

# How safety affects destination image projected through online travel reviews

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## Abstract

Destination image is a key factor for attracting tourists and wealth to destinations. With the spread of Web 2.0 and traveller-generated content, destination management organisations do not control the information regarding destination image formation through its cognitive, affective and conative components. The aim of the study is to analyse, using natural-language processing techniques, whether the terrorist attack of August 2017 and the Catalan sovereignty process, which took place during the last quarter of 2017 in Barcelona, harmed the online destination image perceived and transmitted by tourists, through language recognition, frequency analysis and term categorisation of more than 150,000 online travel reviews, written in English, Spanish, French, German or Italian, posted on a shared-lodging platform. The findings show that visitors did not fear for their personal safety despite the seriousness and immense international media coverage of both events. The opinion of tourists, shared through online reviews, can help companies to improve the supply of goods and services.

**Keywords:** Destination image online; terrorism; political instability; image-formation agent; big data analytics; sentiment analysis; Airbnb; Barcelona

## INTRODUCTION

Due to the importance of tourist destination image (TDI) to attract visitors and prosperity to territories, destination marketing and management organizations (DMO) strategically manage their communications aiming to generate a positive image (Morgan, Pritchard, & Piggott, 2003). When a positive image of a destination is generated the likelihood of visiting it increases (Lee & Gretzel, 2012). In fact, it has been widely shown that TDI has a strong influence on tourists' opinions and choosings (Nadeau, Heslop, O'Reilly, & Luk, 2008). For this reason, DMOs communicate their identity and their brand attempting to distinguish themselves from competitors and create a positive image (Govers, Go, & Kumar, 2007). With the rise of information and communication technologies (ICTs) in the twenty-first century and the spread of social media and review sites, tourists share their experiences and reviews, thereby, contributing to the co-creation of TDI (Jabreel, Moreno, & Huertas, 2017). Thus, DMOs do not control all the existing information in the creation of TDI. Moreover, DMOs do not control other external factors such as political instability or terrorism that can cause crises and influence TDI formation (Oliveira & Huertas, 2019).

On one hand, the spread of Web 2.0 and traveller-generated content (TGC) on social media co-create TDI. Among all the content generated by users, TGC and online travel reviews (OTR) have especially proliferated (Baka, 2016; Marine-Roig, 2017a) as the most frequently consulted digital information by users or tourists planning trips (Yoo & Gretzel, 2008). Now a vast amount of TGC (big data) is available, in a diversity of formats and languages. Moreover, TGC has great credibility because it is perceived as unbiased by economic interests (Ayeh, Au, & Law, 2013). In addition, tourists are co-creators of experience images (Prebensen, Vittersø, & Dahl, 2013), and these experiences generate emotions (Tung & Ritchie, 2011), which at the same time have a positive impact on other users due to the socialisation that they involve (de Rojas & Camarero, 2008). For these reasons, TGC has more influence on the co-

creation of destinations' images (Lu & Stephenkova, 2015) and on tourists' decisions (Liu & Park, 2015) than the official information provided by DMOs (Papathanassis & Knolle, 2011).

On the other hand, some unforeseen events or incidents, such as terrorist attacks and political turmoil, do not depend on DMOs and can create crises and negative impacts on destinations' images (Avraham, 2015). TDI may deteriorate as a result of a crisis (Beirman, 2016; Oliveira & Huertas, 2019). In fact, destinations attract tourists when they are safe and do not imply any risk to their health and safety (Fuchs & Reichel, 2011). Thus, safety is an important attribute, item or descriptor of TDI measurement. With a lack of safety or the existence of any risk, an image of insecurity and, in turn, reduced attraction of a destination is created (Avraham & Ketter, 2013), and tourism demand decreases (Araña & León, 2008; Rittichainuwat & Chakraborty, 2009).

The study analyses Barcelona because it is a leading tourist destination with an image among the top tourist destinations globally (Marine-Roig & Anton Clavé, 2015). Before the Covid-19 crisis, Barcelona, capital city of Catalonia, had a large and growing influx of visitors, as overnight stays in hotels show: 18,537,358 in 2015; 19,590,241 in 2016; 19,688,076 in 2017; 20,201,770 in 2018; and 21,332,210 in 2019 (INEbase, 2020). Moreover, the terrorist attack on 17 August 2017 (BBC News, 2017; Bolon, Karasz, & McKinley, 2017; Patta, 2017) and the unrelated Catalan independence process that followed (Dewan, Cotovio, & Clarke, 2017; Jones, Burgen, & Graham-Harrison, 2017; Minder & Barry, 2017) received immense international media coverage and could have created an image of insecurity in the destination. For this reason, it is necessary to analyse what effect these events had on the image of Barcelona, during the second half of 2017, through the analysis of TGC.

Given that TGC has a great influence on the co-creation of TDI, the objective of this study is to explore to what extent these events affected the image perceived and transmitted by visitors through OTRs from a P2P accommodation platform, in several languages (English, Spanish, French, German and Italian), posted between 17 August and 31 December, during the years 2016, 2017 and 2018. In this way, the study will use natural language processing (NLP) techniques to analyse the TDI segmenting by language and to compare the results of the study period with the same period during the previous year, 2016, and the following year, 2018.

The article has the following structure: first, the theoretical background of TDIs through the critical review of related literature, highlighting the TGC as a TDI formation agent and safety as an attribute of TDIs; second, the description of the case study, and the collection and arrangement of the data; third, the NLP methodology including language recognition and quantitative content analysis of OTRs; fourth, results, discussion, and concluding remarks; finally (Annex), the definition of some key terms.

