford et al., 2017; Melo et al., 2014; Nel & Boshoff, 2020).

Our analysis of the four variables of the WCA (information, communication, e-commerce and additional functions) reveals that although national parks seem to be prepared to carry out online transactions, a significant part of their online presence is focused on a purely informative function. These results coincide with research applied in other sectors and indicate that the analysed websites are, in many cases, static showcases of products and services where the full potential for e-commerce is not exploited (Álvarez Díaz, 2014; Cristobal-Fransi, Daries, et al., 2020.

5.1.1. Cluster analysis of national parks on the basis of WCA results

In the cluster analysis, the solution that best met the following double criterion was retained: maximizing the variance explained by the segmentation generated and avoiding the appearance of excessively small groups (less than 5%). Based on both criteria, four groups were retained: two with above-average online presence (Groups 1 and 2) and two with below-average online presence (Groups 3 and 4). We performed an ANOVA corresponding to the level of compliance with the items of each WCA section (Table 5) and a cross-tabulation with the countries (Table 6) to facilitate cluster characterisation.

Table 5
Average items of the generated clusters

Variable	Total (n = 87)	Group 1 (n = 25)	Group 2 (n = 23)	Group 3 (n = 25)	Group 4 (n = 14)	Snedecor's F
WCA-I1	6.506	6.240	6.913	6.640	6.071	6.472***
WCA-I2	3.609	3.800	3.739	4.160	2.071	20.480***
WCA-I3	3.012	3.480	2.826	3.320	1.929	11.979***
WCA-I4	1.874	2.000	3.087	1.120	1.000	28.978***
WCA-C1	1.437	1.600	1.826	1.120	1.071	4.301**
WCA-C2	2.805	3.000	3.652	2.040	2.429	12.807***
WCA-C3	0.920	0.880	1.000	0.880	0.929	
WCA-C4	0.586	0.680	0.739	0.560	0.214	4.079**
WCA-EC	0.931	2.840	0.174	0.240	0.000	206.182***
WCA-FA1	2.954	3.000	3.000	3.000	2.714	2.995*
WCA-FA2	0.655	0.800	0.348	0.840	0.571	4.588**
WCA-FA3	0.069	0.040	0.130	0.040	0.071	
Total	**25.356**	**28.360**	**27.435**	**23.960**	**19.071**	

P value: * p < 0.05; ** p < 0.01; *** p < 0.001
Source: Authors' own work.

Table 6
Cross-tabulation of clusters and countries

Country	Total		Group 1		Group 2		Group 3		Group 4	
Spain	16	18.39%	1	4.00%			10	40.00%	5	35.71%
United Kingdom	15	17.24%	5	20.00%	7	30.43%	3	12.00%		
France	11	12.64%	6	24.00%			4	16.00%	1	7.14%
Portugal	1	1.15%			1	4.35%				
Germany	16	18.39%			10	43.48%	4	16.00%	2	14.29%
Italy	25	28.74%	12	48.00%	4	17.39%	3	12.00%	6	42.86%
Andorra	3	3.45%	1	4.00%	1	4.35%	1	4.00%		
Total	**87**		**25**		**23**		**25**		**14**	

Note. Cramér's V = 0.440 (p = 0.000).
Source: Authors' own work.

The specific profile of the retained clusters is as follows:

- Group 1 (28.7%). This group had the highest level of online presence, with an average of 55.6% of the items analysed. It had levels equal to or higher than the sample average, except in the basic information section (WCA-I1), where it complied with fewer items than Groups 2 and 3 did. On the other hand, it stands out for providing information on the park's environment (WCA. I3) and, especially, in e-commerce (WCA. CE), where it had an average of 2.84 out of 3.00 (Table 5). This last aspect, e-commerce, was the differentiating element of this group, outperforming the following group by 2.6 items. This group is mostly composed of parks from Italy (48.0%), France (24.0%) and the UK (20.0%). In the cases of France and Italy, half of the parks in both countries belong to this group. In contrast, the group contains only one park in Spain and none in Germany (Table 6). The parks that make up this first group can be called PARKS ORIENTED TO ONLINE SALES.
- Group 2 (26.4%). This group had the second highest online presence, after Group 1, and on average, it accounted for 53.8% of the items listed. This group had the highest levels of basic information (WCA-I1), promotion (WCA-I4) and communication (WCA-C1, WCA-C2, WCA-C3 and WCA-C4). In contrast, it had modest levels with respect to information about the park environment (WCA-I3), e-commerce (WCA-CE) and certificates (WCA-FA2) (Table 5). In terms of country, most of the parks are in Germany (43.5%) or the United Kingdom (30.4%). Specifically, 62.5% of the parks in Germany and 46.7% of the parks in the UK are in this group (Table 6). Group 2 displayed a relatively good online presence but has neglected online retailing. The parks in this second group can be called PARKS ORIENTED TO ONLINE PRESENCE.
- Group 3 (28.7%). This group had a lower online presence than the sample average, with an average of 47.0% of the items. The group had good levels of basic information (WCA-I1), information about its own facilities (WCA-I2) and information about the park environment (WCA-I3), as well as additional functions (WCA-FA1 and WCA-FA2). However, it was below average in all other aspects, especially promotion (WCA-I4), communication (WCA-C1, WCA-C2, WCA-C2 and WCA-C4) and e-commerce (WCA-CE) (Table 5). This group is composed mainly of parks in Spain (40.0%), France (16.0%), Germany (16.0%), Italy (12.0%) and the United Kingdom (12.0%) (Table 6). The parks that make up this third group can be called PARKS WITH LOW ONLINE PRESENCE.
- Group 4 (16.1%). This group had the most basic online presence, accounting on average for only 37.4% of the items listed. The parks in this group had fewer items than those in the other groups across all WCA sections, except for WCA-C2, WCA-C3, WCA-FA2 and WCA-FA3, and were within the sample average for the mobile environment (WCA-C3 and WCA-FA3) (Table 5). Most of the parks are in Spain (35.7%) or Italy (42.9%), with none in the UK or Andorra (Table 6). The parks that make up this group can be called PARKS WITH BASIC ONLINE PRESENCE.

Finally, 100% of the national parks in Spain are in Group 3 (66.6%) and Group 4 (33.3%), whereas 80% of the national parks in the UK are in Group 1 (33.3%) and Group 2 (46.7%). These results (Table 6) elaborate on the results already indicated in Table 3.

5.2. eMICA results

The eMICA provides an indicator of the maturity of these national parks' websites in terms of their commercial orientation on the internet. A close analysis (Table 7) clearly reveals that there is still room for improvement in this type of organisation's level of e-commerce adoption.

