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# Management, Tourism and Smart Technologies

ICMTT 2023 Volume 2

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Carlos Montenegro · Álvaro Rocha ·  
Juan Manuel Cueva Lovelle  
Editors

# Management, Tourism and Smart Technologies


ICMTT 2023 Volume 2

 Springer

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## Preface

In this edition of the International Conference on Management, Tourism and Technologies—ICMTT 2023, papers were presented in the areas of: Managements, Tourism, Marketing Strategies in Management, Tourism and Technology, and Technology.

We would like to give special thanks to the Universidad Distrital Francisco José de Caldas, Fundación Universitaria Internacional de la Rioja, and Universidad de Cundinamarca, for hosting us, as well as to all the members and collaborators, since without them this dream would not have been possible.

We had more than 200 papers presented, we spent 3 consecutive days in 5 parallel rooms, and more than 400 people passed through the event and generated an academic space that allowed the exchange of experiences to advance in the era of knowledge, where we have so much data that the important thing is to transform it into knowledge. Another of the great experiences that the event left us is that virtuality is definitely a reality, since many of our works were presented in this way.

We still have many challenges, but a very important one and on which we are working is how to get that academic relationship that gives us the presence in these events we can also make up for with virtuality, and this reflection has helped us to understand what a visionary as Mark Zuckerberg CEO of Meta has envisioned in what he called the Metaverse and just put an oculus to understand that virtuality needs these visions to achieve the great challenge we have set ourselves: How will we relate to other people in academic, social, or other contexts through virtual scenarios?

I hope to see you all at the next edition of the International Conference on Management, Tourism and Technologies—ICMTT 2024, in Cusco, Peru, and as we will not stop doing virtual sessions, the challenge is that we all have some oculus to see ourselves in our Metaverse.

May 2023

Carlos Montenegro  
Álvaro Rocha

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# Natural Parks Image: An Analysis of Tripadvisor Reviews

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**Abstract.** Natural parks and protected areas have been a significant subject of tourism studies. Understanding the image that visitants have of these areas is important to the planning process, and the analysis of online reviews is a methodology used in different investigations. TripAdvisor is the most used review aggregator in these studies. In this context, this research aimed to analyse the image of three cross-border natural parks based on TripAdvisor reviews. For this, 321 reviews of the *Montesinho* Natural Park (Portugal), *Douro* International Nature Park (Portugal) and *Arribes del Duero* Natural Park (Spain) were collected and analysed using the machine learning techniques known as Latent Dirichlet Allocation. Two dimensions were determined for the *Montesinho* (scenery and nature), two for *Douro* International (activities and nature) and three for *Arribes del Duero* (water-based activities, nature, activities). The dimensions were measured on a 1–5 scale. It can be concluded that the three parks present a positive image, with averages higher than 4, being 4.47 points ( $\pm 0.703$ ) for the evaluation of *Montesinho*, 4.48 ( $\pm 0.671$ ) for *Douro* International and 4.50 ( $\pm 0.703$ ) for *Arribes del Duero*. The common dimension in the three parks was nature, which also presented the best average in the three realities. This study presented as a limitation the use only of TripAdvisor for data collection, suggesting the use of other platforms in future studies.

**Keywords:** Destination image · Nature-based tourism · Marketing digital · TripAdvisor

## 1 Introduction

National and natural parks are attracting tourism, and the demand has grown in the last few years [1]. This tourism segment offers visitors and residents different opportunities and assists in developing and supporting the region where the parks are located [2, 3].

In this context, the studies analysing tourism in natural parks have been a constant subject [1, 3–5] in different world places.

In this sense, identifying the opinions of visitors is important in the planning process and in ensuring the sustainability of these spaces. Different methodologies have been used, and with the advancing technologies, the analysis of online reviews is growing, and one of the most used review aggregators is TripAdvisor.

TripAdvisor is the major online tourism reviews (OTR) platform to share tourism experiences in different tourism sectors, such as hotels, restaurants and attractions [3], including natural parks and protected areas. The perceiving cultural ecosystem services (CES) were identified in 48 National Parks in the United States, using TripAdvisor reviews [5]. The same technic was applied to the reality of Tatra National Park, Poland [6].

Recognising the importance of this methodology, this study aimed to analyse the image of three cross-border natural parks based on TripAdvisor reviews. The three parks analysed were *Montesinho* Natural Park and *Douro* International Nature Park, located in Portugal, and *Arribes del Duero* Natural Park, located in Spain. The natural characteristics and their location were essential for the designation of these areas as the focus of this study. Considering the last ten years of reviews registered on TripAdvisor, 321 reviews were analysed using the software Knime, namely the machine learning techniques known as Latent Dirichlet Allocation (LDA), where the reviews were segmented in dimension based on the words co-occurrence.