## **THEORETICAL BACKGROUND**

From the seminal work of Lynch on the image of cities (Lynch, 1960), the study of TDI was began to develop in the 1970s (Goodrich, 1978a; Gunn, 1972; Hunt, 1971) and has continued so far (Chon, 1990; J. Li, Ali, & Kim, 2015; Picazo & Moreno-Gil, 2019; Steve Pike, 2002) since the authors agree that perceived TDI is a key factor in holiday destination choice (Goodrich, 1978b; Hunt, 1975). In short, TDI is "the sum of beliefs, ideas and impressions that a person has of a destination" (Crompton, 1979, p. 18). In the 1990s, several authors (Baloglu & McCleary, 1999; Echtner & Ritchie, 1991; Jenkins, 1999) built a theoretical model of TDI from different perspectives. One of the most widespread models among researchers was designed by Gartner (1993) and presented the main concepts studied up to that time. Basically, it includes image components (cognitive, affective and conative), and classifies and defines the image-formation agents: induced (overt and covert induced information emanating from destination promoters), autonomous (independently produced reports, films, and newspapers) and organic (unrequested and solicited information received from persons mainly through word-of-mouth, or WoM, communication). Recently, other authors (Kislali, Kavartzis, & Saren, 2020; Marine-Roig, 2019) have analysed TDIs from a holistic perspective.

### **Traveller-generated Content as Image-Formation Agent**

Web 2.0 has been characterised by a spectacular development of social networks and, therefore, by an exponential increase of user-generated content (UGC). Based on the theory of social influence studied

in the field of psychology, several authors have demonstrated the influence of UGC through social media on the behaviour of individuals (Viñán-Ludeña, de Campos, Jacome-Galarza, & Sinche-Freire, 2020). This phenomenon has led to a paradigm shift in investigation because, now, researchers, like other users, can freely consult online user experiences and opinions. In the field of Tourism and Hospitality, the content generated by travellers (TGC), mostly travel blogs and online travel reviews, stands out. Since TGC, disseminated through electronic word-of-mouth communication (eWoM), is consulted and considered by other travellers, it “constitutes a new and unsolicited organic image-formation agent in Gartner’s model” (Marine-Roig, 2019, p. 15). TGC contains visual (e.g. photos), textual (narratives and opinions) and paratextual (e.g. dates, locations, scores, languages) elements (Marine-Roig, 2017b). The content analysis of large amounts of visual data is usually through its textual (caption) and paratextual (date of photo and geographic coordinates) elements (Marine-Roig, Martin-Fuentes, & Daries-Ramon, 2017; Paül i Agustí, 2018). The main sources of TGC are travel-related websites (e.g. TripAdvisor), peer-to-peer (P2P) accommodation platforms (e.g. Airbnb) and online travel agencies (e.g. Booking) (Martin-Fuentes, Fernandez, Mateu, & Marine-Roig, 2018), as well as social media (e.g. Facebook) of destination marketing or management organisations (Ferrer-Rosell, Martin-Fuentes, & Marine-Roig, 2020; Huertas & Marine-Roig, 2015, 2016a, 2016b). The influence of each type of TGC source in the process of TDI formation (Martínez-Ruiz, Llodrá-Riera, & Jiménez-Zarco, 2018) and brand competitiveness (D’Auria & Tregua, 2020; Huertas & Marine-Roig, 2014) is different and varies depending on the phases of the journey (Huertas & Marine-Roig, 2018).

Although the English language is usually dominant, textual TGC is characterised by its diversity of languages. Another feature of TGC is the large amount of data available; for example, TripAdvisor’s portal presently (March 2020) hosts more than 859 million OTRs and comments in 28 languages on 8.6 million tourist resources.

### **Safety as a Destination Image Attribute**

Sönmez (1998) outlined 36 research studies focused on the relationship between tourism, terrorism and political instability and found that the authors were in agreement that political violence in its various forms was detrimental to TDI and, consequently, for tourist flows. The perception of risk directly influences the choice of international vacation destinations (Sönmez & Graefe, 1998). Further, safety, in the sense of personal safety or safety perceived by tourists, has been considered by multiple authors as a TDI attribute. For example, Ban (2016), based on 28 articles published between 1975 and 1996 compiled by other authors (Echtner & Ritchie, 1991; Jenkins, 1999), showed that, in 14 of the studies, personal safety was one of the attributes used to measure TDIs. By contrast, political stability appears only in three of the 28 studies. In another compilation of articles published between 1979 and 1999, Gallarza, Gil Saura and Calderón García, (2002) found that safety was among the most common attributes used in TDI studies. Through the content analysis of 18 interviews, Pike and Kotsi (2016) built a ranking of 21 common attributes and 'safe' appeared in the 19th position, while in a review of 84 TDI studies, from 1973 to 2000 (Steven Pike, 2003), 'safe and relaxing environment' appeared in fourth position.

Beerli and Martín (2004) classified the determining dimensions or attributes of perceived TDI. In the group of political factors, they included political stability and safety (crime rate and terrorist attacks). This research, developed in a Spanish tourist region, was accepted by a prestigious journal on 16 January and published online on 5 June 2004. On 11 March of the same year, three days before the general elections, Spain suffered the worst terrorist attack in its history, resulting in close to 200 deaths and more than 2,000 injuries. The government’s poor management of the crisis caused great political instability and unforeseen electoral results. In the same vein, Nadeau *et al.* (2008) included safety and political stability among the 62 scales designed to measure TDI in a country-image context, and Stepchenkova and Morrison (2008) included them in TDI factors. Other researchers (Bui, 2011; Hui & Wan, 2003) also included personal safety and political stability among the attributes of TDI. By contrast, several authors (Basaran, 2016; Kim & Richardson, 2003) considered only personal safety, and others (Eid, El-Kassrawy, & Agag, 2019) included terror and security risks in the category of political (in)stability. Finally, in a work on measuring destination image in survey studies, Dolnicar and Grün (2013) built the category ‘safe’ comprising several aspects, such as personal safety and political stability, related to the sense of security or safety of visitors and prospective tourists. This category of attributes, combined with

others noted above (Beerli & Martín, 2004), allows for a theoretical basis to analyse the impact of terrorism and political instability on TDI online.