Table 7
Extended model of internet commerce adoption (item analysis)

	Spain	UK	France	Germany	Italy	Cramér's V
Phase 1: Promotion (Information)						
Level 1: Basic Information						
Description of the park	100.00%	100.00%	100.00%	100.00%	100.00%	
Opening times and calendar	18.75%	0.00%	0.00%	0.00%	0.00%	0.396***
Contact: phone number or e-mail	68.75%	86.67%	100.00%	93.75%	100.00%	0.394***
Images of the park	100.00%	100.00%	100.00%	100.00%	100.00%	
Park map	87.50%	93.33%	100.00%	93.75%	96.00%	
Information on the location of the park (Google Maps)	87.50%	100.00%	18.18%	68.75%	64.00%	0.529***
Level 2: Adequate Information						
Information on services offered by the park	81.25%	100.00%	100.00%	75.00%	96.00%	0.339**
Fees for different services offered	43.75%	40.00%	27.27%	31.25%	80.00%	0.416***
Promotions and incentives	0.00%	33.33%	0.00%	50.00%	8.00%	0.504***
Tourist information about the area	93.75%	100.00%	100.00%	43.75%	96.00%	**0.623****
Website available in more than one language	37.50%	93.33%	0.00%	62.50%	68.00%	0.565***
Quality certifications or recognitions	100.00%	40.00%	81.82%	81.25%	68.00%	0.435***
Communication of news and events	93.75%	100.00%	100.00%	100.00%	96.00%	
Phase 2: Provision (Dynamic information)						
Level 1: Low level of interactivity						
Park entrance fees	12.50%	0.00%	0.00%	0.00%	0.00%	0.322**
Links to websites of public tourism organizations	100.00%	93.33%	100.00%	100.00%	100.00%	0.235*
Links to social networks (Facebook, X, Instagram, LinkedIn, etc.)	87.50%	100.00%	100.00%	75.00%	92.00%	0.297**
Video on the homepage	12.50%	13.33%	0.00%	6.25%	12.00%	
Google My Business Profile	6.25%	0.00%	0.00%	0.00%	0.00%	0.226*
Legal notice and/or Privacy policy	100.00%	100.00%	100.00%	100.00%	96.00%	
Level 2: Medium level of interactivity						
Chat bot	0.00%	6.67%	0.00%	0.00%	0.00%	0.235*
Possibility to share content with other users	50.00%	33.33%	0.00%	50.00%	72.00%	0.456***
Newsletter subscription	18.75%	66.67%	9.09%	68.75%	44.00%	0.449***
Section for the submission of complaints, comments and suggestions	6.25%	53.33%	0.00%	6.25%	16.00%	0.479***
Links to external video platforms	62.50%	60.00%	100.00%	62.50%	68.00%	0.271*
Online visit booking tool	43.75%	20.00%	0.00%	25.00%	32.00%	0.293**
Level 3: High level of interactivity						
Log in restricted to registered users	12.50%	33.33%	0.00%	0.00%	12.00%	0.349***
Search function	75.00%	100.00%	100.00%	100.00%	96.00%	0.397***
Virtual tour	6.25%	6.67%	9.09%	0.00%	4.00%	
Responsive design	81.25%	100.00%	100.00%	100.00%	84.00%	0.309**
Own app	6.25%	0.00%	0.00%	6.25%	16.00%	0.244*
Multimedia applications	0.00%	53.33%	90.91%	81.25%	88.00%	**0.702****
Phase 3: Process (Functional maturity)						
Online payment	31.25%	46.67%	54.55%	0.00%	52.00%	0.411***
Secure online transactions	12.50%	40.00%	54.55%	0.00%	52.00%	0.463***
Interaction with the server: database query	6.25%	20.00%	54.55%	0.00%	44.00%	0.470***
Secure Website: HTTPS	100.00%	100.00%	100.00%	100.00%	96.00%	

Note. Very high Cramer's V values. P values are in bold: * $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$
Source: Authors' own work.

According to the results, these national parks' websites presented a low level of functional maturity, as only 6 (9.6%) of the websites had passed Phase 3, and the majority were at the first level of Phase 2 (Table 8). Notably, only 21 (26.3%) of the websites analysed reached a medium level of interactivity, and this number is largely represented by the national parks that have the option of sharing information or subscription

options but with a lower representation of interactive web tools (Table 7), as seen in the WCA (Table 4). At the national level, national parks in Italy are best prepared for e-commerce (Table 8), which coincides with the results of the cluster analysis.

Table 8
Evaluation with the extended model of internet commerce adoption (eMICA)

		Criterion	Spain	UK	France	Germany	Italy	Cramér's V
Phase 1	Level 1	Minimum 3 of the 6	16	15	11	16	25	
	Level 2	Minimum 3 of the 7	15	15	11	14	24	0.205$^{\Phi}$
Phase 2	Level 1	Minimum 3 of the 6	13	14	11	10	23	0.356***
	Level 2	Minimum 3 of the 6	3	7	0	2	9	0.358***
	Level 3	Minimum 3 of the 6	1	5	0	2	8	0.336**
Phase 3		Minimum 2 of the 4	1	2	0	0	5	0.278*

P value: $^{\Phi}$ p < 0.1; * p < 0.05; ** p < 0.01; *** p < 0.001
Source: Authors' own work.

If we focus on companies or organisations in the field of nature-based tourism in general and national parks in particular, which can also become important tourism resources for the areas where they are located, we can state that they have not always taken advantage of all the possibilities derived from ICTs (Gössling, 2021; Koliouska & Andreopoulou, 2013). In this case, the results indicate that national park websites do not exploit all possibilities for maintaining an optimal relationship with their clients but rather use their websites mainly as communication tools (Sinclair et al., 2020).

6. Discussion

The results obtained in this study show that the national parks surveyed recognise the importance of their web presence, as they all have access to the internet and a website. However, a simple online presence is not enough. It is essential that these organisations go beyond a conventional presence and instead promote online interaction and collaboration so that users can generate and share content and knowledge. All of this can be achieved using digital marketing strategies.

These strategies should drive user-generated content (UGC) by encouraging visitors to create and share their own experiences in the park (photos, videos, stories, reviews). The national park can develop its own platforms (web, app) that allow users to share routes, tips, wildlife sightings, local gastronomic recommendations, or sustainable experiences.

Likewise, social networks can be used to organise digital events, such as direct meetings with experts, talks on sustainability, or nature photography workshops, where users can actively participate. They can also consider collaborating with influencers, environmental communicators, and content creators specialised in nature-based tourism and sustainability, so that they can generate content about the park and its values.

These national parks' websites have a medium level of interactivity. As a tourist resource, they therefore need to improve their presence on the internet. Only one-tenth of the websites analysed allow the complete purchasing process to take place over the internet. Achieving this improvement is likely to depend on the role given to their online presence, understanding the benefits derived from the adoption of new technologies, the level of innovation within the organisation and the development of interactive web elements, such as the possibility for consumers to provide comments and ratings, the implementation of blogs and the development of a presence on social networks.

