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Tourism and ICTs: Advances in Data Science, Artificial Intelligence and Sustainability

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Analysis of the Opinions of Users of the Tripadvisor Web Platform on the Cultural Tourism Resources of Málaga



Marco Antonio Soto-Rumiche  and José Luis Caro 

Abstract This study analyses the experiences of visitors to cultural tourism resources in the municipality of Malaga (Spain) through sentiment analysis. The online reviews shared by visitors on TripAdvisor and other platforms are relevant to know the valuation of users, being an influencing factor in decision-making by other users. The aim of this research work is to shed light on the online reputation of the cultural heritage of the city of Málaga through reviews on social networks or TripAdvisor opinion web platforms. The basis of the study were the reviews issued by TripAdvisor users, expressing the satisfaction and emotions experienced in the experiences at the destination, focusing interest on museum exhibitions, and highlighting the architectural spaces that complement the visit. Likewise, our results highlight that the emotions and feelings experienced are mostly positive in visits to heritage monuments, highlighting the historical value and the synergy with green areas as an ideal complement that make up the urban landscape of the city of Malaga. The findings of this study will not only contribute to the existing literature on consumer behaviour towards online reviews but may also provide valuable information for organisations involved in the cultural tourism sector.

Keywords Online reputation · Online reviews · Cultural tourism · Data mining · Museums

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1 Introduction

The impact of online reviews, which are part of electronic word-of-mouth or *eWOM*, through user-generated content (UGC), has significance because of the large-scale accessibility and versatility of content across communities with diverse interests (Verma & Dewani, 2021), serving as indicators of the quality of tourism services (Yang et al., 2018). Such reviews have become an integral part of users' decision-making process towards experiential goods (Chu et al., 2022), which have denoted an influencing factor in consumer behaviour (Cox et al., 2009), generating a bond of trust towards the experiences conveyed on review web platforms.

This research analyses the state of mind of TripAdvisor reviews, referring to the cultural tourist resources that configure the tourist offer of Malaga, which are ideal for the current study, through data mining, as they are unstructured texts. For this purpose, a qualitative analysis is carried out, examining the content, the themes of the reviews, and the feelings expressed by the users. By delving into the qualitative aspects of the reviews, this research aims to provide a deeper understanding of the impact of the reviews on the image of Málaga as a destination.

2 Literature Review and Research Background

2.1 *Cultural Tourism in Málaga*

The tourist destination of the municipality of Málaga, which is primarily constructed on the “sun and beach” binomial, is one of the references that has positioned Málaga as one of the relevant points of the tourist offer of the Costa del Sol. However, over the last few decades, Malaga has undergone considerable progress in the cultural sphere, and the revaluation of heritage monuments, whose interventions have placed cultural tourism as the second reason for visits (Costa del Sol Málaga, 2021).

The search for diversification of opportunities in tourism development is accompanied by the initiatives established in the various tourism plans that Málaga has, the latest being the Málaga 2030 Strategic Plan, which shows the commitment to cultural tourism in the last decade, generating the development of other segments such as meetings and congresses (Fundación CIEDES, 2023). The presence of cultural spaces that form part of Malaga's tourist offer has placed it in third place among Spanish cities, corresponding to the cultural offer in 2021, with 53.6%, behind the cities of Madrid, with 88.9% and Barcelona, with 66.3% (Fundación Contemporánea, 2022).

2.2 TripAdvisor, Relevance of Reviews for the Tourism Sector and Sentiment Analysis

TripAdvisor is one of the social networks for travellers, containing more than 1 billion comments and reviews from almost 8 million businesses affiliated with the platform (TripAdvisor, 2021). This platform is considered one of the early adopters of Web 2.0, as its information and advice indexes are simultaneously built from accumulated opinions (Valdivia et al., 2019).

Experiences, transmitted through opinions and reviews shared by users of the TripAdvisor web platform, are part of online reputation, highlighting the connectivity between users without pre-existing associations (Baggio et al., 2008); whose only connections are based on sharing reviews of experiences. These interrelated connections, through online dialogue, are a factor that influences decision-making by other users (Rubio Gil et al., 2017); highlighting the values of credibility in the face of unbiased opinions and, in addition, reliability causing an increase in the prominence of options towards decision-making (Gavilan et al., 2018).

In a report by TripAdvisor, (2022), the users reported recognition of the value of reviews as descriptive and useful, as well as the accuracy of the content across a wide range of travel information. These qualities have granted trust to the qualitative content of the reviews, whose distinctiveness is part of the image of a collaborative digital tool that is useful for tourism (Minkwitz, 2018) and popular among tourism users and researchers (Taecharungroj & Mathayomchan, 2019).

