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Research Paper: **Treatment of the Airbnb controversy by the press**

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Abstract

Airbnb is one of the most transformative developments in the traditional accommodation system. Due to the social impact it entails, Airbnb is currently a present topic in the press, although studies on how Airbnb is treated in the press are very scarce. Thus, this article aims to analyse the treatment of Airbnb controversial issues in the press and its evolution. The analysis method is first to follow the evolution from 2016 to 2018, second, to conduct a computerised quantitative content analysis, and finally to analyse the importance of information published through compositional data analysis. Results show that topics appearing most in the news are legal issues and regulations followed by gentrification, new forms of tourism and sharing economy, mainly being treated from a negative perspective, although are evolving towards a more positive vision. Results can be useful for local and national authorities to understand and manage this phenomenon.

Keywords: Compositional data analysis, accommodation sharing, media, content analysis, controversial issues, Airbnb.

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1. Introduction

Airbnb is the most important and successful peer-based platform for accommodation sharing (Dann et al., 2019). It is an online platform through which individuals can rent out their spaces as tourist accommodation and even offers other services as booking restaurants or guided tours (Guttentag, 2019). The widespread of Internet and mobile technologies and a change in consumption habits (Hassanli et al., 2019) has brought the great expansion of Airbnb (McDermid, 2017). Nowadays Airbnb has a higher market valuation than any traditional lodging company (Thomas, 2017).

Airbnb has been one of the most transformative developments in the world tourism sector (Akbar and Tracogna, 2018; Guttentag, 2019) and has led to a major change in the traditional accommodation system (Guttentag, 2015; Oskam and Boswijk, 2016; Zervas et al., 2017). The main advantages Airbnb entails are cost savings for accommodation, the generation of more authentic local experiences and better relations with the hosts (Gunasekaran and Anandkumar, 2012; Prayag and Ozanne, 2018).

However, it has been said that Airbnb is a disruptive company (Guttentag and Smith, 2017; Sovani and Jayawardena, 2017) that has transformed the accommodation industry (Oskam and Boswijk, 2016). It affects touristification of destinations (Freytag and Bauder, 2018), which involves problems of noise, traffic, parking and quality of life for locals (Gurran and Phibbs, 2017) and creates a decrease in demand for regulated accommodation (Kwok et al., 2017; Zervas et al., 2017) and, therefore, of the work places in hotels (Fang et al., 2016). It is said that Airbnb also has a negative social impact in the housing sector (Lambea Llop, 2017; Stabrowski, 2017) because it decreases the housing supply (Lee, 2016) and increases the sale and rental prices (Alizadeh et al., 2018; Brauckmann, 2017; Horn and Merante, 2017). However, other studies have shown that it does not have a negative impact in the hotel industry because it affects another type of tourist that does not go to the hotels (Varma et al., 2016). Consequently, Airbnb creates controversy and bipolarity of image and feelings among public opinion.

Due to all the impact it entails and the controversy of opinions it generates, Airbnb is currently a present topic in the press and a recurrent subject of media coverage (Jasperson et al., 1998). The coverage of Airbnb in the press has increased as quickly as its development in the lodging industry (Varma et al., 2016). Previous studies have shown the impact of press news on public opinion (Ghanem and Evatt, 1995) and evolution over the time. The treatment of issues in the media plays an important role in changing the attitudes of the public (Page and Shapiro, 1992; Zaller, 1994, 1992) in a positive or negative way (Gunther, 1998).

Recently many studies about Airbnb have appeared, especially since 2017, regarding Airbnb guests, hosts, its impact in destinations, regulations or the impact in the tourist sector (Gunasekaran and Anandkumar, 2012; Guttentag, 2019; Prayag and Ozanne, 2018; Zervas et

al., 2017). The reviews about Airbnb in social media have been analysed (Camilleri and Neuhofer, 2017; Cheng and Jin, 2019; Johnson and Neuhofer, 2017; Tussyadiah and Zach, 2017), but studies about the treatment of Airbnb in press are almost non-existent (Hassanli et al., 2019; Mikhalkina and Cabantous, 2015).

Given the controversial opinions that Airbnb generates, the increased press coverage of Airbnb in recent years and the press's general impact on public opinion, the research question of the study was: What is the treatment of Airbnb in the Spanish press? The study also involved analysing its evolution from 2016 to 2018 through content analysis and compositional data analysis. Thus, the aim is first, from a descriptive perspective, to follow the evolution of the phenomenon, by knowing the number of articles published, the topics treated and the main polarity of the news. Then a computerised quantitative content analysis is conducted, including keyword and sentiment analysis to determine if the content is positive or negative, and finally, from a quantitative perspective, to see the relative importance of information published between topics related to Airbnb and press sources through compositional data analysis. It is also the aim of this article to provide a straightforward methodology to analyse the treatment of controversial issues in the press and its evolution to assess how this may affect public opinion. The press's treatment of Airbnb needs to be clarified, because, whether positive or negative, such treatment will affect not only the public's future perceptions and opinions on the topic but also future regulations and commercial development.