Regarding the information sources that influence perceived safety, in addition to organic sources (WoM and eWoM) and induced sources (Govers et al., 2007; McNair, 2007), the authors highlighted the important role of autonomous sources and, specifically, of mass media (Cousins & Brunt, 2002; Hall, 2002). The assured publicity and extensive coverage by the media of attacks on tourists benefits the terrorist plans (Adeloye & Brown, 2018). Political turmoil also has persistent effects and can prevent travel to affected areas (Sönmez, 1998). The role of the media in the influence of public opinion and perception is fundamental for these issues. With its unintentional assistance, terrorists can effectively communicate their demands and objectives to large audiences who, otherwise, could never access. It should be underlined that the role of the media is paramount in the implementation of any anti-terrorist strategy (Paraskevas & Arendell, 2007).

## Literature Review on the Case Study

Regarding the impact on the tourism industry of the events that took place in Barcelona between 17 August and 31 December 2017, five recent studies can be highlighted:

- Markoulis and Neofytou (2019) studied the magnitude and persistence of terror attacks (including Barcelona 2017) on global equity markets, specifically on the airline, hospitality, and utilities industries globally. They concluded that the attacks on London Bridge and in Barcelona, both in 2017, triggered adverse market reactions unlike those of previous attacks in Europe.
- Perles-Ribes, Ramón-Rodríguez, Such-Devesa, and Moreno-Izquierdo (2019) studied the impact on influx and outlay of international tourists in Catalonia. They concluded that, during the last quarter of 2017, the independence process produced a decrease in arrivals and expenditure, but whether the impact was statistically significant could not be determined certainly.
- Benítez-Aurioles (2019) analysed the impact of both events (terrorist attack and independence process) on the Airbnb market in Barcelona, using a regression model with two foreign city markets representing a control group. She concluded that OTRs and revenues fell during the last quarter of 2017 and did not recover until the second quarter of 2018.
- Huertas and Oliveira (2019), and Oliveira and Huertas (2018, 2019) showed that DMOs, as induced image-formation agents, obtained no advantage of the interactive potential of social media to share information with users during the crisis, even though such information is decisive for destinations to produce an image of safety or to restore a damaged image.
- Gray (2019) notes the confluence between the terrorist attack and the Catalan independence movement, through the slogan '*No tinc por*' (I am not afraid) in response to both the terrorist barbarism and the reactions of the Spanish State to the secessionist process, considered authoritarian by pro-independence sectors.

## DATA AND METHODS

Given that TGC has a great influence on the co-creation of TDI, and also that there are certain external factors such as political instability or terrorist attacks that can create crises and negative effects on destinations' images (Avraham, 2015), the objective of the study is to analyse to what extent the terrorist attack of August 2017 and the Catalan independence process that took place during the last quarter of 2017 have influenced the perceived image of Barcelona transmitted by tourists through OTRs.

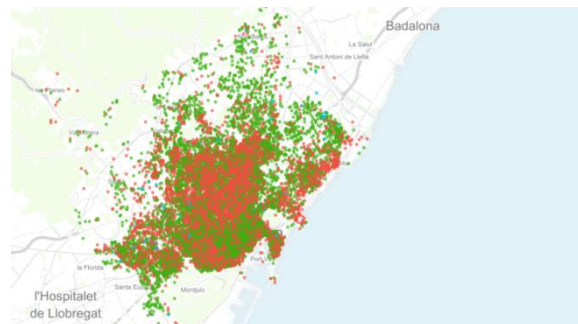
The study analyses 152,704 Airbnb OTRs on Barcelona in several languages (English: 108,064; Spanish: 22,132; French: 13,805; German: 4611; and Italian: 4092), posted between 17 August and 31 December during the years 2016, 2017 and 2018. This sample of languages represented 92.47% of the total reviews corresponding to the destination and period studied.

Due to the vast amount of TGC and data available on the Web (big data) and the diversity of languages present in textual OTRs, the study uses NLP techniques to analyse TDI segmenting by language and to compare the results of the study period with the same period during the previous year (2016) and the following year (2018).

### Incidents in Barcelona during the Second Half of 2017

Barcelona is a well-known tourist destination that maintains its image among the top positions of worldwide rankings (Datzira-Masip & Poluzzi, 2014) and receives a large number of tourists annually (Marine-Roig & Anton Clavé, 2015). It is also the capital of Catalonia, an outstanding Mediterranean destination. Barcelona has experienced problems related to touristification and gentrification, especially in the city centre, due in part to the proliferation of P2P accommodation (Blanco-Romero, Blázquez-Salom, & Cànoves, 2018; Martin-Fuentes, Marine-Roig, Cristobal-Fransi, & Ferrer-Rosell, 2019). For example, there are more than 18,000 properties registered on Airbnb listings (Figure 1).

Figure 1. Barcelona peer-to-peer accommodation properties registered on Airbnb



Note. Red: Entire home / apt (48.7%); Green: Private room (50.2%); Blue: Shared room (1.1%)  
Source: InsideAirbnb (Murray, 2019) under a Creative Commons (CCO 1.0 Universal) license

Firstly, the terrorist attack took place on the 17th of August in 2017, when, at 5:00 pm, a van ran into a large number of walkers on Barcelona's Las Ramblas boulevard. At least 15 people were killed and more than 100 injured by the hit-and-run. The attack was claimed by the Islamic State.

Secondly, the events of the Catalan independence process, known as '*el procés*', took place during the last quarter of 2017, when the Catalan government carried out a referendum to democratically decide whether civilians wanted the Catalonia's independence from the Kingdom of Spain, also known as the '1 October Referendum'. Although this was declared illegal by the Spanish state, it was still conducted. On the day of the vote, there were several clashes in polling stations when the Spanish National Police attempted to prevent people from voting. About 90% of Catalan voters backed independence, and the Catalan Parliament symbolically declared Catalonia's independence on 27 October. In response, the Spanish government completely dissolved the Catalan elected government, and called for regional elections of the Catalan parliament on 21 December 2017 (BBC, 2017). General strikes and numerous demonstrations for and against the independence of Catalonia took place. Finally, the process was halted, and the members of the Catalan government were exiled or imprisoned. Recently, demonstrations have continued to be organised to protest the sentences of the imprisoned politicians and social leaders.