Therefore, this paper is structured into five sections, followed by an introduction is presented a theoretical framework in which natural parks concepts and previous TripAdvisor are presented. Next, the methodological process is exposed, focusing on descriptive analysis. The pre-processing of the data and the LDA algorithm modelling are also presented in this section. The findings are presented in section four and finally, the discussion, conclusion, limitations and suggestions for future research are presented in the last section of the paper.

## 2 Theoretical Framework

This session presents the main concepts related to the subject of this study, namely natural parks, destination image and online tourism reviews, especially TripAdvisor.

The relationship of tourism with natural parks or protected areas is highly evident. The search for activities in natural environments has grown substantially [7] and the visitors' search for these areas is obvious, especially during the post-pandemic period. One of the concerns regarding these studies is the guarantee of sustainability [4] and discussions of the importance of conserving these environments are also evident [1].

As a tourism destination and, associated with these concerns, natural parks and protected areas have some challenges. In this sense, the emergence of smart destinations and smart tourism can change the way visitors travel and after demonstrates their loyalty [8]. Recommendations are essential in the process of choosing a tourism destination and this can be obtained through word of mouth, in books, and more strongly through the Internet, namely in online tourism reviews (OTR) [9]. Increasingly, Internet reviews influence the decision to select tourist destinations [10]. These reviews are present in different platforms, such as Booking, Google and TripAdvisor.

TripAdvisor, founded in 2000, stands as the world's largest travel website, boasting a massive user base of 390 million unique visitors per month by the end of 2016. With its user-generated content and reviews spanning global destinations and multiple language versions, TripAdvisor offers a valuable resource for information seekers. Its wide-reaching, multilingual platform presents a unique opportunity to address challenges in studying dispersed activities [11, 12]. In this sense, different methods are used to analyse the visitors' perspectives presented in the reviews of TripAdvisor. An example is the study realised in the Tatra National Park in Poland, the analysis was processed using NVIVO and analysing the most frequent words and word clouds. In this study was analysed 624 reviews and the park presented a positive image.

Other approach, is the use of LDA (Latent Dirichlet Allocation) modeling that has emerged as one of the most commonly used methods. LDA determines dimensions or themes based on the underlying hidden structure within the reviews. By considering the co-occurrence of terms across a large number of reviews, LDA identifies latent constructs that represent the collective sentiment or opinion expressed in the corpus of comments [13]. This method was used to analyse TripAdvisor reviews in touristic attractions [13], hotels [14], and urban trails [15], proving efficiency and innovation in the analysis process, once it is possible to size revisions according to the main elements that arise in each issue. In this context, this was the method chosen to answer the aim of this study, which will be explained in the next section.

### 3 Methodology

#### 3.1 Fieldwork Under Analysis

In this study three parks located on the Portuguese-Spanish border were selected. The *Montesinho* Natural Park, recognised as a Natural Park in 1979, is in the Northeast of Portugal, covering territories of two municipalities (*Bragança* and *Vinhais*). The park has about 75 thousand hectares and has 9,000 inhabitants in 92 villages, with extensive biodiversity, with species such as the Iberian wolf, the roe deer, and the red deer. Shale is the dominant rock, but granites, ultramafic rocks and small limestone patches can also be found [16].

The *Douro* International Nature Park covers part of the municipalities of *Miranda do Douro*, *Mogadouro*, *Freixo de Espada à Cinta* and *Figueira de Castelo Rodrigo* also in the Northeast of Portugal. The border stretch of the *Douro* River is about 122 km long and 86,834.82 hectares, which separates Portugal from Spain. The region's climate has wide temperature ranges, with cold winters and very hot dry summers, and the Park's southern area is integrated into the so-called *Terra Quente* (Hot Earth). The *Douro* international is a fundamental area for the conservation of birdlife of some of the most threatened species, such as the Black Stork (*Ciconia Nigra*), the Vulture of Egypt (*Neophron Percnopterus*), the Real Eagle (*Aquila Chrysaetos*), the Bonelli Eagle (*Aquila Fasciata*), *Falco Peregrinus* (Falcon peregrinus), the Red-billed Chough (*Pyrrhocorax pyrrhocorax*) and the Black Chasco (*Oenanthe Leucura*). The valley river's rugged banks form monumental canyons, where several species of birds, have their nests [17].