The results of the Web Content Analysis suggest that Spain is the country with the worst online presence, whereas the UK has the best. Although Portugal and Andorra also have a good level of online presence, it

should be remembered that they only have a very small number of parks. The cluster analysis confirmed the differences by country detected in the WCA and suggested four different situations: good online presence with strong development of online commerce (Italy stands out); good online presence without development of online commerce (the UK and Germany stand out); low online presence (Spain stands out); and basic online presence (Spain and Italy stand out). Finally, the eMICA analysis indicated a low level of functional maturity, with very few national parks having reached Phase 3, most of those that have been in Italy. This result largely coincides with Group 1 of the cluster analysis. The UK's leadership in digital maturity suggests that an integrated strategy combining interactive tools, e-commerce and multichannel promotion could be key to maximising the tourism impact of national parks.

As a theoretical contribution and from a methodological point of view, this study develops and adapts a combined model of web content analysis and the extended model of e-commerce adoption (eMICA), specifically for the nature-based tourism sector and national parks. This integrated approach allows for a structured and comparative assessment of digital presence, interactivity levels, and e-commerce development across protected natural areas, overcoming the limitations of previous sector-specific or fragmented analyses. By combining both models, we provide a more holistic framework that captures the progressive evolution of online maturity in national parks' websites. These results are consistent with research conducted by Daries et al. (2018), Cristobal-Fransi, Montegut-Salla, et al. (2020) and Ramon-Cardona et al. (2022).

The study empirically validates the usefulness of the eMICA model in the context of European national parks, showing that the evolution of digital presence follows a stepwise process from a purely informative function, through interactivity, to full transactionality.

The results of this research allow us to identify different typologies of parks according to their digital profile. Through cluster analysis, the work identifies four theoretical profiles of national parks according to their digital presence and maturity: online sales-oriented, online presence-oriented, low presence, and basic presence. This typology provides a useful conceptual framework for future research and for the strategic management of nature destinations, allowing us to compare, classify, and guide digital improvement policies.

It demonstrates the relevance of digitisation to the sustainability and competitiveness of nature-based tourism. Digitalisation is not only a promotional tool but also a strategic resource for the sustainability, conservation, and competitiveness of national parks. It theoretically reinforces the idea that an advanced digital presence can contribute to both sustainable management (by facilitating visit planning and environmental education) and local economic development (by enhancing e-commerce of associated products and services). These results confirm the research conducted by Mangold et al. (2024) or Mitova et al. (2021).

The study expands the theoretical discussion concerning the role of ICT and digital marketing in nature-based tourism, highlighting the importance of interactivity, multi-channelling, and the integration of tools such as social networks, mobile applications, and online booking systems (Khan et al., 2022; Mitova et al., 2021).

With respect to implications for management, it is recommended that park managers prioritise the development of interactive functionalities such as online booking systems and multilingual content, which can significantly improve the user experience and increase conversion rates. To this end, when designing a website, a set of fundamental elements should be included around the four proposed dimensions: information, communication, e-commerce and additional functions. National park managers should encourage greater online participation through dynamic content (short videos, livestreaming, augmented reality, etc.), take advantage of social networks to generate authentic interaction with potential visitors (content, competitions, interactive surveys, etc.) and integrate advanced analytical systems to continuously monitor the real effectiveness of the website beyond static content.

These recommendations drawn from the research findings can be summarized as follows: (a) develop and maintain attractive, up-to-date, and well-structured websites that provide clear and relevant information about the organization's services, products or activities; (b) ensure that the website is accessible and easy to navigate for all users, applying usability and user-centred design principles; (c) incorporate tools that enable direct interaction with users, such as contact forms, online chats, satisfaction surveys and discussion forums; d) use social networks and other digital platforms to maintain fluid and continuous communication with clients, users, and other stakeholders; e) facilitate the reservation and purchase of services or products through the web, integrating secure payment gateways and simple purchasing processes; f) offer customization options and packages tailored to the needs of users, which can increase satisfaction and loyalty. Other recommendations include improving website design for mobile compatibility, expanding multilingual offerings, implementing secure online booking systems, and encouraging UGC through interactive tools.

A suitably developed presence on the internet will make it possible to obtain better results, both in terms of visits and activity bookings.

7. Conclusions

The future of tourism, especially that of nature-based tourism, needs to be approached from a perspective that emphasises innovation and the effective application of information and communication technologies (ICTs), including taking full advantage of the internet. In this context, the medium should be conceived not only as a communication tool but also as a key marketing resource. Improving digital presence and e-commerce in national parks not only benefits visitors but can also contribute to the economic and environmental sustainability of the territory in a context of growing demand for authentic and sustainable experiences.

The study demonstrates that most European national parks exhibit low to medium digital maturity, using their websites primarily as informational showcases and underutilising commercial and interactive possibilities. The combined application of WCA and eMICA provides an effective framework for describing and improving digital presence in the field of nature tourism. The main contribution lies in the identification of differentiated profiles—online sales-oriented, online presence-oriented, low presence, and basic presence—which enables future comparative research and the optimisation of digital marketing strategies and management.

For limitations of the study, the main disadvantage of the eMICA model is that it only measures the presence or absence of a service or application and not the ease of finding a resource or the time it takes to access it, i.e., it does not evaluate the usability of the website. Moreover, because the eMICA model responds to a process of gradual adoption of the internet, it is possible to find cases in which the sites bring together functionalities and incorporate elements from different stages and levels of the model, which can make it more complex to classify the website analysed. If we consider the WCA, we must highlight the fact that this research has analysed the internet presence of national parks through items obtained from the literature review, not taking into account other factors such as the size of the park, among others. The services offered on the websites of national parks are constantly changing, which means that the results obtained may vary depending on the time at which the study is carried out. Finally, we would like to note that we have only studied the national parks of seven countries located in specific geographical areas of Western and Southern Europe. Other lists can also be used as a primary source for identifying national parks, as the official lists used may suffer from biases due to national differences. Differences in park designation and management may have affected the results obtained. For example, some countries might place a greater emphasis on sustainable tourism or community involvement, which could translate into more interactive websites or more functionalities related to e-commerce (Zhang et al., 2023). These differences could partially explain the variations detected between countries, beyond the general level of digital or economic development.

Future studies should extend the number of national parks to other geographical areas to obtain more data and compare results. International comparative research could incorporate additional variables such as the level of technological development in each country, public policies on tourism digitisation, and specific regulatory frameworks for protected areas. This would allow a better understanding of how national contexts influence the digital strategies of national parks and their effectiveness in attracting visitors and generating revenue. This research should incorporate a more in-depth comparative analysis of how specific national governance and management models influence the use and development of tourism websites. This research could explore how management autonomy, budgets allocated to digital marketing, and organisational structures impact the ability of parks to develop robust digital ecosystems.