2.3 Social Media Sentiment Analysis

The opinions issued on review web platforms reflect quality on a certain scale, being sufficient to capture sentiment (TripAdvisor, 2021); they are complemented by the sentiment of trust through indicators that provide veracity in the comments, ranging from personal information to actual images, locations, and dates of access to the website (Lee et al., 2018). Through qualitative interpretation, based on text mining or sentiment analysis, they can be developed into two types of studies: the word-level study, in which the analysis relies on the detection of keywords and lexical affinity (Poria et al., 2012), and the concept-level study, which considers the expressions coming from different words (Qazi et al., 2016).

Currently, there are several proposals in the current study and analysis of sentiment that cover the qualitative aspect, ranging from the search for keywords to verifying correlations between terms that can generate terminological guidelines (Delvizio, 2018). The aim of the conducted studies on sentiment analysis is to determine the emotions and personality of the wording on specific topics (Ray et al., 2021). Obtaining results through sentiment analysis has been useful in the formulation of various recommendations and predictions, such as the proposal made by Hu et al.

(2017) formulating a multi-text summarisation technique to identify the most reiterative phrases in hotel reviews. Likewise, the results obtained can be oriented towards the determination of predictions, through the usefulness of the opinions and resorting to the classification technique (Lee et al., 2018). However, the authors Farhadloo et al. (2016) determine that one of the challenges in the qualitative study of reviews lies in understanding the aspects and determining a relationship between the feelings associated with the aspects found or the state of mind of tourists (Li et al., 2018).

3 Data and Methods

This study has considered the reviews transmitted on the TripAdvisor web platform, popularly accepted by tourists and managers (Valdivia et al., 2017); and whose information has significant effects on decision-making by other users (Seok et al., 2020). For this purpose, online reviews have been analysed in Spanish using the phrase “cultural tourism in Málaga” on *TripAdvisor.es* to understand the perception of users towards the cultural tourism resources that form part of the tourism offer of the municipality of Málaga, from 2017 to 2022, compiling a total of 18.227 reviews. In terms of user ratings, 83% were positive (excellent and very good); 11% corresponded to neutral opinions (normal) and 3% to negative ratings (bad and very bad), demonstrating the high level of acceptance and satisfaction in the users’ experiences.

For the treatment of the extracted texts in a crude manner, far from any formal structure, the data structuring has been employed, as proposed by the authors Farhadloo et al. (2016), intending to obtain semi-structured data, following the interest of the analysis of the sentiments of the reviews on TripAdvisor.

The first step was to analyse the TripAdvisor ratings quantitatively, segmenting them into positive (excellent and very good), neutral (normal), and negative (bad and very bad) ratings according to the categories of the cultural tourism resources, as shown in Table 1. The findings show that most of the users’ opinions are positive, which indicates a high level of satisfaction in visiting these cultural resources.

Demonstration through visualisation of sentiment analysis data from reviews, as an important part of the analysis of the macro data, as observed by Cheng and Jin (2019), has been implemented through the *KH Coder* software, a programme that enables qualitative content analysis or text mining, employed in this research, responding correctly to tourism-related texts (Povilanskas et al., 2016; Jurkus et al., 2022).

4 Results

Based on word frequency analysis using the *KH Coder* software, as shown in Table 2, seeds of sentiments are visible, which are the nouns that place us in the positive or negative context of the image of cultural tourism resources. The positive terms with

Table 1 Percentage evaluation of the reviews according to the categories of cultural tourism resources in the municipality of Malaga

Categories	Positive (%)	Neutral (%)	Negative (%)
Wineries and vineyards	90.1	6.1	3.8
Castles	86.1	11.4	2,6
Civic centres	97.7	0.0	2.3
Churches and cathedrals	88.4	9.1	2.5
Architectural interest	79.5	13.7	6.8
Gardens	85.7	9.1	5.2
Art museums	78.9	15.4	5.8
History museums	91.2	7.7	1.1
Specialised museums	91.3	5.7	2.9
Landmarks and points of interest	81.6	15.2	3.2
Archaeological sites	79.7	18.8	1.5
Theatres and performances	89.1	5.8	5.1

Source Own elaboration based on the results of this research, 2023

the highest number of frequencies are the following: *good* (1063), *interesting* (934), *nice* (859), *best* (566), *great* (548) and *recommended* (542); which convey positive and favourable feelings about the image of the resources analysed. In addition, these expressions reflect the level of satisfaction of visitors to the cultural spaces, with the comments being overwhelmingly positive, emphasising the positive feeling towards the museum spaces in a more proportional manner.