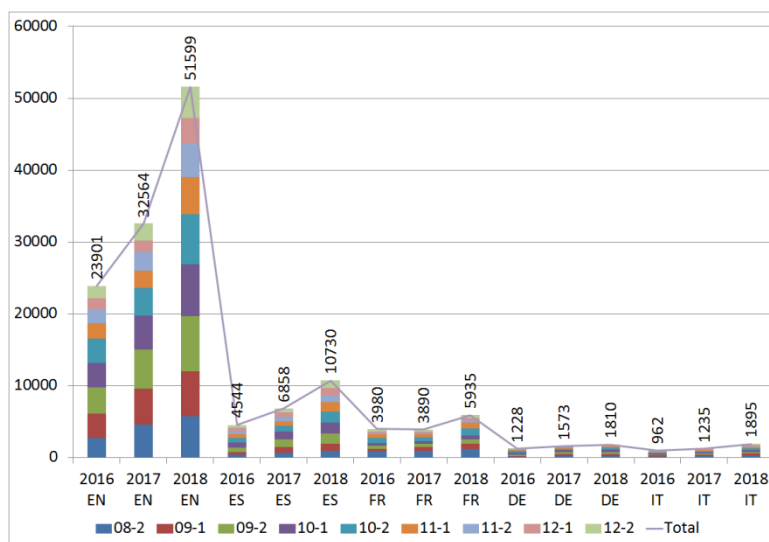
Both the terrorist attack and the Catalan independence process received immense international media coverage. Media also warned of decreases in tourism demand and economic losses related to the tourism sector (Guerrero, 2018) as a result of the incidents. All of them could have contributed to creating an image of insecurity in the destination.

## Airbnb Online Travel Reviews

Home-sharing lodging experiences are closely related to TDI perceptions (Shi, Gursoy, & Chen, 2019). Airbnb is the main P2P accommodation platform and offers a large number of OTRs, as well as a lot of information about the listed properties (Cheng & Jin, 2019; Martin-Fuentes et al., 2018). However, the structure of the Airbnb website does not easily allow a massive download of data. Because of this, OTRs (Figure 1) have been downloaded from Inside Airbnb (Murray, 2019): “No ‘private’ information is used. Names, photographs, listings and review details are all publicly displayed on the Airbnb site. This site claims ‘fair use’ of any information compiled in producing a non-commercial derivation to allow public analysis, discussion and community benefit”. Murray’s team does not depend on Airbnb and periodically and selflessly compiles the information hosted by the platform in multiple cities around the world. To ensure greater protection of personal data, these authors have replaced owners’ names by [host] in the OTR samples (Table 1).

Figure 2 shows the temporal evolution of the number of reviews by fortnights and languages. Since Catalonia is a seasonal tourist destination (Marine-Roig, 2014), the comparison is made with the same periods of the previous and following years.

Figure 2. Biweekly number of online travel reviews during the period studied



Source: 152,704 Airbnb OTRs posted between 17 August and 31 December 2016, 2017 and 2018

## Natural Language Processing (NLP)

TGC is highly useful as a source of data for analysing images perceived by visitors, as well as their satisfaction and loyalty in relation to the tourist destination (Marine-Roig, 2019). Sentiment analysis is the most widespread TGC analysis technique. The volume and complexity of data analysis requires automation. NLP techniques allow interaction between computers and human languages in order to digitally process and analyse large amounts of natural language data. In addition, while seeking “to make computers understand human language, NLP has become the essential tool for text data analysis and is undergoing fast-paced growing based on the applications of deep learning in word embedding, syntax analysis, machine translation, and text understanding. Machine learning-based NLP techniques have been widely used in tourism text analysis, with superior results” (Q. Li, Li, Zhang, Hu, & Hu, 2019, p. 2). The applications of NLP are innumerable but for the purposes of this study, the most interesting are: the recognition and translation of languages to be able to unify the dataset and perform content analysis based on common parameters (compound terms, stop words, lexicon, etc.); text segmentation or

tokenisation to divide the text into units of analysis; and stemming or lemmatisation to reduce or remove inflectional forms.

### Language recognition and English translation

Herein, the recognition of languages is based on a naïve Bayes classifier (Equation 1) from character unigrams, bigrams and trigrams (Table 1). Let there be  $n$  language classes:  $L_1, L_2, \dots, L_n$ . Let each text be represented by  $m$  feature vectors,  $X = x_1, x_2, \dots, x_m$ , with their language class labels. To predict languages, a sample text  $X$  is selected to belong to language class  $L_i$ , if and only if its final probability is greater than that of all other language classes (Equation 2):

$$P(L_i | X) = P(X | L_i) \cdot P(L_i) / P(X) \quad (1)$$

$$P(L_i | X) > P(L_j | X); \text{ for } 0 < j < n+1; j \neq i \quad (2)$$

in which  $P(L_i | X)$  is the posterior probability of a language class  $L_i$  given a sample text  $X$ ;  $P(X | L_i)$  represents the likelihood of a text  $X$  belonging to language class  $L_i$ ;  $P(L_i)$  is the prior probability of class; and  $P(X)$  is the predictor previous probability. That is, since  $P(X)$  is a constant for the known data set size, the denominator of Equation (1) can be ignored. Then, to calculate the total probability of a text, it is necessary to multiply each of the probabilities of all  $n$ -grams, which can produce results with an unmanageable number of decimal figures. Because the log of a product equals the sum of logs, one solution is working with the sums of logarithms.

Regarding  $n$ -grams (Table 1), the ‘Th’ digraph, for example, is very frequent in the English language and rarely used in other languages such as German, Spanish, French and Italian; instead, these languages use different vowels with nonexistent accents and diaeresis in English. The procedure comprises the following steps: first, a compilation of abstracts from the Wikimedia of each of the most frequent languages among the visitors to the tourist destination (Wikimedia, 2019) is downloaded; next, a profile is built for each language composed of  $n$ -grams (Table 2) and its frequency is determined, with the help of an NLP library (Shuyo, 2014); and, finally, the language of the OTRs is detected. Based on the aforementioned library implemented in Java, the programme filters noises, normalizes characters and extracts the  $n$ -grams of the text from OTRs, and detects the main language by comparing the frequencies in both cases. When the probability of the main language is insufficient, the programme calculates the probability of a second language. This is the case in regard to bilingual reviewers who usually add a translation of their language into English. For monolingual texts containing more than 10 words and using a linguistic corpus including all languages in the sample, the programme can perform classification with more than 99% accuracy.