In addition, personal interviews could be carried out with the managers of these facilities, first, to determine which elements to evaluate on the website and study the causes for the lack of information and interaction in their online presence and, second, to identify the main barriers to mature Internet use that could explain the scarce presence of national parks in the third phase of the eMICA model. In-depth interviews with managers could reveal perceptions about the importance of digital marketing, institutional priorities, and constraints to implementing e-commerce functionalities. Complementarily, it would be valuable to include the perspective of other stakeholders, such as local tourism businesses, specialised guides, and resident communities, to understand the digital ecosystem from multiple perspectives.

As mentioned above, a recognised limitation of the eMICA model is that it only measures the presence or absence of services but does not evaluate the ease of finding resources or access time. Future studies could incorporate methodologies such as eye-tracking, navigation flow analysis, and usability testing with real users to assess the actual effectiveness of websites beyond their technical functionality.

A particularly promising line of future research is the analysis of the implementation of emerging technologies such as artificial intelligence, virtual and augmented reality, Internet of Things (IoT), and metaverse in the promotion and management of natural spaces. This research could explore how technologies such as AI-enabled chatbots can improve interaction with potential visitors, how virtual reality can be used for destination promotion and environmental education, and how IoT sensors can contribute to both sustainable management and visitor experience. The study of the metaverse as a new form of virtual tourism presents particularly interesting opportunities for national parks seeking to expand their global reach without increasing pressure on fragile ecosystems.

National parks must not only be guardians of natural heritage but also leaders in digital innovation to ensure their relevance as a tourism resource in an increasingly connected world.

Declaration of Competing Interests

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

References

Adventure Travel Trade Association. (2023). *Adventure travel industry snapshot*. https://learn.adventuretravel.biz/research/2023-adventure-travel-industry-snapshot

Ahmed, T. A. A., & Shaker, E. S. (2021). Website evaluation of travel agencies class A in Saudi Arabia and Egypt using extended version of internet commerce adoption model: A comparative study. *International Journal of Economics and Management Engineering, 15*(4), 453-461. https://publications.waset.org/10011976/pdf

Álvarez Díaz, Y. (2014). *La orientación al mercado en el sector turístico con el uso de las herramientas de la web social: Efectos en los resultados empresariales* [Market orientation in the tourism sector through the use of social web tools: Effects on business results] [Unpublished doctoral dissertation]. Universidad de Cantabria.

An, L. T., Markowski, J., Bartos, M., Rzenca, A., & Namiecinski, P. (2019). An evaluation of destination attractiveness for nature-based tourism: Recommendations for the management of national parks in Vietnam. *Nature Conservation, 32*, 51-80. https://doi.org/10.3897/natureconservation.32.30753

Andreopoulou, Z., Koliouska, C., Lemonakis, C., & Zopounidis, C. (2015). National Forest Parks development through internet technologies for economic perspectives. *Operational Research, 15*, 395-421. https://doi.org/10.1007/s12351-014-0147-8

Avecillas-Torres, I., Herrera-Puente, S., Galarza-Cordero, M., Coello-Nieto, F., Farfán-Pacheco, K., Alvarado-Vanegas, B., Ordóñez-Ordóñez, S., & Espinoza-Figueroa, F. (2025). Nature tourism and mental well-being: Insights from a controlled context on reducing depression, anxiety, and stress. *Sustainability, 17*(2), Article 654. https://doi.org/10.3390/su17020654

Bauer, C., & Scharl, A. (2000). Quantitative evaluation of web site content and structure. *Internet Research, 10*(1), 31-44. https://doi.org/10.1108/10662240010312138

Benbunan-Fich, R. (2001). Using protocol analysis to evaluate the usability of a commercial web site. *Information & Management, 39*(2), 151-163. https://doi.org/10.1016/S0378-7206(01)00085-4

Bhatt, P., & Pickering, C. M. (2022). Destination image of Chitwan National Park, Nepal: Insights from a content analysis of online photographs. *Journal of Outdoor Recreation and Tourism, 37*, Article 100488. https://doi.org/10.1016/j.jort.2022.100488

Bricker, K. S., Lackey, N. Q., & Joyner, L. (2022). A framework for sustainable tourism development in and around national parks. *Journal of Park and Recreation Administration, 40*(1), 134-153. https://doi.org/10.18666/JPRA-2021-11113

Bulchand-Gidumal, J., William Secin, E., O'Connor, P., & Buhalis, D. (2024). Artificial intelligence's impact on hospitality and tourism marketing: Exploring key themes and addressing challenges. *Current Issues in Tourism, 27*(14), 2345-2362. https://doi.org/10.1080/13683500.2023.2229480

Burgess L., & Cooper J. (1998). The status of internet commerce in the manufacturing industry in Australia: A survey of metal fabrication industries. In *Proceedings of the Second CollECTeR Conference on Electronic Commerce* (pp. 65–73).

Burgess, L., Parish, B., & Alcock, C. (2011). To what extent are regional tourism organisations (RTOs) in Australia leveraging the benefits of web technology for destination marketing and eCommerce? *Electronic Commerce Research, 11*, 341–355. https://doi.org/10.1007/s10660-011-9077-1

Burgess, S. (2016). Representing small business web presence content: The web presence pyramid model. *European Journal of Information Systems, 25*(2), 110-130. https://doi.org/10.1057/ejis.2015.4

Camprubí, R., & Coromina, L. (2016). Content analysis in tourism research. *Tourism Management Perspectives, 18*, 134-140. https://doi.org/10.1016/j.tmp.2016.03.002

Canteiro, M., Córdova-Tapia, F., & Brazeiro, A. (2018). Tourism impact assessment: A tool to evaluate the environmental impacts of touristic activities in Natural Protected Areas. *Tourism Management Perspectives, 28*, 220-227. https://doi.org/10.1016/j.tmp.2018.09.007

Chiou, W.-C., Lin, C.-C., & Perng, C. (2010). A strategic framework for website evaluation based on a review of the literature from 1995-2006. *Information and Management, 47*(5-6), 282-290. https://doi.org/10.1016/j.im.2010.06.002

Chu, S.-C., Deng, T., & Cheng, H. (2020). The role of social media advertising in hospitality, tourism and travel: A literature review and research agenda. *International Journal of Contemporary Hospitality Management, 32*(11), 3419-3438. https://doi.org/10.1108/IJCHM-05-2020-0480

Chung, M. G., Dietz, T., & Liu, J. (2018). Global relationships between biodiversity and nature-based tourism in protected areas. *Ecosystem Services, 34*, 11-23. https://doi.org/10.1016/j.ecoser.2018.09.004

Cramér, H. (1946). *Mathematical methods of statistics.* Princeton University Press.