However, terms also have been detected that attribute a negative sentiment status with less than 200 recurrences, referring to the terms *full* (147) and *expensive* (126); in direct relation to the categories of wineries and vineyards and churches and cathedrals. Another group of comments expressed the following terms in relation to the rest of the cultural tourism resources, such as *bad* (122), *incomplete* (29), *poor* (27) and, finally, the term *scarce* (26).

In Fig. 1, the co-occurrence network graph of the reviews is presented, emphasising the semantic aspect and the high degrees between the terms. The result, using the limit of 120 co-occurrences, has shown a relationship between 57 words (N), with a density of 0.075. Based on the co-occurrence study, 7 subgraphs could be detected, the first one being museums, linking the expressions **interesting*, **great*, **good*, **art*. Likewise, the terms **car*, **collection*, **building* and **old*, are associated with the Automobile and Fashion Museum, as it is one of the spaces with a high index of positive valuation and favourable reviews, giving favourable recognition to the permanent collection it hosts and the architectural value of the space, in relation to the old building of the Royal Tobacco Factory or locally known as “la tabacalera”.

The second sub-graph corresponds to the image of historical monuments, which have been related to the feelings of **recommendable*, **worthwhile*, **best*, **precious*, **impressive*; highlighting the places of Gibralfaro and Alcazaba, obtaining a higher

Table 2 The most common words for cultural tourism resources in the municipality of Malaga, found in TripAdvisor reviews

Positive	Frequency	Positive	Frequency	Negative	Frequency
Good	1063	Malagueño	221	Full	147
Interesting	934	Wonderful	202	Expensive	126
Nice	859	Incredible	173	Bad	122
Best	566	Great	167	Incomplete	29
Great	548	Unique	162	Poor	27
Recommended	542	Magnificent	161	Scarce	26
Beautiful	438	Pretty	157	Worse	23
Impressive	343	Important	156	Unpleasant	22
Old	332	Permanent	148	Dirty	21
Spectacular	310	Curious	147	Indifferent	14
Excellent	302	Cultural	136	Horrible	10
Pleasant	300	Different	131	Uncomfortable	9
Essential	274	Wide	123	Rare	9
Free	271	Greater	117	Nefarious	8
Large	260	Complete	116	Dark	8
Roman	250	Lovely	115	Terrible	8
Temporary	237	Friendly	101	Terrifying	8
Historical	223	Original	101	Embarrassing	8

Source Own elaboration based on the results of this research, 2023

degree of correlation coefficient with the terms **spectacular* and **views*. The terms theatre and Roman, appear as another sub-graph; however, they have a strong link of co-occurrence with the historical monuments, which is why they have been included in this segment.

Subsequently, the third sub-graph corresponds to the state of feelings of the most emblematic resources that compose the spaces of the historic centre, having a direct co-occurrence with the terms **historic*, **street*, **plaza*; in addition, the Cathedral is related to the terms **palace* and **nice*. The term Picasso has a high rate of co-occurrence with **nice*, which alludes to the Picasso Museum in Málaga, followed by the expressions **house* and **square* in relation to the geographical location of the Málaga artist's house-museum.

The fourth sub-graph corresponds to visits to monuments, where the term *entrance ticket* is highly correlated with the terms **opinion*, **free*, **Sunday*, **time* and **price*. Such expressions demonstrate an interest in the time slot of free visits to museums and historical monuments.

The fifth sub-graph is related to the favourable comments on the satisfaction of visiting cultural tourism resources with the expressions of **staff*, **rooms* and **children*. It is worth specifying the didactic factor of these resources in relation to



Fig. 1 Network of co-occurrences of reviews issued on TripAdvisor

the experience of children. Lastly, there are the terms **walk* and **pleasant*, which demonstrate the high rate of satisfaction on the part of the users.

Finally, a correspondence analysis was carried out, as shown in Fig. 2, to visualise the relationships between the dimensions of the reviews, through the experiences towards the cultural tourism resources of the municipality of Málaga, where the expressions that accompany the experience of museums, are characterised by **exhibition*, **interesting*, **great*. As far as historical monuments are concerned, we can see that Alcazaba, the Roman theatre, the Castle and Gardens of Gibralfaro are related to the experiences of **views* and **wonderful*, **spectacular* and **walking*; in addition, there is a valuation in the correspondence between the terms of the city with the expression of **impressive*.