The *Arribes del Duero* Natural Park is in Spain where the *Duero* River borders Portugal. In it are formed canyons, with a drop of up to 500 m, considered the deepest

and most extensive in the entire Iberian Peninsula. It is a natural area that highlights the rugged beauty of its granite landscape and a rich and varied flora and fauna [18].

### 3.2 Data Collection and Pre-Processing

TripAdvisor is considered the major platform for review aggregators of tourism products, with over a billion reviews [6, 15], and so different studies use TripAdvisor to understand different aspects of tourism [13, 19–22]. Thus, to achieve the aim of the study, the reviews and ratings platform were used, considering three natural parks located on the Portuguese-Spanish crossborder.

The data, related to quantitative ratings, the titles and the reviews written in all languages were collected between January and February 2023. The period considered for analysis was the last ten years (2012–2022). It was collected 321 reviews, 51 (15.9%) from *Montesinho* Natural Park, 52 (16.2%) from *Douro* International Nature Park and 218 (67.9%) from *Arribes del Duero* Natural Park (Table 1).

**Table 1.** Number of reviews

<u>Natural Park</u>	<u>Number of reviews</u>
<i>Montesinho</i> Natural Park	51
<i>Douro</i> International Nature Park	52
<i>Arribes del Duero</i> Natural Park	218
Total	321

Source: Authors’ own elaboration.

To prepare and analyse the data Knime Analytics Platform 4.6.4 was used. Different tourism studies used this software [13, 15] that uses modular pipelining for analyses [13]. All the reviews were written in Portuguese or during the collected process were translated into Portuguese to standardise. The pre-processing in the software consists of a punctuation eraser, flowed by the change to lowercase (case converter). The next step was applying the N Chars filters, removing the reviews with fewer than three characters. The following was to apply a stop word filter using common stop words in Portuguese and removing no significant words. The words were stemmed using the Porter algorithm. This process was repeated in the data of each natural park.

The quantitative evaluations were analysed by descriptive statistics (mean, standard deviation and distributions). Based on a previous study [19], score of 4–5 points was classified as a positive image, a score of 3 points as a neutral image and a score of 1–2 points as a negative.

### 3.3 Data Analysis

Considering different methods used to analyse TripAdvisor review, LDA modelling was selected to analyse the data in this study. The LDA modelling determines dimensions according to the terms co-occurrence and is considered a latent construct of the total of reviews [23]. Therefore, the following steps were performed do the LDA analysis:

- i) Determine the number of dimensions.
- ii) Extract the dimensions. iii) Appoint the dimensions. iv) Determine the number of reviews in each dimension.
- v) Determine the positive and negative image per dimension.

The k-means clustering, namely the Elbow method based on sum square errors was applied to determine the optimal number of dimensions. Two dimensions were confirmed for *Montesinho* Natural Park, two dimensions for *Douro* International Nature Park and three for *Arribes del Duero* Natural Park. According to the LDA algorithm, each dimension contained 10 terms and was named considering previous studies.

## 4 Findings

As above-mentioned, the dimensions for each natural park were determined using k-means clustering. Calculating the sum squared errors was delimited by the Elbow Method to confirm the number of dimensions. Thus, two dimensions were determined for *Montesinho* Natural Park, two for *Douro* International Nature Park and three dimensions for *Arribes del Duero* Natural Park.

Next, the LDA algorithm was used in Knime to obtain dimensions, their respective terms, and the weight that each term represents in the dimension. The higher weight indicates a more representative term in the dimension. Some terms are repeated along the dimensions. However, their weights are different. The authors determined each dimension's labels based on previous studies and considering the terms with higher weight. Tables 2, 3 and 4 present each Natural Park's dimensions and prevalent terms.

The two dimensions that characterise *Montesinho* Natural Park are scenery and nature (Table 2). The five more representative elements presented in the first dimension are tour, nature, road, stone and village. The second dimension is represented with nature characteristics such as forest reserve, beauty, walk, village, places, tour, vegetation, view, flora and fauna.

There are two dimensions related to *Douro* International Nature Park (Table 3): activities and scenery. The first dimension, activities, includes terms related to the activities that can be realised in the park, such as boat, cruise and walk and the characteristics presented in this area. The second dimension is scenery, which connotes analysis regarding the nature, wine and views of the park.

**Table 2.** Dimensions of *Montesinho* Natural Park

<u>Scenery</u>	<u>Weight</u>	<u>Nature</u>	<u>Weight</u>
Tour	26	Forest reserve	22
Nature	22	Beauty	20
Road	16	Walk	14
Stone	14	Village	13
Village	13	Places	12
Landscape	13	Tour	12
City	12	Vegetation	10
Calm	12	View	10
Person	12	Flora	9
Visit	10	Fauna	9

Source: Authors' own elaboration.