Crawford, M. R., Holder, M. D., & O'Connor, B. P. (2017). Using mobile technology to engage children with nature. *Environment and Behavior, 49*(9), 959-984. https://doi.org/10.1177/001391651667387

Cristobal-Fransi, E., Daries, N., del Río Rama, M. C., & Fuentes-Tierno, M. G. (2026). The challenge of digital marketing in health tourism: The case of Spanish health resorts. *Quality & Quantity, 60*, 7859–7887. https://doi.org/10.1007/s11135-023-01744-2

Cristobal-Fransi, E., Daries, N., Martín-Fuentes, E., & Montegut-Salla, Y. (2020). Industrial heritage 2.0: Internet presence and development of the electronic commerce of industrial tourism. *Sustainability, 12*(15), Article 5965. https://doi.org/10.3390/su12155965

Cristobal-Fransi, E., Daries, N., Ramon-Cardona, J., & del Río Rama, M. C. (2023). Challenges of digitization in the social economy in times of pandemic: The evolution of online presence and e-commerce in agri-food cooperatives. *Journal of Agriculture and Food Economics, 11*, Article 49. https://doi.org/10.1186/s40100-023-00291-6

Cristobal-Fransi, E., Daries-Ramon, N., Mariné-Roig, E., & Martín-Fuentes, E. (2017). Implementation of Web 2.0 in the snow tourism industry: Analysis of the online presence and e-commerce of ski resorts. *Spanish Journal of Marketing - ESIC. 21*(2), 117-130. https://doi.org/10.1016/j.sjme.2017.06.002

Cristobal-Fransi, E., Martin-Fuentes, E., & Daries-Ramon, N. (2015). Behavioral analysis of subjects interacting with information technology: Categorizing the behavior of e-consumers. *International Journal of Services Technology and Management, 21*(1-3), 163-182. https://doi.org/10.1504/IJSTM.2015.071121

Cristobal-Fransi, E., Montegut-Salla, Y., Ferrer-Rosell, B., & Daries, N. (2020). Rural cooperatives in the digital age: An analysis of the internet presence and degree of maturity of agri-food cooperatives' e-commerce. *Journal of Rural Studies, 74*, 55-66. https://doi.org/10.1016/j.jrurstud.2019.11.011

Daries, N., Cristobal-Fransi, E., & Ferrer-Rosell, B. (2021). Implementation of website marketing strategies in sport tourism: Analysis of the online presence and e-commerce of golf courses. *Journal of Theoretical and Applied Electronic Commerce Research, 16*(3), 542-561. https://doi.org/10.3390/jtaer16030033

Daries, N., Cristobal-Fransi, E., Ferrer-Rosell, B., & Marine-Roig, E. (2018). Maturity and development of restaurant websites: A comparison of Michelin-starred restaurants in France, Italy and Spain. *International Journal of Hospitality Management, 73*, 125-137. https://doi.org/10.1016/j.ijhm.2018.02.007

Deb, S. K., Nafi, S. M., & Valeri, M. (2024). Promoting tourism business through digital marketing in the new normal era: A sustainable approach. *European Journal of Innovation Management, 27*(3), 775-799. https://doi.org/10.1108/EJIM-04-2022-0218

Díaz-Pérez, F. M., García-González, C. G., & Fyall, A. (2021). Accommodation, seasonality and domestic tourism to national parks: Implications for environmental policy. *Sustainability, 13*(9), Article 5072. https://doi.org/10.3390/su13095072

Doolin, B., Burgess, L., & Cooper, J. (2002). Evaluating the use of the web for tourism marketing: A case study from New Zealand. *Tourism Management, 23*, 557–561. https://doi.org/10.1016/S0261-5177(02)00014-6

Escobar-Rodríguez, T., & Carvajal-Trujillo, E. (2013). An evaluation of Spanish hotel websites: Informational vs. relational strategies. *International Journal of Hospitality Management, 33*, 228-239. https://doi.org/10.1016/j.ijhm.2012.08.008

Esparza-Huamanchumo, R. M., Botezán, I., Sánchez-Jiménez, R., & Villalba-Condori, K. O (2024). Ecotourism, sustainable tourism and nature-based tourism: An analysis of emerging fields in tourism scientific literature. *Geojournal of Tourism and Geosites, 54*(2), 953-966. https://doi.org/10.30892/gtg.542spl19-1270

Font, X., Garay, L., & Jones, S. (2016) Sustainability motivations and practices in small tourism enterprises in European protected areas. *Journal of Cleaner Production, 137*, 1439-1448. https://doi.org/10.1016/j.jclepro.2014.01.071

Gao, F., Liao, S., Wang, Z., Cai, G., Feng, L., Yang, Z., Chen, W., Chen, X., & Li, G. (2024). Revealing disparities in different types of park visits based on cellphone signaling data in Guangzhou, China. *Journal of Environmental Management, 351*, Article 119969. https://doi.org/10.1016/j.jenvman.2023.119969

Gaur, A., & Kumar, M. (2018). A systematic approach to conducting review studies: An assessment of content analysis in 25 years of IB research. *Journal of World Business, 53*(2), 280-289. https://doi.org/10.1016/j.jwb.2017.11.003

Gössling, S. (2021). Tourism, technology and ICT: A critical review of affordances and concessions. *Journal of Sustainable Tourism, 29*(5), 733-750. https://doi.org/10.1080/09669582.2021.1873353

Gretzel, U., Sigala, M., Xiang, Z., & Koo, C. (2015). Smart tourism: Foundations and developments. *Electronic markets, 25*, 179-188. https://doi.org/10.1007/s12525-015-0196-8

Hausmann, A., Toivonen, T., Slotow, R., Tenkanen, H., Moilanen, A., Heikinheimo, V., & Di Minin, E. (2018). Social media data can be used to understand tourists' preferences for nature-based experiences in protected areas. *Conservation Letters, 11*(1), Article e12343. https://doi.org/10.1111/conl.12343

Heslinga, J. H., & Hartman, S. (2021). Improving governance systems of national parks: How the instrument of a 'governance scan' can contribute. *Sustainability, 13*(19), Article 10811. https://doi.org/10.3390/su131910811

Joppa, L. N., & Pfaff, A., (2009). High and far: Biases in the location of protected areas. *PLOS ONE 4*(12), Article e8273. https://doi.org/10.1371/journal.pone.0008273

Joukes, V., & Gerry, C. (2010). Website effectiveness in wellness promotion by Portuguese spas. *Journal of Hospitality & Tourism Management, 17*(1), 136–143. https://doi.org/10.1375/jhtm.17.1.136

Kabassi, K., & Martinis, A. (2020). Evaluating the electronic presence of protected areas managing boards in Greece using a combination of different methods and theories. *Journal of Ecotourism, 19*(1), 50-72. https://doi.org/10.1080/14724049.2019.1649413