2. Theory

2.1 Airbnb: impact on tourism and society

It is a reality that the sharing economy has a great influence on tourism activity. This has caused the realization of some research to analyse its impact on the tourism industry and study how it has been transformed so quickly (Dredge and Gyimóthy, 2015; Sigala, 2017; Tussyadiah and Pesonen, 2018). As a result of these works, it is concluded that there is not a single reason, but several, ranging from the birth of a suitable technology for its development, the availability of social and communication skills, and of course, the economic opportunities provided (Moreno-Izquierdo et al., 2019). An element to highlight in the sharing economy is the authenticity, a quality that is highly demanded by tourists, who seek to meet people and places unique and alternative to those usual in tourist destinations (Forno and Garibaldi, 2015).

Airbnb is the paradigm of the sharing economy. This phenomenon is driven by the growing interest of part of society in a sustainable development and environmental responsibility for enjoyment of the experience in the destination and for the economic benefit (Hamari et al., 2016). Therefore, the object of study of this article is focused on Airbnb, a peer-to-peer (P2P) hosting platform that has become one of the most successful examples in the collaborative economy. Since its creation in San Francisco in 2008, this platform has experienced rapid growth by offering more than seven million unique places to stay in more than 100,000 cities in 191 countries (Airbnb, 2019). With these figures, it can be said that Airbnb has burst into the accommodation sector with such force that it has completely modified the sector (Cheng and Jin, 2019). A study conducted by Skift Take affirmed that Airbnb had a value close to 30 billion dollars. This value is above most hotel groups (Ting, 2016).

A recent work carried out by Mody, Hanks, and Dogru (2019) indicated that Airbnb offers the authenticity of the travel experience tourists demand so much since it allows local experiences that offer a sense of identity and sense of place, and this can generate greater brand loyalty. In addition, a key element of the authentic Airbnb experience is the encounter between the host and the tourist that cannot be replicated in conventional hotels (Tussyadiah, 2016). However, although Airbnb promotes the authenticity of the accommodation experience as a key reason to use the platform, it should be borne in mind that most travellers tend to use Airbnb for much more functional reasons, such as price or available space (Chen and Xie, 2017; Dogru and Pekin, 2017).

The social impact of Airbnb is also remarkable. Thanks to platforms such as Airbnb, many homeowners have found the possibility of renting second homes or rooms to tourists, economically exploiting an investment that could otherwise be non-productive (Moreno-Izquierdo et al., 2019). However, the benefit homeowners can find can be perceived as a threat to the interests of hoteliers in general, who observe platforms such as Airbnb as unfair competition (Heo, 2016). Therefore, these activities must be regulated by public administrations to ensure that economic activity is taxed just like other companies. Through these measures, the intention is that the sharing economy has a positive impact on cities and their inhabitants. Works such as that of Malhotra and Van Alstyne (2014) affirm that platforms such as Airbnb will allow a greater knowledge of the real offer, and in this way, it will be possible to identify and regularize a part of the activities that until now were hidden.

However, not all are apparent benefits. Authors such as Zervas et al. (2017) affirm that the labour market will be affected with a decrease in direct employment in sectors directly involved with the sharing economy, such as the hotel sector. However, this effect could be offset by the benefit of the collaborative economy on the destination, since a higher number of tourists will demand more products and services. Following this line, the results of a research carried out by Kaplan and Nadler (2015) showed how the lower average expenditure allocated to accommodation thanks to Airbnb had a positive impact on the destination's businesses.

On the other hand, we also find works which state that Airbnb has a strong influence on the real estate market, increasing rental prices and home sale prices (Barron et al., 2019; Horn and Merante, 2017; Sheppard and Udell, 2016), giving rise to gentrification phenomena, and directly affecting the inhabitants, since they are displaced from the centre of the cities (Wachsmuth and Weisler, 2018). This situation can lead to a rejection of the tourists and tourism by the population, and this is reflected in the media (Hassanli et al., 2019).

2.2 Treatment of Airbnb and tourist controversial issues by the press and its influence on public opinion

It has been shown that controversial issues become issues for media coverage (Jasperson et al., 1998). But what impact does this press coverage have on public opinion? How do issues emerge and evolve in the agenda-setting over time changing public opinion?

Many scholars have shown the impact of press news on public opinion (Ghanem and Evatt, 1995) and their evolution over the time. Both agenda-setting approach studies (McCombs and Bell, 1996), based on how much coverage an issue receives, or framing approach studies (Entman, 1993), based on what type of coverage that issue receives, have shown that media influences public opinion and shifts the aggregate opinion (Jasperson et al., 1998). From the

framing approach, it is said that it is not the quantity of information shared on an issue that influences more, rather it is how media discuss an issue that influences public opinion.

Moreover, several studies have shown that the treatment of issues in the media plays an important role in changing the attitudes of the public (Page and Shapiro, 1992; Zaller, 1994, 1992), although it is said that media serve as a tool to communicate elite opinions to the public (Jasperson et al., 1998). Gunther (1998) established the *persuasive press inference*, affirming that people assume that what mass media are saying will be what the public will think tomorrow. Consequently, people who perceive unfavourable media coverage will have a more negative public opinion, whereas those who perceive favourable coverage believe that the opinions of others will be more positive.