**Table 3.** Dimensions of *Douro* International Nature Park

<u>Activities</u>	<u>Weight</u>	<u>Scenery</u>	<u>Weight</u>
Belvedere	32	Nature	22
Boat	26	Wine	18
Cruise	24	Views	14
Beautiful	16	Boat	14
Route	14	Flora	12
Walk	14	Road	12
Explanation	14	Amazing	10
Recommendations	12	Fauna	10
Landscape	12	Village	8
Views	12	Tour	8

Source: Authors' own elaboration.

The Spanish Park was the only one where it was possible to determine three dimensions. The first dimension is named water-based activities, considering the mainly terms related to this variety of activities (boat and cruise). The second dimension is nature, where nature, waterfall, belveder and nature are terms evidenced. The last dimension was related with the different activities' practices in the park such as walk.

After determining the dimensions, the evaluations were divided into positive (4–5), neutral (3), or negative (1–2) based on TripAdvisor quantitative evaluations. Tables 57 present the means, standard deviations, and absolute and relative distribution of the scores for each dimension, determining the image.

**Table 4.** Dimensions of *Arribes del Duero* National Park

Water-based activities	Weight	Nature	Weight	Activities	Weight
Boat	128	Views	79	Walk	37
Recommendations	51	Boat	76	Belvedere	30
Fauna	51	Belvedere	74	Landscape	28
Cruise	41	Show	48	Views	25
Flora	37	Amazing	41	Boat	24
Walk	34	Nature	35	Cruise	23
Show	31	Waterfall	31	Like	22
Explanation (guide)	29	Walk	30	Nature	20
Wine	28	Wonder	28	Amazing	19
Vulture	28	Dam	27	Charm	18

Source: Authors' own elaboration

The global mean and standard deviation of *Montesinho* Natural Park (Table 5) was ( $4.47 \pm 0.703$ ) points, where 92.2% was positive (scores 4 and 5 points). The evaluation of each dimension follows the same trend, and the dimension with the highest mean was Nature ( $4.70 \pm 0.470$ ) points. This dimension presented a 100% of the analysis in the positive scores (4–5). A positive evaluation written in August 2019 by a visitor from Lisbon (Portugal) evidences the nature potential of the park:

“The vast *Montesinho* Natural Park is of enormous beauty. There are dozens of places to visit, countless corners to discover, fauna and flora of unparalleled richness”.

Although with a low percentual in negative image (1–2 score), the dimension related to the scenery was the one that presented a review with a 2 score. This review was written by a Portuguese visitor in June 2016 and was related to difficulties he had while walking through the park.

**Table 5.** Evaluations of *Montesinho* Natural Park

Score	Global $\bar{X} \pm \sigma$		Dimension 1: Scenery $\bar{X} \pm \sigma$		Dimension 2: Nature $\bar{X} \pm \sigma$	
	4.47 ± 0.703		4.32 ± 0.791		4.70 ± 0.470	
	n = 51	%	n = 31	%	n = 20	%
1	0	0	0	0	0	0
2	1	2.0	1	3.2	0	0
3	3	5.9	3	9.7	0	0
4	18	35.3	12	38.7	6	30
5	29	56.9	15	48.4	14	70

Source: Authors’ own elaboration

Related to the evaluation of *Douro* International Nature Park (Table 6) the global mean is 4.48 points ( $\pm 0.671$ ), representing a positive image, also corroborated with 90.4% with scores 4 and 5 points. Dimension Activities presented a slightly smaller (4.44 points  $\pm 0.698$ ), representing 88.9% of positive evaluations (4 and 5 points). Dimension Scenery presented a mean of 4.52 points ( $\pm 0.653$ ), with 92% of positive image evaluations. It is significant to highlight that this park has not presented any negative evaluations in the analysed period.

*Arribes del Duero* National Park presented the highest global mean (4.50  $\pm 0.917$ ). In this reality is presented the dimension with the parks’ highest mean (nature, 4.80  $\pm 0.431$ ) and the minimum mean (activities, 4.29  $\pm 0.1.170$ ). The park presented a score of 1 point (3.7%), possibly related to the higher number of reviews. One of the negative evaluations was written by a Singapore visitor in January 2020. It is worth noting that evaluations may be influenced by previous expectations of the park and also by the time spent on the visit.