Kabassi, K., Martinis, A., & Papadatou, A. (2019). Analytic hierarchy process in an inspection evaluation of National Park websites: The case study of Greece. *Journal of Environmental Management & Tourism, 10*(5), 956-966. https://doi.org/10.14505//jemt.v10.5(37).02

Khan, M. M., Siddique, M., Yasir, M., Qureshi, M. I., Khan, N., & Safdar, M. Z. (2022). The significance of digital marketing in shaping ecotourism behavior through destination image. *Sustainability, 14*(12), Article 7395. https://doi.org/10.3390/su14127395

Khare, A., Dixit, S., & Sarkar, S. (2020). Factors affecting website continuance intention: A study of Indian travel websites. *Information Technology & Tourism, 22*, 243-271. https://doi.org/10.1007/s40558-019-00162-1

Khoo, S. Y. Y., Lo, M. C., & Mohamad, A. A. (2025). Exploring tourist behaviour and interaction with user-generated content on social media: A case of Sarawak's national parks and nature reserves. *Tourism: An International Interdisciplinary Journal, 73*(4), 728-742. https://doi.org/10.37741/t.73.4.9

Koliouska, C., & Andreopoulou, Z. (2013). Assessment of ICT adoption stage for promoting the Greek national parks. *Procedia Technology, 8*, 97-103. https://doi.org/10.1016/j.protcy.2013.11.014

Kredens, C., & Vogt, C. A. (2023). A user-generated content analysis of tourists at wildlife tourism attractions. *Frontiers in Sustainable Tourism, 2*, Article 1090749. https://doi.org/10.3389/frsut.2023.1090749

Mangold, M., Schwietering, A., Zink, J., Steinbauer, M. J., & Heurich, M. (2024). The digitalization of outdoor recreation: Global perspectives on the opportunities and challenges for protected area management. *Journal of Environmental Management, 352*, Article 120108. https://doi.org/10.1016/j.jenvman.2024.120108

Mathew, V., & Soliman, M. (2021). Does digital content marketing affect tourism consumer behavior? An extension of technology acceptance model. *Journal of Consumer Behaviour, 20*(1), 61-75. https://doi.org/10.1002/cb.1854

Law, R., Qi, S., & Buhalis, D. (2010). Progress in tourism management: A review of website evaluation in tourism research. *Tourism Management, 31*(3), 297-313. https://doi.org/10.1016/j.tourman.2009.11.007

Lee, G., & Pang, M.-S. (2022). How are service automation and national ICT development associated with international trade in services? *Information Technology for Development, 28*(4), 837-859. https://doi.org/10.1080/02681102.2021.1997881

Lee, J. K, & Morrison, A. M. (2010). A comparative study of web site performance. *Journal of Hospitality and Tourism Technology, 1*(1), 50-67. https://doi.org/10.1108/17579881011023016

León, C. J., de León, J., Araña, J. E., & González, M. M. (2015). Tourists' preferences for congestion, residents' welfare and the ecosystems in a national park. *Ecological Economics, 118*, 21-29. https://doi.org/10.1016/j.ecolecon.2015.07.003

Liao, C., To, P.-L., & Shih, M.-L. (2006). Website practices: A comparison between the top 1000 companies in the US and Taiwan. *International Journal of Information Management, 26*(3), 196-211. https://doi.org/10.1016/j.ijinfomgt.2006.02.007

Liebetrau, A. M. (1983). *Measures of association*. Sage Publications.

Lin, D., Zhou, Z., & Guo, X. (2009). A study of the website performance of travel agencies based on the EMICA model. *Journal of Service Science and Management, 2*(3), 181-185. https://doi.org/10.4236/jssm.2009.23021

Lin, P., Chen, L., & Luo, Z. (2022). Analysis of tourism experience in Haizhu National Wetland Park based on web text. *Sustainability, 14*(5), Article 3011. https://doi.org/10.3390/su14053011

Malik, G., Sharma, P., & Pradhan, D. (2026). Leveraging gamification for tourism marketing activities: Toward a comprehensive conceptual model. *Journal of Vacation Marketing, 31*(1), 147-167. https://doi.org/10.1177/13567667241268725

Marinello, S., Butturi, M. A., Gamberini, R., & Martini, U. (2023). Indicators for sustainable touristic destinations: A critical review. *Journal of Environmental Planning and Management, 66*(1), 1-30. https://doi.org/10.1080/09640568.2021.1978407

Melo, L., Abreu, J., & Silva, T. (2014). Mobile applications for natural parks: Guidelines study for the development of a mobile device application. *Procedia Technology, 16*, 263-268. https://doi.org/10.1016/j.protcy.2014.10.091

Mitova, R., Borisova, B., & Koulov, B. (2021). Digital marketing of Bulgarian natural heritage for tourism and recreation. *Sustainability, 13*(23), Article 13071. https://doi.org/10.3390/su132313071

Navrátil, J., Pícha, K., & White Baravalle Gilliam, V. L. (2016). The interest of visitors to protected natural areas in 'green' accommodation. *Tourism: An International Interdisciplinary Journal, 64*(2), 159-174. https://hrcak.srce.hr/160523

Nel, J., & Boshoff, C. (2020). Status quo bias and shoppers' mobile website purchasing resistance. *European Journal of Marketing, 54*(6), 1433-1466. https://doi.org/10.1108/EJM-02-2018-0144

Neuendorf, K. A. (2018). Content analysis and thematic analysis. In P. Brough (Ed.), *Advanced research methods for applied psychology: Design, analysis and reporting* (pp. 211–223). Routledge.

Pai, C.-K., Xia, M. L., & Wang, T.-W. (2014). A comparison of the official tourism website of five east tourism destinations. *Information Technology & Tourism, 14*(2), 97-117. https://doi.org/10.1007/s40558-014-0007-7

Phung, P. V., Hien, L. T. D., & Hoang, T. H. L. (2023). Sustainable eco-tourism development in national parks: An approach from local community's support. *Journal of Law and Sustainable Development, 11*(9), Article e1146. https://doi.org/10.55908/sdgs.v11i9.1146

Powers, Z. (2021). The proliferation of the online sales of tourism activities. *Tourism: An International Interdisciplinary Journal, 69*(4), 630-634. https://doi.org/10.37741/t.69.4.10

Ramon-Cardona J., Daries, N., Cristobal-Fransi, E., & Serra-Cantallops, A. (2022). eCommerce web content adoption model (eWCAM): An integrated tool for WCA and eMICA models for tourism industry. *Cuadernos de Turismo, 50*, 279-306. https://doi.org/10.6018/turismo.541951

Raum, S., Rawlings-Sanaei, F., & Potter, C. (2021). A web content-based method of stakeholder analysis: The case of forestry in the context of natural resource management. *Journal of Environmental Management, 300*, Article 113733. https://doi.org/10.1016/j.jenvman.2021.113733