Although several scholars have affirmed that with the changes in the media environment nowadays, the classic media influence has decreased (Bennett and Iyengar, 2008) and traditional news media are losing ground as a source of information (Blekesaune et al., 2012; Hopkins et al., 2017); others (Djerf-Pierre and Shehata, 2017; Holbert et al., 2010; Shehata and Strömbäck, 2013) have shown that traditional news media still have important agenda-setting effects on the aggregate and individual public opinion. Moreover, it has been shown that the presence of issues in news media increases the public discussion of these issues among users in social media and other online spaces (King et al., 2017).

Few studies exist about the treatment of tourism issues in the press and its influence (Hall, 2003, 2002; Ma and Kirilenko, 2020; Schweinsberg et al., 2017). Hall (2002) focused on the issue of travel security after the terrorist attacks of September 11 in the mass media. Schweinsberg et al. (2017) examined the agenda-setting and framing role of news media in the ongoing development of botanical gardens. Ma and Kirilenko (2020) have analysed the mass media's treatment of climate change and tourism. As Wanta & Hu (1993) affirmed, the issues that appear in the press are those that involve conflict or dramatic events, and that is why tourist issues in general are not present. Due to the great impact that Airbnb has assumed in the world tourism sector and the diversity of opinions, both positive and negative, that it generates, Airbnb is a subject currently present in the mass media and the press. As Ma and Kirilenko (2020) have emphasised, although generating effective, trustworthy communication is necessary for the public to understand certain controversial tourist issues and to act wisely in relation to those issues, mass media hardly succeeds in performing that role. The press frequently covers negative issues about Airbnb such as regulations, taxations, potential negative impact in local economies, but also positive issues as exotic locations (Varma et al., 2016). Although Airbnb is present in the press, studies on the treatment of Airbnb in the press are still scarce (Hassanli et al., 2019; Mikhalkina and Cabantous, 2015). Mikhalkina and Cabantous (2015) focused on the case of Airbnb as a business model innovation and analysed how six mainstream business media publications discussed Airbnb between 2008 and 2013. Meanwhile, (Hassanli et al., 2019) analysed the representation of Airbnb in the local press in Sydney. They showed that the texts focus on the community costs and issues related to governmental regulations. They analysed how Airbnb is socially constructed through language and analysed the dominant interests in the press.

For these reasons, this study analyses the treatment of the relevant controversial social issue of Airbnb in the Spanish press in order to know the possible impact it can achieve in public opinion, and to determine if the treatment is positive or negative. Agenda-setting studies of *natural history* design are based on longitudinal time series analyses to see the evolution of

topics in the press (McCombs, 2014). Similarly, the present study analyses the evolution of the treatment of Airbnb in the last two years.

3. Materials and Methods

3.1 Data selection and collection

In order to carry out the field work, the ten most-read newspapers in Spain were taken into account in the period between 2016 and 2018. To determine the audience of the newspapers, the General Mass Media Survey (Estudio General de Medios – EGM) was consulted. EGM studies the audience of different media through 30.000 personal, face-to-face interviews annually, distributed in three stages, with results disclosed in April, July and December. EGM depicts a richer and more complete scenario of media consumption at local and regional levels in Spain. If we focused on newspapers (EGM Press), the research represents an extension of 45.000 telephone interviews, for a total of 75.000 interviews annually. The data are available on the EGM website (<https://www.aimc.es/egm/>).

As we can see in Table 1, apart from being the most-read newspapers in Spain, they are also the newspapers with the highest circulation. To measure the circulation, the Circulation Audit Office (OJD –Oficina de la Justificación de la Difusión) was consulted. The OJD is a Spanish organization that certifies the circulation of newspapers and periodicals in Spain to provide advertisers with audience measurement figures. The data are available on the OJD website (<https://www.ojd.es>).

Table 1. Ranking of Spanish newspapers by daily audience and circulation

Press source	Daily readers EGM (Feb.-Nov. 2018)	Daily Average Circulation OJD (2018)
<i>El País</i>	1.027.000	215.877
<i>El Mundo</i>	702.000	135.828
<i>La Vanguardia</i>	572.000	127.523
<i>La Voz de Galicia</i>	530.000	74.602
<i>ABC</i>	408.000	110.694
<i>El Periódico</i>	358.000	87.939
<i>El Correo</i>	327.000	74.871
<i>La Nueva España</i>	288.000	44.542
<i>Faro de Vigo</i>	238.000	29.745
<i>La Razón</i>	217.000	94.620

Source: Authors' own elaboration based on data from EGM (2018) and OJD (2018).

During data collection performed in January 2019, newspaper articles published from 2016 to 2018 were targeted. The word “Airbnb” was used in the search tool of the above-mentioned press sources. Pieces of news related to Airbnb but not specifically talking about accommodation or the platform were discarded.