Table 1. Sample of  $n$ -grams used in this study to detect languages.

N-gram	#	T	h	a	n	k	f	u	l	#
1-gram		T	h	a	n	k	f	u	l	
2-gram	#T	Th	ha	an	nk	kf	fu	ul	l#	
3-gram		#Th	Tha	han	ank	nkf	kfu	ful	ul#	

Note: # = word separator character

Table 2. Wikimedia corpus abstracts used to extract  $n$ -grams of main languages.

Language	Abstracts	XML file	Size (bytes)	N-grams
German (de)	2,361,997	dewiki-20191101-abstract.xml	2,316,401,465	1,177,672
English (en)	5,964,251	enwiki-20191101-abstract.xml	5,868,107,914	2,123,802
Spanish (es)	1,504,755	eswiki-20191101-abstract.xml	1,522,520,114	695,587
French (fr)	2,152,583	frwiki-20191101-abstract.xml	2,662,368,238	743,074
Italian (it)	1,563,165	itwiki-20191101-abstract.xml	1,620,541,295	618,712

Source: Compiled by authors from extensible markup language (XML) files (Wikimedia, 2019)

Once the languages were identified, the OTRs were translated into English using the Google Translator Toolkit. This computer-assisted translation tool allows the user to obtain quality translations, thanks to

the extensive databases using NLP. First, the text is divided into segments, and then, the tool searches for a previous human translation of the segment in the available databases. If a human translation is not found, it proceeds to the automatic translation of the segment.

Human translation of more than 44,000 posts would be very expensive. Google's translation tool allows you to get translations in a few minutes with acceptable accuracy for further content analysis based on counting and categorising key terms. In addition, some authors cited below have shown that the accuracy of Google Translate is almost comparable to that of human translations. Using the TOEFL (test of English as a foreign language) reading comprehension standard, Aiken and Balan (2011) found that Google Translate exceeded the minimum score required by American universities to students whose first language was non-English. In tests on 50 languages, they found that Google Translate was better performed in translations between Western languages. In 2016, Google substantially improved the conventional phrase-based machine translation (PBMT) system with the introduction of the Google's neural machine translation (GNMT) system. Wu et al. (2016) found that the new GNMT system obtained translations with much greater accuracy than the PBMT system and close to human (fluid people in both languages) translations. For example, on a rating scale from zero (*complete nonsense*) to six (*perfect translation*) and a translation from French to English, the GNMT system achieved an accuracy of 5.343 versus 5.404 obtained by human translation. Finally, Aiken (2019) replicated the aforementioned 2011 experiment and found an increase of about 34% in accuracy.

### *Quantitative content analysis of online travel reviews*

Content analysis is “a research technique for making for the objective, systematic and quantitative description of manifest content of communication” (Berelson, 1952, p. 18). The goal of any quantitative content analysis is to produce key category counts and measurements of the quantities of other variables (Neuendorf, 2017). Content analysis of OTRs is based on the categorisation of key terms and requires that terms be mapped “into a data matrix suitable for statistical analysis” (Roberts, 2001, p. 2697). The essential part of content analysis is the formulation of categories, i.e. groupings of terms with similar meaning or connotations (Weber, 1990). Content analysis succeeds or fails based on its categories (Berelson, 1952). According to classical doctrine, categories must be exhaustive and mutually exclusive (GAO, 1989). In the big-data age, when researchers work with many millions of words, it is virtually impossible to achieve completeness, but they can control mutual exclusivity. There are two methods for formulating categories: a priori coding and emergent coding (Stemler, 2001). In the first case, researchers build the categories with the help of thesauruses and, in the second case, they place the terms existing in the text into the categories to be analysed, starting with the most frequent ones.

The frequency analysis starts from the basis that the terms that are mentioned most frequently are those that reflect the greatest interest. The frequency analysis algorithm (Marine-Roig, 2019), implemented in Java, produces a CSV (comma-separated values) file with three fields: term, count and percentage of total words (including stop words). It uses non-alphabetic characters in working languages as word separators. The algorithm gives absolute priority to compound terms, for example, ‘not welcoming’ has preference over ‘not’ (stop word) and ‘welcoming’ (keyword). In the event that two compound terms overlap (e.g. Basilica of La Sagrada Familia vs. La Sagrada Familia), the algorithm gives preference to the first in the list.

The English language has few inflections and, therefore, stemming or lemmatisation processes are not necessary because the most common variants of a keyword can be included in the corresponding category (e.g. recommendations: recommend and recommended; warnings: avoid, avoidance and avoided). Thus, the frequency analysis of terms requires only two lists: the blacklist, with stop words such as determiners, prepositions, conjunctions, adverbs and pronouns that are not useful for the analysis; and the list of compound terms with their own meanings (e.g. gothic quarter, chill-out, cannot recommend, not stay here).