Rezaei, S., Ali, F., Amin, M., & Jayashree, S. (2016). Online impulse buying of tourism products: The role of web site personality, utilitarian and hedonic web browsing. *Journal of Hospitality and Tourism Technology, 7*(1), 60-83. https://doi.org/10.1108/JHTT-03-2015-0018

Robbins, S. S., & Stylianou, A. C. (2003). Global corporate websites: An empirical investigation of content and design. *Information & Management, 40*(3), 205-212. https://doi.org/10.1016/S0378-7206(02)00002-2

Ruhanen, L. (2019). The prominence of eco in ecotourism experiences: An analysis of postpurchase online reviews. *Journal of Hospitality and Tourism Management, 39*, 110-116. https://doi.org/10.1016/j.jhtm.2019.03.006

Sangpikul, A. (2010). Marketing ecotourism through the internet: A case of ecotourism business in Thailand. *International Journal of Hospitality & Tourism Administration, 11*(2), 107-137. https://doi.org/10.1080/15256481003732782

Santesmases Mestre, M. (2009). DYANE *Versión 4: Diseño y análisis de encuestas en investigación social y de mercados* [DYANE version 4: Survey design and analysis in social and market research]. Ediciones Pirámide.

Sheskin, D. J. (2011). *Handbook of parametric and nonparametric statistical procedures* (5th ed.). Chapman & Hall/CRC.

Silva, S., Silva, L. F., & Vieira, A. (2023). Protected areas and nature-based tourism: A 30-year bibliometric review. *Sustainability, 15*(15), Article 11698. https://doi.org/10.3390/su151511698

Sinclair, M., Mayer, M., Woltering, M., & Ghermandi, A. (2020). Using social media to estimate visitor provenance and patterns of recreation in Germany's national parks. *Journal of Environmental Management, 263*, Article 110418. https://doi.org/10.1016/j.jenvman.2020.110418

Singh, S., Dash, T. R., & Vashko, I. (2016). Tourism, ecotourism and sport tourism: The framework for certification. *Marketing Intelligence & Planning, 34*(2), 236-255. https://doi.org/10.1108/MIP-09-2014-0180

Soliman, M., Peetz, J., & Davydenko, M. (2017). The impact of immersive technology on nature relatedness and pro-environmental behavior. *Journal of Media Psychology, 29*(1), 8-17. https://doi.org/10.1027/1864-1105/a000213

Stolton, S., Shadie, P., & Dudley, N. (2013). IUCN WCPA best practice guidance on recognising protected areas and assigning management categories and governance types. In N. Dudley (Ed.), *Guidelines for applying protected area management categories* (Best Practice Protected Area Guidelines Series No. 21, pp. 1–31). IUCN.

Sun, S., Fong, D. K. C., Law, R., & He, S. (2017). An updated comprehensive review of website evaluation studies in hospitality and tourism. *International Journal of Contemporary Hospitality Management, 29*(1), 355–373. https://doi.org/10.1108/IJCHM-12-2015-0736

Thapa, K., King, D., Banhalmi-Zakar, Z., & Diedrich, A. (2022). Nature-based tourism in protected areas: A systematic review of socio-economic benefits and costs to local people. *International Journal of Sustainable Development & World Ecology, 29*(7), 625-640. https://doi.org/10.1080/13504509.2022.2073616

The International Ecotourism Society. (2015). *What is ecotourism?* https://ecotourism.org/what-is-ecotourism/

Ting, P.-H., Wang, S.-T., Bau, D.-Y., & Chiang, M.-L. (2013). Website evaluation of the top 100 hotels using advanced content analysis and eMICA model. *Cornell Hospitality Quarterly, 54*(3), 284-293. https://doi.org/10.1177/1938965512471892

Tsai, W.-H., Chou, W.-C., & Lai, C.-W. (2010). An effective evaluation model and improvement analysis for national park websites: A case study of Taiwan. *Tourism Management, 31*(6), 936-952. https://doi.org/10.1016/j.tourman.2010.01.016

UN Tourism. (2025). *UN tourism data dashboard*. https://www.unwto.org/tourism-data/un-tourism-tourism-dashboard

Walcott, P. A. (2007). Evaluating the readiness of e-commerce websites. *International Journal of Computers, 4*(1), 263-268.

Wang, H., & Yan, J. (2022). Effects of social media tourism information quality on destination travel intention: Mediation effect of self-congruity and trust. *Frontiers in Psychology, 13*, Article 1049149. https://doi.org/10.3389/fpsyg.2022.1049149

Wang, Y., & Jiao, Y. (2024). Can environmental science popularization of tourism live streaming stimulate potential tourists' pro-environmental behavior intentions? A construal level theory analysis. *Journal of Hospitality and Tourism Management, 60*, 42-50. https://doi.org/10.1016/j.jhtm.2024.06.003

Xu, L., Ao, C., Liu, B., & Cai, Z. (2023). Ecotourism and sustainable development: A scientometric review of global research trends. *Environment, Development and Sustainability, 25*(4), 2977-3003. https://doi.org/10.1007/s10668-022-02190-0

Yung, R., Khoo-Lattimore, C., & Potter, L. E. (2021). Virtual reality and tourism marketing: Conceptualizing a framework on presence, emotion, and intention. *Current Issues in Tourism, 24*(11), 1505-1525. https://doi.org/10.1080/13683500.2020.1820454

Zhang, H., Guo, T., & Su, X. (2021). Application of big data technology in the impact of tourism e-commerce on tourism planning. *Complexity, 2021*, Article 9925260. https://doi.org/10.1155/2021/9925260

Zhang, Y., Wang, Z., Shrestha, A., Zhou, X., Teng, M., Wang, P., & Wang, G. (2023). Exploring the main determinants of national park community management: Evidence from bibliometric analysis. *Forests, 14*(9), Article 1850. https://doi.org/10.3390/f14091850

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Appendix A

National parks analysed

SPAIN:	
1.	Aigüestortes i Estany de Sant Maurici
2.	Archipiélago de Cabrera
3.	Cabañeros
4.	Caldera de Taburiente
5.	Doñana
6.	Garajonay
7.	Islas Atlánticas
8.	Monfragüe
9.	Ordesa y Monte Perdido
10.	Picos de Europa
11.	Sierra de Guadarrama
12.	Sierra de las Nieves
13.	Sierra Nevada
14.	Tablas de Daimiel
15.	Teide
16.	Timanfaya
UNITED KINGDOM:	
1.	Brecon Beacons
2.	Cairngorms
3.	Dartmoor
4.	Exmoor
5.	Lake District
6.	Loch Lomond & Trossachs
7.	New Forest
8.	North York Moors
9.	Northumberland
10.	Peak District
11.	Pembrokeshire
12.	Snowdonia
13.	South Downs
14.	The Broads
15.	Yorkshire Dales
FRANCE:	
1.	Vanoise
2.	Port-Cros
3.	Pyrénées
4.	Cévennes
5.	Ecrins
6.	Mercantour
7.	Guadeloupe
8.	Guyane
9.	Réunion
10.	Calanques
11.	Forêts
PORTUGAL:	
1.	Peneda-Gerês