Table 2. Number of pieces of news about Airbnb (accommodation and the platform) in the ten main journals of Spain during 2016-2018 period

PRESS SOURCE	2016	2017	2018	SUM
<i>ABC</i>	20	46	59	125

<i>El Correo</i>	5	10	22	37
<i>El Mundo</i>	10	61	63	134
<i>El País</i>	34	80	27	141
<i>El Periódico</i>	8	47	77	132
<i>Faro de Vigo</i>	1	4	6	11
<i>La Nueva España</i>	2	4	9	15
<i>La Razón</i>	5	21	20	46
<i>La Vanguardia</i>	11	39	92	142
<i>La Voz de Galicia</i>	8	27	16	51
Total general	104	339	391	834

Source: Authors

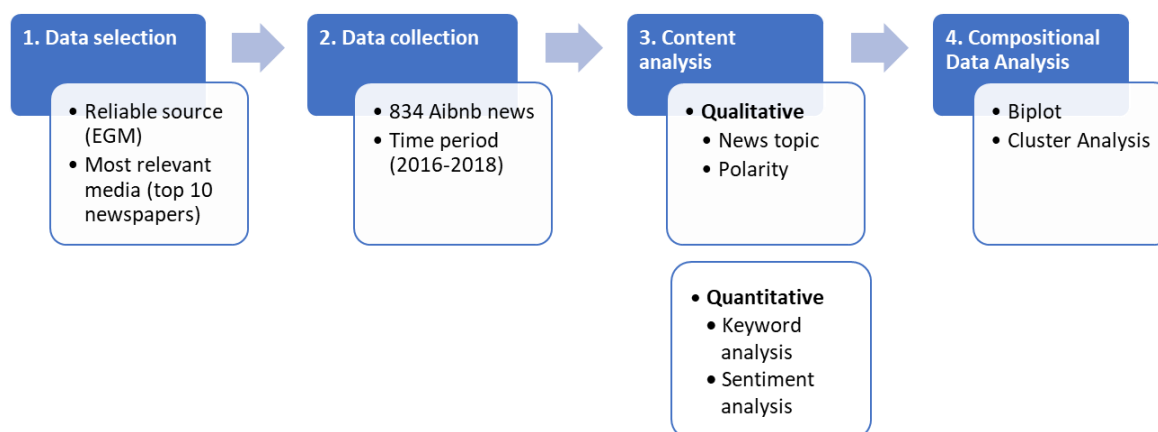
As we can observe, the mediatic attention on Airbnb has grown in the past three years (from 104 news items in 2016 to 391 in 2018). Besides, we can observe that the four journals which have dedicated more news to this topic are *La Vanguardia* (142), *El Mundo* (134), *El Periódico* (132) and *ABC* (125). It is also remarkable that, depending on the journal, the focus on Airbnb has grown or decreased in this period. *La Vanguardia* and *El Periódico*, for example, show a great focus on this topic in 2018. This coincides with the fact that both journals are headquartered in Barcelona, and Airbnb was a big issue in this city. Other journals such as *El País* or *La Voz de Galicia*, focus more on this topic in 2017 and lose interest in it in 2018.

It is worth mentioning that press sources *Faro de Vigo* and *La Nueva España* were not included in the compositional analysis, as they had very few pieces of news related to Airbnb. We established a threshold of ten pieces of news, and *Faro de Vigo* and *La Nueva España* did not reach it in any of the years of analysis. In the same vein, the sources *La Razón* and *El Correo* were not either considered in 2016 but were included for 2017 and 2018.

3.2 Data analysis

This section proposes a data analysis methodology for the treatment of controversial issues by the press overtime. The methodology combines the content analysis of the news (topic, keywords, polarity and sentiment) with compositional data analysis. Figure 1 illustrates the steps and components of the methods.

Figure 1. Steps and components of the methods



Source: authors

3.2.1 Content analysis

Content analysis is a consolidated research technique in social sciences used to make inferences and extract meaningful insights and patterns from communicative products (messages, texts or speech) from both quantitative and qualitative perspectives (Piñuel, 2002). The most frequent type of information analysed through content analysis is text, and the most used techniques are based on quantifying certain recurring topics and word frequency counts, since the most mentioned topics and words reflect the greater interest of the producer (Stemler, 2001). Both qualitative (news topic and polarity) and quantitative computerised content analysis are used (keyword and sentiment analysis).

News Topic: Once the data were gathered, a team of researchers read the 834 news items and identified the main topics qualitatively for each one arising from the same content. One article could have one or more topics. The maximum number of topics was limited to six. The topics were then grouped in common and narrowed down to a few dominant categories.

Keyword analysis: After the topic identification, a computerised quantitative content analysis was conducted for both the titles and subtitles of the news and the body of the text through a Java-based algorithm. The list of the most frequent keywords was obtained, and their total number of appearances and percentage in relation to the total number of words were calculated. It made sense to separate titles from body text, because titles concentrate the summary or main topic of the article (De Ascaniis and Gretzel, 2013; Marine-Roig, 2017) and have a major dissemination to readers since many times people only read the titles and not the full content of an article (Marine-Roig, 2017).

Polarity: The main polarity of the press article's approach to the Airbnb phenomenon was identified qualitatively by reading all of the articles. Then the team of researchers classified the articles into positive, negative or neutral.

Sentiment analysis: Looking at the content of the message, sentiment analysis tries to deduce the positive or negative polarisation of the feelings and moods of the author, mainly from the adjectives used (Marine-Roig and Ferrer-Rosell, 2018). This analysis was conducted through a computerised process. Feelings and recommendations categories were identified from the quantitative keyword analysis table and a lexicon with a list of positive and negative terms and recommendations. These categories are calculated by the percentage of positive or negative terms/recommendations in relation to the total number of words (including stop words). The sentiment analysis algorithm goes through the keyword-frequency table and classifies several words and expressions into positive and negative feelings and positive and negative recommendations.