“My friend and I made a diversion from Salamanca to the Mirante, as I had read somewhere that this was the best place to get a great view in a short time. What a mistake!!! First of all, the scenery leading to the viewpoint was horrible - it looked like a post-apocalyptic landscape with gravel and rocks and not much beauty. When we arrived at the viewpoint still with some hope (after passing through miles of electricity pylons and towers), the dam and river were totally brown and stagnant! Total waste of time”.

On the other hand, positive comments value the natural aspects of the park, such as the one made by a Spanish visitor in August 2020.

“It is one of Spain’s great unknown factors. It is 140 kilometres long, mostly along the Douro and the River. I spent a week getting to know it and didn’t see everything. You have to enjoy its landscapes, visit its viewpoints, get to know its villages and above all enjoy the Douro, where it is essential to take a cruise (somewhere it

**Table 6.** Evaluations of *Douro* International Nature Park

Score	Global $\bar{X} \pm \sigma$		Dimension 1: Activities $\bar{X} \pm \sigma$		Dimension 2: Scenery $\bar{X} \pm \sigma$	
	4.48 ± 0.671		4.44 ± 0.698		4.52 ± 0.653	
	n = 52	%	n = 27	%	n = 25	%
1	0	0	0	0	0	0
2	0	0	0	0	0	0
3	5	9.6	3	11.1	2	8
4	17	32.7	9	33.3	8	32
5	30	57.7	15	55.6	15	60

Source: Authors' own elaboration

**Table 7.** Evaluation of *Arribes del Duero* Natural Park

Score	Global $\bar{X} \pm \sigma$	Dimension 1: Water-based activities $\bar{X} \pm \sigma$		Dimension 2: Nature $\bar{X} \pm \sigma$		Dimension 3: Activities $\bar{X} \pm \sigma$	
	4.50 ± 0.917	4.34 ± 0.999		4.80 ± 0.431		4.29 ± 1.170	
n = 218	%	n = 79	%	n = 81	%	n = 58	%
1 8	3.7	4	5.1	0	0	4	6.9
2 1	0.5	0	0	0	0	1	1.7
3 13	6.0	6	7.6	1	1.2	6	10.3
4 48	22.0	24	30.4	14	17.3	10	17.2
5 148	67.9	45	57	66	81.5	37	63.8

Source: Authors' own elaboration

reminded me of the Norwegian fjords that I visited not long ago). Another thing to see are the local industries: oil mill, olive press, cheese factory, bakeries with wood oven, etc. It is worth buying their products. The dams are very interesting, highlighting the immense engineering work of the Almendra dam”.

## 5 Discussion and Conclusions

Technology is an essential factor for marketing and for determining the image of tourism destinations, TripAdvisor is an important tool that helps understanding the perception of visitors in relation to tourism destinations. Being one of the evaluated items the natural parks in OTR, this study aimed to analyse the image of three border parks (Portugal and Spain) through TripAdvisor reviews.

Different studies demonstrate the positive destinations evaluation [8, 13, 24] from the analysis of TripAdvisor, using text mining. Using the same methodology of these previous studies, the present study can positively assess the cross border national parks. The three parks presented a similar positive evaluation. Comparable studies have also revealed this positive image of natural parks such as USA [5] and on Poland [6]. In these two cases, the evidence of a positive evaluation was through word clouds that highlighted the positive feelings towards the experience in these places.

Based on the methods applied, namely the LDA with the use of KNIME, the some conclusions remarka demonstrate that the analysed parks present a very positive evaluation in TripAdvisor when considering the mean ratings obtained (4.47 points  $\pm$  0.703 for *Montesinho* Natural Park; 4.48 points  $\pm$  0.671 for Douro International and, 4.50 points  $\pm$  0.917 for *Arribes del Duero*) It was also evidenced that visitors value the natural aspects since the dimension of nature was presented in two cases and the activities practised in these parks are also an aspect to be considered.

Other conclusion is that the characteristics of each park influenced the dimensions of the analysis. For example, in the Spanish case, there is an emphasis on aquatic activities, which is due to the park's characteristics. Similar results were found in other studies, such as the case of US National Parks in which one of the dimensions identified was water-based activities [5]. A practical implication of these findings is that these results can help managers and planners identify and minimise the weaknesses as well as maximise strengths in their marketing strategies to attract demand to the parks.

The just use of TripAdvisor can be presented as a limitation of this study. In this sense, in future studies is suggested to extend the analysis to reviews of other OTR's. Nature-based tourism, specially in natural and national parks became focal points in the pos pandemic period. In this sense, other suggestion for further studies is to apply the method of this study in other realities.

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