In this case study, the categories have been formulated by a combination of the two methods described above (a priori and emergent encodings). Cognitive categories have emerged, on the one hand, from the



words used by the English media to report the events and, on the other, from the preliminary analysis of frequencies using simple seeds: terror and attack for the category ‘terrorist attack’ and independence and referendum for the category ‘independence process’. Affective categories start from the lists of English adjectives that denote feelings and moods with positive and negative polarities, contrasted with dictionaries of synonyms and antonyms. Then, the preliminary frequency analysis allows checking to determine whether there are frequent terms that should be included in the categories (e.g. nouns and verbs with positive or negative polarity) and the existence of particles that change the polarity of the key terms. The quantitative analysis of the TDI components resulted from the following categories:

- **Cognitive:** 1) *attack*: key terms related to the terrorist attack (e.g. terror attack, terrorist attack, terrorist incident, attack on Las Ramblas, Ramblas attack, Barcelona incident); and 2) *process*: key terms related to the independence process (e.g. independence referendum, independence movement, independence vote, independence protests, referendum for independence, Catalan independence strike, Catalan referendum, independence crisis).
- **Affective:** 1) *feel+*: key terms related to positive feelings and moods (e.g. great, comfortable, happy); and 2) *feel-*: key terms related to negative feelings and moods (e.g. dirty, awful, disappointed).
- **Conative:** 1) *recom+*: key terms related to positive recommendations (e.g. look no further, never disappoints, recommend); and 2) *recom-*: key terms related to warnings and negative recommendations (e.g. be aware, not recommend, not welcomed).

Thus, sentiment analysis is based on the key term frequency table and the four previous categories (*feel+*, *feel-*, *recom+*, and *recom-*). In other words, the analysis does not take into account the intensity of the feelings but the percentage of key terms, with positive or negative polarity, in relation to the total of terms including stop words (Marine-Roig, 2019; Marine-Roig & Ferrer-Rosell, 2018).

## RESULTS AND DISCUSSION

The total line in Figure 2 shows a slight slowdown, during 2017, of the growth in the number of reviews posted. There is even a slight decrease in the case of reviews written in French. The result shown in Figure 2 contradicts that obtained in a previous study (Benítez-Aurioles, 2019) on the same events and data source but with different methods, where the author concluded that the number of reviews had dropped in the last quarter of 2017, because Figure 2 shows clear growth in OTRs in that quarter.

The reality is that, during the last quarter of 2017, official statistics (INEbase, 2020) detected a decrease in hotel overnight stays of 7.43% in relation to the same period of the previous year. However, it cannot be assured that the decline corresponds to the terrorist attack or the political instability. For example, the authors of one study (Markoulis & Neofytou, 2019) concluded that the terrorist attack had caused adverse reactions in the market, while the authors of another study (Perles-Ribes et al., 2019) claimed that the independence process had resulted in a decrease in arrivals and tourism expenditure in the same destination and period.

In relation to the frequency analysis of terms, Table 3 shows a great coincidence of keywords in the ranking of the three periods. Taking into account that almost nine million words from OTRs originally written in five different languages have been analysed, these results demonstrate that there are unconscious patterns of writing for this type of review. Some keywords (e.g. apartment, place, Barcelona) represent the cognitive component of TDI, while others (e.g. great, nice, good, perfect, comfortable) represent the affective component with an evident positive polarity. Finally, regarding the conative component of TDI, the keyword ‘recommended’, in twelfth position in the ranking of the three periods, represents the attitudinal loyalty of guests, while in later positions, guests express their intention to return in the future, representing their behavioural loyalty.

The most common key terms in Table 3 show that Airbnb OTRs are mainly focused on reviewing the quality of accommodations. Most authors agree to consider tourism-related services (lodging, dining, etc.) as attributes of the online image (Hlee, Lee, & Koo, 2018; Kwok, Xie, & Richards, 2017). Marine-Roig (2019) includes ‘facilities’ in the designative aspect of an all-encompassing model to measure

tourist destination images. In this case, ‘facilities’ include the features and amenities of the apartment where the reviewer stayed. Furthermore, the data in Table 3 serve as a basis for elucidating whether the serious events studied affected the satisfaction of the guests and the image projected online.

Table 3. Twenty most frequent key terms per years in percentage of total words

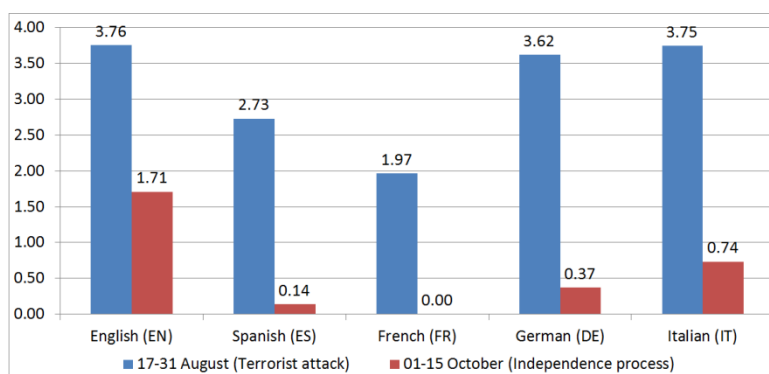
2016			2017		2018	
Rank	Key term	Percent	Key term	Percent	Key term	Percent
1	apartment	1.08152	apartment	1.02558	apartment	0.97920
2	<b>great</b>	0.71022	<b>great</b>	0.83816	<b>great</b>	0.89513
3	stay	0.62253	location	0.66984	location	0.79997
4	location	0.52018	stay	0.62789	place	0.68087
5	barcelona	0.50652	place	0.60867	stay	0.63854
6	<b>nice</b>	0.48645	<b>clean</b>	0.51406	<b>clean</b>	0.52633
7	place	0.44589	barcelona	0.49549	<b>nice</b>	0.50449
8	<b>clean</b>	0.43786	<b>nice</b>	0.48713	<b>good</b>	0.50145
9	<b>good</b>	0.42020	<b>good</b>	0.45507	barcelona	0.48101
10	host	0.37303	host	0.39016	host	0.42137
11	room	0.33741	room	0.38559	room	0.38087
12	<b>recommend</b>	0.30248	<b>recommend</b>	0.33316	<b>recommend</b>	0.35125
13	metro	0.29337	close	0.31312	<b>perfect</b>	0.28721
14	<b>perfect</b>	0.27038	metro	0.30668	close	0.28605
15	really	0.26325	<b>perfect</b>	0.27716	metro	0.28372
16	close	0.25908	<b>comfortable</b>	0.26289	really	0.25990
17	<b>comfortable</b>	0.25165	really	0.26042	<b>comfortable</b>	0.25897
18	located	0.24125	located	0.24559	located	0.24584
19	time	0.24031	time	0.21154	time	0.19975
20	<b>helpful</b>	0.21212	walk	0.20735	walk	0.19464