Likewise, about the historic centre, experiences are characterised by the terms **precious* and **beautiful*; and churches and cathedrals, together with the expressions **essential* and **impressive*. In reference to the words emitted towards the museum spaces in Málaga, they are: **art*, **great*, **collection*, **work*, **interesting*, **great*, **painter*.

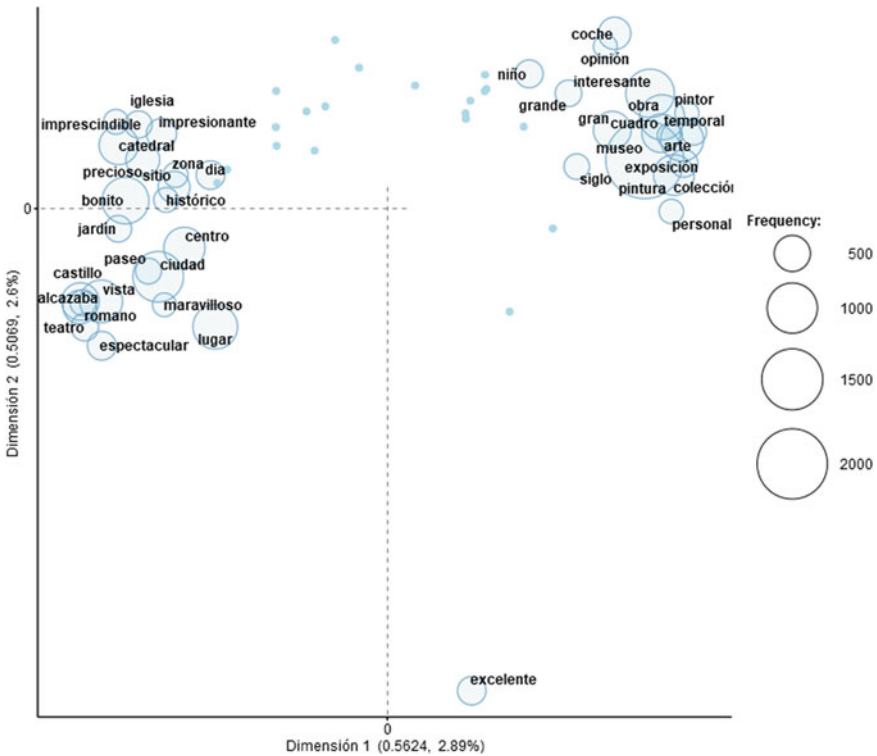


Fig. 2 Correspondence analysis between the experiences and the cultural tourism resources of the municipality of Málaga

5 Conclusions

The study and sentiment analysis of the reviews transmitted on TripAdvisor towards the cultural tourism resources that form part of the tourism offer in the municipality of Málaga, based on a qualitative study, have shown the high approval and high level of satisfaction of visitors, whose reviews demonstrate that users tend to evaluate the experiences globally, confirming the conclusion of Valdivia et al. (2019).

The opinions reflected the interest in the monumental heritage assets distributed throughout the city of Málaga, expressing admiration and appreciation for the symbolic connection (historical), demonstrating the visitor’s empathy towards the cultural heritage, and, in addition, appreciation for the state of conservation of these monuments. The reviews issued towards the museums recognise the variety of the collections they host, both permanent and itinerant, highlighting the works of local artists (such is the case of the Museum of Málaga and the Picasso Museum), adding the textual emphasis of “good and interesting exhibitions”. Likewise, there is a group of visitors who emphasise the architectural value of the museums as an added value

of the tourist resource, as is the case of the Automobile and Fashion Museum, recognising good practices in the conservation of an industrial monument for museum purposes. Similarly, the comments show a high rate of appreciation for the environmental component (gardens), in complementarity with the monumental cultural heritage, reflecting a positive assessment of destinations committed to sustainability, through the protection of green areas. This conclusion ratifies the research of authors Nowacki and Niezgoda (2023); on visitors' interest in nature, possibilities of contemplation and connection with the environment, and intangible values concerning nature tourism (Teles da Mota & Pickering, 2020).

There is also an emphasis on enquiries about the economic value of tickets for cultural tourism resources, confirming the research carried out by TripAdvisor (2021), which stipulates that 44% of visitors resort to the description of places and 36% to enquiries about the cost of tickets, as elements prior to trip planning, with the aim of making a more precise budget.