GERMANY:	
1.	Bayerischer Wald
2.	Berchtesgaden
3.	Schleswig-Holsteinisches Wattenmeer
4.	Niedersächsisches Wattenmeer
5.	Hamburgisches Watternmeer
6.	Jasmund
7.	Müritz
8.	Sächsische Schweiz
9.	Vorpommersche Boddenlandschaft
10.	Unteres Odertal
11.	Hainich
12.	Eifel
13.	Kellerwald-Edersee
14.	Harz
15.	Schwarzwald
16.	Hunsrück-Hochwald
ITALY:	
1.	Abruzzo, Lazio i Molise
2.	Gran Paradiso
3.	Circeo
4.	Stelvio
5.	Sila
6.	Aspromonte
7.	Dolomitas de Belluno
8.	Gran Sasso i Montes de la Laga
9.	Cilento, Valle de Diano i Alburini
10.	Majaella
11.	Gargano
12.	Val Grande
13.	Pollino
14.	Foreste Casentinesi, Monte Falterona i Campigna
15.	Monti Sibillini
16.	Archipiélago de Maddalena
17.	Vesubio
18.	Archipiélago Toscano
19.	Asinara
20.	Golfo de Orosei y Gennargentu
21.	Cinque Terre
22.	Alta Murgia
23.	Apeninos Tosco-Emilianos
24.	Isla de Pantelleria
25.	Val d'Agri i Lagonegrese
ANDORRA:	
1.	Comapedrosa
2.	Vall del Madriu-Perafita-Claror
3.	Vall de Sorteny

Appendix B

WCA data by country

	Spain (n = 16)	UK (n = 15)	France (n = 11)	Portugal (n = 1)	Germany (n = 16)	Italy (n = 25)	Andorra (n = 3)	Total (n = 87)
INFORMATION VARIABLE								
1. Basic information about the national park								
I.1.1- Description of the national park	16	15	11	1	16	25	3	87
I.1.2- Information on the park's location	15	15	2	1	11	16	3	63
I.1.3- Contact: telephone number, fax or e-mail address	11	13	11	1	15	25	3	79
I.1.4- Images of the park	16	15	11	1	16	25	3	87
I.1.5- Information on the activities being carried out	13	15	11	1	15	16	3	74
I.1.6- Communication of news/events	16	15	11	1	16	24	3	86
I.1.7- Links to websites of public tourism organizations	16	14	11	1	16	25	3	86
I.1.8- Opening hours and timetable	3	0	0	0	0	0	0	3
I.1.9- Entrance fees	1	0	0	0	0	0	0	1
2. Facilities of the national park								
I.2.1- Map of the park	13	14	11	1	15	24	3	81
I.2.2- Information on service and leisure areas	13	15	11	1	15	12	3	70
I.2.3- Online booking tool for visiting appointments	7	3	0	0	3	8	0	21
I.2.4- Virtual tour	1	1	1	0	0	1	0	4
I.2.5- Information on the park's routes and resources	13	15	11	1	15	22	3	80
I.2.6- Information on how to get around the park	8	15	7	0	9	16	3	58
3. Surrounding area of the national park (zone of influence)								
I.3.1- Tourist information about the area	15	14	11	1	13	24	3	81
I.3.2- Information on access to the park	9	13	9	0	13	19	3	66
I.3.3- Information on atmospheric conditions	8	2	0	1	8	9	0	28
I.3.4- Information on other national parks	3	0	11	0	0	2	0	16
I.3.5- Links to other related businesses	15	15	9	1	12	16	3	71
4. Promotion								
I.4.1- Promotions: special events, advertising campaigns, etc.	3	14	11	1	15	22	3	69
I.4.2- Incentives: loyalty cards, "friends of" associations, etc.	0	4	0	1	8	2	0	15
I.4.3- Resources: webinars, podcasts, magazines, newsletters, etc.	2	10	1	1	11	15	3	43
I.4.4- Press area	0	5	11	1	12	7	0	36
COMMUNICATION VARIABLE								
1. Interaction with clients								
C.1.1- Email and telephone number of the park on the homepage	11	13	11	1	15	25	3	79
C.1.2- Chat bot	0	1	0	0	0	0	0	1
C.1.3- WhatsApp/Instant messaging systems	0	0	0	0	0	1	0	1
C.1.4- Restricted user access area	2	5	0	1	5	3	0	16
C.1.5- Possibility to receive complaints, comments or suggestions	1	8	0	0	1	4	0	14
C.1.6- FAQs section	0	7	0	0	2	5	0	14
2. Web resources								
C.2.1- Blog	3	7	0	0	0	2	0	12
C.2.2- Video on the homepage	2	2	0	0	1	3	3	11
C.2.3- Google My Business profile	1	0	0	0	0	0	1	2
C.2.4- Links to social networks	14	15	11	1	12	23	3	79
C.2.5- Links to external video platforms	10	9	11	1	10	17	3	61
C.2.6- Newsletter subscription	3	10	1	1	11	11	1	38
C.2.7- Possibility to share content with other users	8	5	0	1	8	18	1	41
C.2.8- SEM Campaigns	0	0	0	0	0	0	0	0
3. Mobile adaptation								
C.3.1- Responsive design	13	15	11	1	16	21	3	80
4. Language skills								
C.4.1- Content available in more than one non co-official language	6	14	0	1	10	17	3	51

Table ***(continued)***

E-COMMERCE VARIABLE								
E-commerce								
EC.1.1- Online payment	5	7	6	0	0	13	1	32
EC.1.2- Secure online transactions	2	6	6	0	0	13	1	28
EC.1.3- Interaction with the server: database query	1	3	6	0	0	11	0	21
ADDITIONAL FUNCTIONS VARIABLE								
Information security								
FA.1.1- Legal notice	16	15	11	1	16	24	3	86
FA.1.2- Privacy policy - GDPR	16	15	11	1	16	23	3	85
FA.1.3- Secure Website: HTTPS	16	15	11	1	16	24	3	86
2. Certifications								
FA.2.1- Universal Accessibility Certification ISO 17001	0	0	0	0	0	0	0	0
FA.2.2- Quality management ISO 9001 or Q de Calidad	16	4	0	0	0	1	0	21
FA.2.3- Environmental Management ISO 14001 or EMAS	0	0	0	0	0	4	0	4
FA.2.4- Other certifications and/or accreditations	1	0	11	1	5	12	2	32
3. Mobile App								
FA.3.1- Own app	1	0	0	0	1	4	0	6

Source: Authors' own work.