Note. Green: positive affective term; Blue: positive conative term

Source: 152,704 Airbnb OTRs posted between 17 August and 31 December. Total words: 8,775,021

Regarding TDI cognitive component categories, the majority of OTRs related to the events are concentrated (Figure 3) in the second half of August (terrorist attack) and the first half of October 2017 (independence process). The others are scattered throughout the next fortnights: 09-1 *attack* (1 in EN) and *process* (2 in EN); 09-2 *process* (4 in EN and 1 in DE); 10-2 *process* (3 in EN); and 11-1 *process* (6 in EN). As seen in Figure 3, the OTRs do not reach 4% of the total in the fortnight with the greatest impact of the terrorist attack or 2% in the independence process. In addition, French-speaking visitors are the ones who posted the fewest OTRs related to both events even though France shares a border with Catalonia. Therefore, the impact of events on the online TDI was minimal.

Figure 3. Cognitive component: online travel reviews on events (%) by fortnight and languages



Source: Airbnb OTRs posted during the second half of August and the first half of October 2017

Table 4 provides a random sample of paragraphs from the reviews written in English that refer to the terrorist attack or the independence process. The first three belong to the second fortnight of August and the following three to the first fortnight of October 2017 (see 1<sup>st</sup> and 2<sup>nd</sup> columns of Figure 3).

Table 4. Random sample of reviews written in English that refer to the events analysed.

2017-08-17. [...] We visited Barcelona during the Las Ramblas terrorist attack and I appreciated the management's written communication with us after the incident. They provided some emergency numbers and some advisement after the fact. Very sad time, but I found the apartment's response appropriate and helpful.
2017-08-18. [...] And even though our stay was marred by the August 17 terror attack we felt safe in this friendly community and heartened by [host]'s kindness and attentiveness when she rang concerned about our safety on Barcelona's darkest day. Thank you again to a gracious and thoughtful host.
2017-08-22. [...] We visited at a sad time for his city, but joined him in celebrating the spirit of Barcelona. The terrorists did not win! The people of Barcelona will not let violence diminish their spirit. [...]
2017-10-01. Short review: I would definitely stay here again. [...] Also, we checked out on Oct 1st 2017, when Catalan was voting for independence from Spain. We didn't know what to expect but [host] took us to the airport early in the morning because we were expecting protests, blockades, potential violence, etc. [...]
2017-10-02. [...] We were there the weekend of the Catalan Independence vote which was very interesting as we saw a couple protests and voters lined up, but we felt very safe and felt no danger in the neighborhood we were in! Overall good stay! [...]
2017-10-09. [...] If anyone is having any reluctance to visit Barcelona due to the current controversy over Catalan independence, I want to share that my family and I felt completely safe, and that the local people were very warm, despite the tension around the issue.

Source: Airbnb OTRs posted during the second half of August and the first half of October 2017

In Table 4, all safety comments have a positive polarity despite the circumstances, except for one (2017-10-01) that describes unconfirmed negative expectations. In addition, the induced and autonomous Spanish sources spread with insistence that Catalonia's pro-independence referendum was prohibited, while no reviewer called the referendum a forbidden or illegal vote.

Just as Table 3 shows matches between the positive key terms of the three periods of 2016, 2017 and 2018, Table 5 shows that the nine most frequent negative key terms are the same in all three periods, with small differences in order and percentage. Besides, the negative key term *problem/s* is more frequent in 2016 and 2018 than in the same period in 2017, which is one more indication that the serious events, which occurred in the last quarter of 2017, did not negatively affect the image of Barcelona projected through Airbnb reviews.

Table 5. Nine most common negative key terms in the three periods

Key term	2016		2017		2018	
	Rank	Percent	Rank	Percent	Rank	Percent
problem	127	0.05375	145	0.04760	139	0.04945
problems	277	0.02290	296	0.02161	306	0.02099
bad	352	0.01783	332	0.01903	286	0.02213
busy	313	0.02045	339	0.01861	343	0.01813
loud	436	0.01414	376	0.01678	323	0.01935
unfortunately	368	0.01736	395	0.01547	354	0.01737
touristy	607	0.00945	496	0.01172	565	0.01048
dirty	529	0.01100	539	0.01075	411	0.01514
uncomfortable	705	0.00786	585	0.01000	571	0.01038

Source: Zoom in on Table 3

Table 6 shows the results of the sentiment analysis of the two categories of the affective and conative components of the TDI, in relation to the reviews posted on Airbnb between 17 August and 31 December

2016, 2017 and 2018. The figures show the percentage of key terms in relation to the total words (including stop words) for each year. In relation to the previous year, in regard to the affective component, positive feelings increased 0.4%, while negative feelings increased only 0.01%. Looking at the conative component, positive recommendations decreased 0.02% and negative recommendations increased less than 0.01%. Given that the number of OTRs that commented on the events was minimal (Figure 3) and that the differences in the sentiment analysis (Table 6) were so small, it cannot be said that the events of 2017 significantly damaged the online TDI of Barcelona through OTRs posted on Airbnb.

Table 6. Summary of sentiment analysis in percentage of total words per year

Year	Affective component of the TDI		Conative component of the TDI	
	Positive feelings	Negative feelings	Positive recommendations	Negative recommendations
2016	5.38124	0.30402	0.64079	0.02316
2017	5.78085	0.31421	0.61661	0.02734
2018	5.93684	0.34034	0.62655	0.02817

Source: 152,704 Airbnb OTRs posted between 17 August and 31 December

## CONCLUDING REMARKS

Previous studies have shown that Spanish media, as autonomous sources, are positioned against the sovereignty process and have treated it negatively, even with belligerent and aggressive language, whereas Catalan media treated it more positively (Gili Ferré, 2014; Muñoz, 2014) and international media more neutrally (Pont-Sorribes, Perales-García, Mauri-Rios, & Tulloch, 2019). However, UGC on social media, as organic source, did not consistently treat the sovereignty process negatively. In fact, Anderson (2019) revealed the important role that social media played in the Catalan independence movement—namely, promoting the cause by facilitating the coordination of actions and creating the perception of a virtual community. Moreover, providing substantial coverage of the terrorist attack, mass media, acting as autonomous sources, did not help the TDI of Barcelona (Guerrero, 2018), and the DMOs, acting as induced sources, failed to seize the full potential of crisis communication through social media to recover the city's TDI following the attack. Thus, the DMOs of destinations that have experienced terrorist attacks and political turmoil but that have positive online reviews should make those reviews more visible in order to create a positive TDI during times of crisis.