3.2.2 Compositional data analysis (CoDa)

As traditionally seen in the analysis of content published by media the focus rests on the relative importance or the comparison of some content over others. It is supposed that some media or press sources are more concerned about certain topics over others, which drive towards to a general study of the relative volume of information about some topics in detriment of absolute volumes of contents (Blasco-Duatis et al., 2018; Coenders and Ferrer-Rosell, 2020). Common research questions when analysing content published by different sources, in this case media sources, are expressed in comparative terms, relative terms or competitive terms. For instance, the dominant topics of the public agenda (Luo, 2014), comparison of information coverage by

different media sources of a given political issue (Ferin-Cunha et al., 2015), hierarchy of topics given by different media regarding a particular issue (Koziner and Zunino, 2013), and the most frequent political topics discussed by media sources with respect to a particular region (Besova and Cooley, 2009). Regarding the use of compositional analysis, the research question is what contents/topics related to Airbnb are more frequently published by press sources.

As explained by Blasco-Duatis et al. (2018), once the content analysis is carried out, the best way to take into account the relative importance of information published by press sources is through the use of compositional data analysis (CoDa); otherwise, the proportionality of content appearance is not considered, which leads to confusing interpretations. CoDa serves as one of the most valuable methods to complement content analysis. Compositional analyses of the present study are based on the analyses carried out in Blasco-Duatis et al. (2018), as the most accurate tool to visualize compositional data, the CoDa biplot, is used. It is meant to arrange two types of information in a joint way with the aim of reducing interpretation complexity. In this study, information refers to the topics (components) and the press sources (compositions, or individuals, or units of analysis) to be depicted.

As already mentioned, the relative importance of contents, that is, their proportions (or percentages), are of key interest, given that it is taken for granted that more active press sources will have more content of all types. The analysis of these proportions outlines several statistical challenges (Aitchison, 1986; Pawlowsky-Glahn and Buccianti, 2011). Blasco-Duatis et al. (2018) explain how to resolve these challenges when analysing content published by media (press sources). Compositional data analysis is defined as the analysis of parts of a whole, when the relative size of its D elements (or components) is of interest. The compositional vector x has to be positive and add up to 1 (or 100 in case of percentage). In our case, each press source is a composition formed by the D topics identified in the content analysis and expressed in proportions (from 0 to 1).

Treating proportions with standard statistical techniques would be confusing. Euclidean distance, for instance, supposes that the change of a component from 0.01 to 0.02 is the same difference as changing from 0.11 to 0.12, while it would be more logical to consider the change from 0.11 to 0.22, given that in relative terms, in both cases, it refers to duplicating the initial value. The most common approach in CoDa is to transform the data into logarithms of ratios, with the simplest one computed as the log-ratio between the geometric means of components (called centred log-ratio transformation). The main advantage of log-ratios is that they constitute the natural way of distilling the information about the relative size of components, and they form the basis for defining associations between components (topics) and distance in a meaningful way.

Proportionality between components (topics) is used to measure the association. If two components behave proportionally, their ratio will be constant and the variance of the log-ratio will be zero. The variation matrix contains those log-ratio variances computed for all possible pairs of components. The zero value implies direct perfect association between two components. High values of log-ratio variance indicate that the two components do not change proportionally (Egozcue and Pawlowsky-Glahn, 2011). From centred log-ratio transformation (clr), which is interpreted as the relative importance of one of the components when compared with the geometric mean of all the others, the so-called Aitchison distance must be computed. This distance is of particular interest since it computes the distance between two compositions.

Returning to the CoDa biplot, the joint visual representation of proportionality between Airbnb topics (D components) and press sources (unit of analysis), it is worth noting that components are usually represented as vectors with the origin at the centre of coordinates, and the individuals (press sources in this case as dots. The quality of the representation is indicated as the percentage of explained variance by the two dimensions (coordinates). The interpretation is as follows. The main element to interpret is the distances between the end of the vectors (topics). A short distance between the end of vectors indicates that topics keep an approximate proportionality. In this sense, pairs of topics that, if the proportion of one topic is doubled in a given press source, it is also doubled the proportion of the other topic. In the other way, vectors that are far from one another indicate that if a topic increases proportion in a given press source, the proportion of the other topic decreases. In summary, this tool allows us to visualize the approximate importance of each topic for each press source in relative terms. It allows the identification of which topics contribute to distinguishing each press source among others.

When a component contains zeros, neither geometric mean nor log-ratios can be computed and zeros must be replaced. In this study, the few zeros which were present in some of the topics were replaced as in Blasco-Duatis et al. (2018).

CoDaPack software (v2.02.21) has been used to carry out compositional analyses (Thió-Henestrosa and Martín-Fernández, 2005).