Another point to highlight is the recognition of the pedagogical factor in the management of cultural tourism monuments, which continue to disseminate content in a didactic manner for a diverse public, with appropriate information and, in the case of museums, with recreational activities for the attention of the younger public.

Overall, online reviews on TripAdvisor and other opinion platforms are relevant for a better understanding of the language of reviews and are indispensable for the tourism sector, as stated by authors Bridges and Vasquez (2018). Online reviews not only have an impact on the decision-making of other tourists but also influence how the entities in charge manage their offers. Similarly, reviews can provide insights into initiatives to promote authentic and enriching experiences, with the aim of preserving cultural heritage and encouraging sustainable practices.

The current study reveals several research topics. Firstly, comparative studies using machine learning. Secondly, using variables such as descriptions, the responsibility of the resource management bodies towards users and the sustainability of resources, with special attention to the divergences that exist between the information considered relevant by users and that prioritised by the TripAdvisor web platform. In addition, linguistic and semantic analyses of the use of different languages in tourism social networks.

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technological nutrients), making and consuming or using to minimise the loss of materials and energy (Centro de Innovación y Economía Circular, 2023).

Artifact, process and organisational technologies (Villalba, et al., 2022) contribute to the transition towards a circular economy that ensures added value and sustainability. According to Schröder et al. (2020) the triumph of the transition towards CE is related to the widespread use of Industry 4.0 technologies, such as blockchain, cloud computing, big data analytics, among others. The author adds that the generation and dissemination of information on the waste stream promoted by Industry 4.0 technologies is fundamental to increase recycling rates instead of final adoptions such as landfill and incineration. All of the above with potential application to the tourism industry in terms of circular economy.

Vargas-Sánchez (2021) also mentions that:

“Artificial intelligence is also entering restaurants, more specifically their kitchens. Thus, with machine vision technology, chefs can make better decisions in order to drastically reduce both food waste and the costs of their activity” (p. 123).

2.2.3 Empirical Research on the Circular Economy

This section presents various measures to assess CE practices at the organisational level and the authors' conclusions based on the findings.

Zhu et al. (2010) presents a measure to assess CE practices, adapted from various authors, validated with expert opinion: academics, civil servants and industrial managers to verify the appropriateness of the questionnaire items and the understanding of the questionnaire, with the dimensions: Internal Business Management, Eco-design and Return on Investment. Taking this scale as a background Botezat et al. (2018) conducted a research to identify the relationship between the cooperation between the members of the eco-oriented supply chain and the practices and performance of Romanian producers with respect to the implementation of the principles of CE, they conclude that the type of cluster to which a producer belongs influences its CE practices.

Mura et al. (2020) developed a 7-point Likert-type scale to inquire about the CE practices that have been implemented in Italian SMEs, the main constraints and facilitators for the adoption of CE and sustainable business practices. They conclude that CE practices are not being widely implemented in the companies that participated in the study due to the perception that they increase costs in the organisations.

In another study, Broche-Fernández and Ramos-Gómez (2015) present a methodological instrument to quantitatively and qualitatively assess the environmental performance of small and medium-sized enterprises in the hotel sector in Cuba that includes indicators related to CE, such as: total consumption of materials, packaging, energy and water; as well as the amount of waste for disposal and recycling. Likewise for the tourism sector, Cornejo-Ortega & Chávez (2020) designed a questionnaire to measure the knowledge about CE and CE certification processes of owners and managers of restaurants and hotels, in their study they conclude that less than 50% of the participants are aware of the elements of CE and only 51.5% consider that CE

certification should be unavoidable. A study on return on investment for food waste reduction involving 700 companies from 17 countries that considered restaurants and hotels, the results reported that 99% of businesses had a positive return, where the sites with the best returns tend to be restaurants between 5:1 and 10:1 (Hanson & Mitchell, 2017), a result that is important to disseminate, to eradicate the belief that environmental conservation practices only generate costs.

3 Conclusions

The CE model is starting to be aired in the tourism sector, however, it is imperative that all actors in this sector contribute to the transition towards sustainable business models, where CE is a significant alternative to achieve this.

Hotels, restaurants, and other businesses in the tourism sector should initiate or consolidate actions such as the design of green services and internal environmental management that foster commitment to environmental issues through processes throughout the value chain that promote a circular approach.

The literature review identifies that most of the research instruments to assess CE practices have content validity through expert judgement and some with reliability tests of Conbranch's Alpha, but there are few studies with construct validity tests or structural equation models that relate variables that influence CE.

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