The study has revealed that the influence of organic sources as online reviews is greater than that of mass media in the formation of online TDI. Thus, the methodology should be established among researchers and managers of destinations, especially ones that have experienced terrorist attacks and political turmoil, as a key tool for analysing TDI. Furthermore, analysis of tourist opinion, shared online through travel reviews, can help businesses improve their brand and supply of goods and services.

## Practical Implications

Firstly, the present study shows that, although autonomous and induced sources could have damaged the TDI of Barcelona, the organic sources (OTRs of visitors) did not damage it. The results revealed that the affective component is positive and that, in the conative component, visitors expressed their loyalty to the destination with positive recommendations and intention to revisit Barcelona. Consequently, in line with previous studies (Liu & Park, 2015; Lu & Stepchenkova, 2015; Papathanassis & Knolle, 2011), the study reveals that organic sources have a greater influence on TDI formation than induced sources such as DMOs.

Secondly, the study demonstrates that, despite the great influence of mass media (autonomous source) on public opinion (Habermas, 1991), their influence in TGC is not as important. The results show that very few OTRs discussed the terrorist attack (4%) and the sovereignty process (2%) are very few and that negative recommendations increased even less (0.01%). Consequently, the study has also revealed that the influence of organic sources (TGC spread through eWoM) is greater than that of mass media (autonomous source) in regard to TDI formation.

Thirdly, this study has shown that, despite the efforts of Spanish media to spread reports of danger of the sovereignty process and to create fear among the population (Dowling, 2019) and the not-so-successful use of crisis communication by the DMOs to convey information about the measures taken to restore the security image of the destination (Oliveira & Huertas, 2019), all OTRs treated safety with a positive polarity. Thus, it has been found that neither the terrorist attack nor the sovereignty process negatively affected the online image of Barcelona's safety as a tourist destination.

Finally, the study illustrates that NLP techniques have been useful for analysing the influence of OTRs on P2P lodging experiences, written in various languages, on the formation of the TDI of Barcelona.

## Limitations and Future Research Directions

Reviews on accommodation are mainly focused on the cognitive, affective and conative aspects of the image of the housing itself, but the guests also share other experiences in the tourist destination. According to Shi et al. (2019), the stay in a shared accommodation impacts other tourist experiences and perceived destination images.

This exploratory research is limited to a single case study (Barcelona during the second half of 2017) and mainly to an organic data source (Airbnb OTRs), although it takes into account several induced and autonomous sources to define the context. Nevertheless, in this field of home-sharing lodging experiences, there are other P2P platforms such as Couchsurfing (Medina-Hernandez, Marine-Roig, & Ferrer-Rosell, 2020) that host a considerable number of OTRs.

Based on the NLP techniques described previously and following Gartner's model, future research can study how (a lack of) safety affects the image of other tourist destinations because unfortunately there are many countries affected by terrorist attacks and political turmoil. In relation to organic sources online, other types of OTRs can provide information on the images perceived by visitors, such as those hosted on travel-related websites, in the sections: 'Things to do and see' (Marine-Roig, 2017b; Marine-Roig & Mariné Gallisà, 2018), 'Restaurants' (Daries, Cristobal-Fransi, Ferrer-Rosell, & Marine-Roig, 2018; Marine-Roig, Ferrer-Rosell, Daries, & Cristobal-Fransi, 2019) and 'Hotels and places to stay' (Marine-Roig, 2019; Martin-Fuentes et al., 2018). Similarly, the interaction of visitors on the social media of DMOs is another source of online information to measure the perceived TDI (Campillo-Alhama & Martínez-Sala, 2019; Huertas & Marine-Roig, 2016a, 2016b). In addition, researches can deepen the study of the image through induced and autonomous sources to highlight the contrasts between the three groups of Gartner's agents (Ferrer-Rosell & Marine-Roig, 2020; Marine-Roig & Anton Clavé, 2016; Marine-Roig & Ferrer-Rosell, 2018).

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## ANNEX: KEY TERMS AND DEFINITIONS

**Destination Management Organisation (DMO):** Generally, a public organisation responsible for planning, coordinating and promoting a destination's tourism policies, as well as providing information on tourism-related activities, goods and services.

**User-Generated Content (UGC):** Information produced by users or consumers and shared between peers through online platforms.

**Electronic Word-of-Mouth (eWoM):** A domain of marketing based on UGC that encompasses all informal person-to-person communication via online technologies on the use or attributes of brands, products and services, or about their vendors or retailers.

**Traveller-Generated Content (TGC):** Recounts, opinions, and ratings shared on social media and based on the visitor's experiences travelling, sightseeing, entertaining, shopping, lodging and dining in a tourist destination.

**Online Travel Review (OTR):** Recounts, opinions, and ratings freely posted on travel-related websites or online travel agencies by travellers, based on their experiences with resources for tourists, such as tourist-characteristic activities, goods and services.

**Term:** Minimum textual content analysis unit. It can consist of a single keyword (e.g. Barcelona, comfortable) or a group of consecutive words with their own meaning that differs from that of the individual words (e.g. Basilica of La Sagrada Familia, not so nice).

**Comma-separated values (CSV):** Plain-text file used to store a data table. Each line represents a record and a record is composed of fields containing a piece of information (e.g. code, date, and text). Fields are separated by commas or semicolons. CSV files are compatible with any text editor, spreadsheet or database system.

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