4. Results

4.1 News topic and keyword analysis

Table 3. Most frequent topics of the news on Airbnb (all ten press sources considered, 2016-2018)

	2016%	2017%	2018%	Num	SUM%
Gentrification	16.19	20.27	15.02	166	17.18
Price/Effects on rentals	0.95	3.20	8.64	55	5.69
Legal issues/Regulation	49.52	47.73	37.04	411	42.55
Today tourism/Sharing Economy	17.14	10.93	22.43	168	17.39
AirBnB problems (e.g., bothered neighbourhood)	4.76	11.73	7.61	86	8.90
Other	11.43	6.13	9.26	80	8.28

Source: Authors

In general, we see that the topics that most appear in the news are related to legal and regulatory issues, gentrification (overtourism or touristification), and the phenomenon of Airbnb as part of the sharing economy. The most frequent topics are usually presented from a negative perspective and present confrontation with different agents of destination. Concerning the topic that has appeared most often in the news, legal and regulatory issues, studies have shown that Airbnb has transformed the accommodation industry (Guttentag and Smith, 2017; Oskam and Boswijk, 2016; Sovani and Jayawardena, 2017) by lowering the demand for regulated accommodations demand (Kwok et al., 2017; Zervas et al., 2017) and affecting negatively to hotels (Fang et al., 2016). These types of studies, like the news, are critical with Airbnb and evidenced the necessity of a regulation to protect the industry. However, other studies have also shown that Airbnb does not have a negative impact in the hotel industry because it affects

another type of tourist that does not go to the hotels (Varma et al., 2016). In relation of the second most treated topic in the news, gentrification (overtourism or touristification), studies have also shown that Airbnb affects touristification of destinations (Freytag and Bauder, 2018), which involves problems for residents (Gurran and Phibbs, 2017) and also a negative social impact in the housing sector (Lambea Llop, 2017; Stabrowski, 2017) chiefly by depleting the housing supply (Lee, 2016) and increasing both sales and rental prices (Alizadeh et al., 2018; Barron et al., 2019; Brauckmann, 2017; Horn and Merante, 2017; Sheppard and Udell, 2016). In response, legal and regulatory measures have been necessary to protect residents and the housing market. Hassanli et al. (2019) have also analysed the press's portrayal of Airbnb and highlighted common topics also identified in our study, including government regulations, taxation and Airbnb's negative impact on local economies.

However, we see that the most recurrent topic (legal issues/regulation), usually with a negative approach, clearly decreases in interest over the years, while other topics, which may have a more positive connotation, such as the sharing economy phenomenon, grow in interest. On that somewhat positive topic in the news, studies have also shown that Airbnb ranks among the most successful businesses in the collaborative economy (Hamari et al., 2016; Tussyadiah, 2016). Those studies have additionally highlighted Airbnb's positive aspects, including the creation of economic opportunities (Moreno-Izquierdo et al., 2019) and prioritising the authenticity of tourism experiences at destinations (Forno and Garibaldi, 2015; Mody et al., 2019) precisely because conventional hotels cannot replicate the encounters between hosts and guests facilitated by Airbnb (Tussyadiah, 2016).

Table 4. Most frequent words within Airbnb related news bodies (all ten press sources considered, 2016-2018)

total:560867	Num	%		Num	%
Airbnb	3997	0.713	Número	522	0.093
plataforma/s	2441	0.435	Días	507	0.090
vivienda/s	2436	0.434	Datos	505	0.090
ciudad/es	1585	0.283	Pasado	503	0.090
pisos	1518	0.271	Gobierno	497	0.089
alquiler/es	1495	0.267	Personas	483	0.086
Barcelona	1388	0.247	Vecinos	479	0.085
Euros	1315	0.234	Sector	468	0.083
año/s	1486	0.265	Licencia	465	0.083
Ayuntamiento	1061	0.189	Nueva	456	0.081
Turismo	1044	0.186	Tipo	448	0.080
turístico/a/s	2038	0.363	Anuncios	445	0.079
alojamiento/s	975	0.174	propietarios	444	0.079
pisos turísticos	835	0.149	Ahora	405	0.072
Oferta	739	0.132	Empresa	401	0.072
Millones	708	0.126	Web	389	0.069
Madrid	701	0.125	Comunidad	380	0.068
Actividad	656	0.117	Forma	374	0.067
alquiler/es turístico/s/vacacional/es	647	0.115	apartamentos	370	0.066
Turistas	623	0.111	Mercado	370	0.066
Ilegales	596	0.106	Normative	365	0.065

España	573	0.102	Mes	349	0.062
Ley	570	0.102	Mundo	348	0.062
Uso	550	0.098	Regulación	348	0.062
Anfitriones	547	0.098	habitaciones	345	0.062

Source: Authors

As we can observe in Table 4, the most frequent word within the news is Airbnb and platform/s (plataforma/s, web) and refer to Airbnb as a P2P online platform. Next are words related to the apartment or accommodation offer itself (vivienda/s, pisos/s, alojamiento/s, piso/s turístico/s, apartamentos, habitaciones).

Remarkably, some geographical references or destinations appear; the most frequent is Barcelona, followed by Madrid and Spain. This is accompanied by words referring to the phenomenon specifically affecting cities (ciudad/des) and city centres. As these results show, the Airbnb phenomenon affects mostly the two main cities in Spain.

Supporting the topic identification, several words are related to legal or regulatory issues: illegal (ilegal), the law (ley regulation, normativa, regulación), licence (licencia), law (ley).

There are also frequent words related to the agents involved in this phenomenon: hosts (anfitriones, propietarios), tourists (turistas), neighbours and the community (vecinos, comunidad), economic agents and the market (empresa, mercado) or political agents such as the town hall (ayuntamiento) or the government (gobierno). There are also words related to money and prices (euro, millones). This keyword analysis is in the same line as the topic identification.

Table 5. Most frequent words within Airbnb-related news titles (all ten press sources considered, 2016-2018)

total:560867	Num	%		Num	%
Airbnb	635	2.143	turistas	41	0.138
Barcelona	183	0.618	nueva	39	0.132
Pisosturísticos	152	0.513	colau	38	0.128
plataforma/s	229	0.773	web	38	0.128
vivienda/s	179	0.604	días	36	0.122
Euros	116	0.392	vecinos	36	0.122
Ayuntamiento	99	0.334	capital	34	0.115
Ilegales	98	0.331	propietarios	34	0.115
piso/s	141	0.476	anuncios	32	0.108
alquiler/es	134	0.452	turístico/a	61	0.206
Turismo	65	0.219	multa	31	0.105
Millones	63	0.213	pide	31	0.105
Madrid	62	0.209	sector	31	0.105
Año	59	0.199	viajeros	29	0.098
Anfitriones	58	0.196	actividad	28	0.095
Turísticas	55	0.186	hoteles	28	0.095
ciudad/es	88	0.297	datos	27	0.091
España	51	0.172	ley	27	0.091
Oferta	50	0.169	partir	27	0.091

alquiler/es turístico/s/vacacional	93	0.314	regulación	27	0.091
Licencia	47	0.159	centro	26	0.088
alojamiento/s	76	0.257	mundo	26	0.088
Gobierno	45	0.152	habitaciones	25	0.084
Apartamentos	42	0.142	precio	25	0.084
Hacienda	41	0.138	comunidad	24	0.081

Source: Authors

Very remarkably, the title analysis expresses, with much more emphasis, the main topic of the news. In this case, Barcelona is the second most-frequent word, which means that the media have a special incidence in this destination. Even the word Colau appears among the most frequent (the surname of the Mayor of Barcelona). Madrid is also mentioned as well as the words related to cities, and city centres (ciudad/es, centro), the main place where the phenomenon is located.

The word illegal, having a negative or problematic connotation, is even more emphasized and prominent in news article titles. The word fine (multa), also with negative connotations, appears among the most frequent in titles. Legal and regulatory issues continue to be very prominent in titles, with words such as licence (licencia), tax authorities (hacienda), law (ley) or regulation (regulación).

Involved agents such as the hosts, the tourists/travellers, the neighbours/community, and the town hall/government appear. Remarkably, among the top is the word hotels (hoteles), which reflects one of the main issues of the phenomenon (its direct competition with the hotel sector). In the case of titles, the word price (precio) is also among the top, emphasizing the monetary issues related to this phenomenon, along with words such as euros or millions.

4.2 Polarity and sentiment analysis

Table 6. News polarity (all ten press sources considered, 2016-2018)

	N	2016%	2017%	2018%	TOTAL %
Negative	352	43.27	51.92	33.33	42.21
Neutral	266	23.08	24.78	40.77	31.89
Positive	214	33.65	23.01	25.90	25.66

Source: Authors

As Table 6 shows, news about Airbnb is mostly negative in the studied period (42.21%), then neutral (31.89%), and only about one quarter are positive (25.66%). Because the media's treatment of topics plays an important role in changing the public's attitudes (Page and Shapiro, 1992; Zaller, 1994, 1992) and because the press's treatment of Airbnb is mostly negative (Hassanli et al., 2019), a negative public opinion of the platform is almost inevitable (Gunther, 1998). However, this negative perception of the Airbnb phenomenon notably decreases in 2018 (to one-third of news), and the most frequent approach is neutral in this last year. As news in the press news evolves (Ghanem and Evatt, 1995), public opinion on Airbnb will also evolve, likely towards being more neutral, if not positive, towards the platform.

Table 7. Most frequent feelings and recommendations in Airbnb news (all ten press sources considered, 2016-2018)

	N	2016%	2017%	2018%	TOTAL %
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Positive Feelings	1888	0.327	0.340	0.360	0.347
Negative Feelings	1963	0.408	0.433	0.277	0.361
Positive Recommendations	156	0.036	0.032	0.024	0.029
Negative recommendations	200	0.036	0.040	0.034	0.037

Source: Authors

The analysis of the most frequent keywords concerning feelings and recommendations (Table 7) shows that negative feelings and recommendations are more frequent than positive feelings within Airbnb news articles. These quantitative results are in the line of the polarity analysis. In 2017, Airbnb topics are presented more negatively, and in 2018, the topics are presented with less negative feelings and recommendations associated.

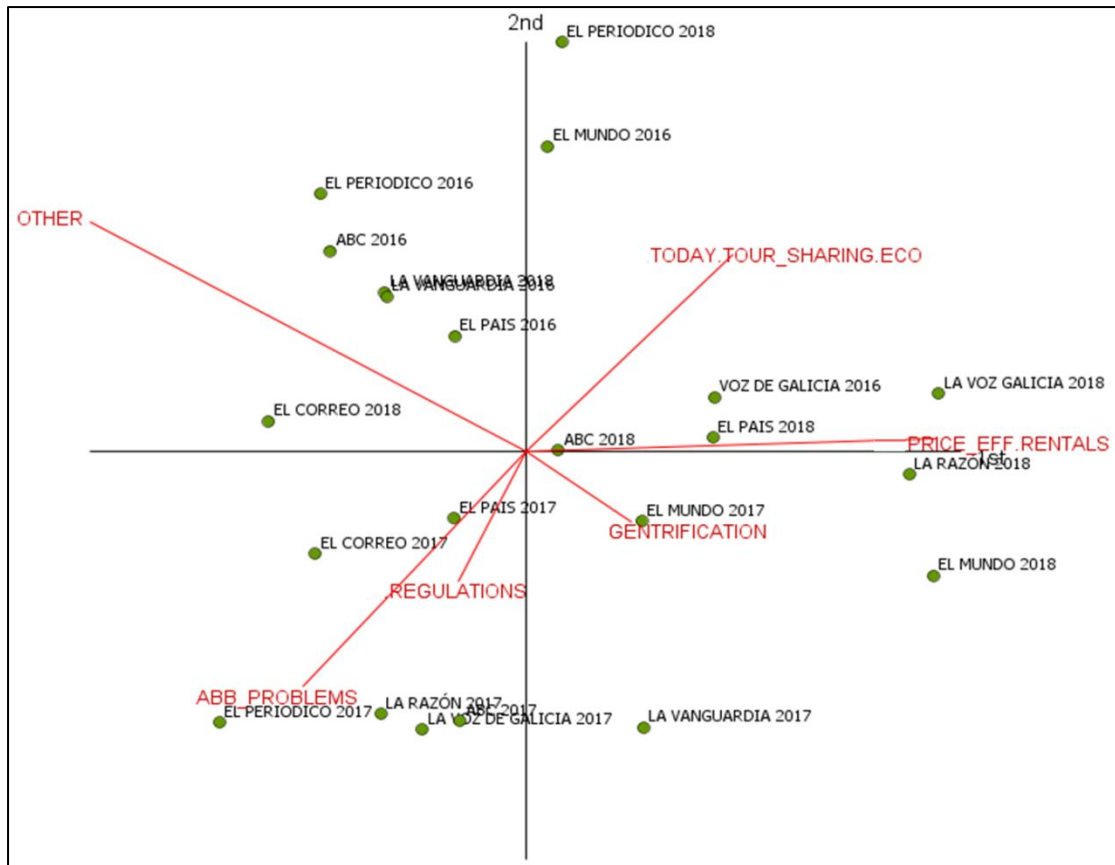
4.3 Results of compositional analysis

As mentioned, press sources *El Faro de Vigo* 2016, 2017 and 2018, *La Nueva España* 2016, 2017 and 2018, *La Razón* 2016 and *El Correo* 2016 have not been included in the compositional analysis due to the lack of enough news published. Thus, 22 press sources (units of analysis) were considered.

First, a global interpretation of the CoDa biplot (Figure 2) is given. As can be seen, each red ray is a topic. Topics close together (small angle between them) have a similar behaviour in terms of proportionality. In other words, press sources publishing news of one of the topics publish news related to the other topics. For example, topics ABB_PROBLEMS and REGULATIONS are close together and go in the same direction, that is, press sources talking about regulations also talk about Airbnb problems. In contrast, when the angle between topics is wide, press sources talking about one topic do not talk about the other. This is the case of topics OTHER and GENTRIFICATION, which, even appear as opposite rays. Proportionality between topics can also be seen in the variation matrix, that is, the distances among pairs of rays closely mirrors the log-ratio variance (Table 8).

As already mentioned, compositional analysis and, most particularly, the CoDa biplot represents a good complement to what has been exposed above, in the sense that it allows visualization of what press sources are talking about. For example, *El Periodico* 2016, *ABC* 2016, and *La Vanguardia* 2016 and 2018 publish relatively more news related to other content, while *La Voz de Galicia* 2018, *La Razón* 2018 and *El Mundo* 2018 publish relatively more news related to prices and effect on rentals. *El País* 2017 and *El Correo* 2017 appear close on the topic of regulations, meaning that these two press sources focus a high number of news on this topic. Moreover, *El Mundo* 2017 published more news about the topic of gentrification. At the bottom of the biplot, *El Periodico* 2017 has the majority of news related to Airbnb problems, but did not publish news about tourism today and the sharing economy (appearing at the other side of the biplot). Thus, *El Mundo* 2017 and *El Mundo* 2018 did not publish news about other topics.

Figure 2. CoDa biplot of Airbnb news



Source: Authors

The first two dimensions (coordinates) of the biplot explain 66% of total variance, thus arguing for reasonable biplot accuracy.

Table 8. Centre, variation matrix, centred log-ratios variances and total variance

	Center	PRICE_EFF.RENTALS	REGULATIONS	TODAY.TOUR.SHARING.ECO	ABB_PROBLEMS	OTHER	Clr variances
GENTRIFICATION	0.170	0.892	0.855	0.776	0.894	1.466	0.312
PRICE_EFF.RENTALS	0.041		1.381	0.819	1.613	2.374	0.678
REGULATIONS	0.475			0.917	0.781	1.277	0.366
TODAY.TOUR.SHARING.ECO	0.161				1.411	1.597	0.418
ABB_PROBLEMS	0.082					1.022	0.451

OTHER	0.071
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0.787
3.012

Source: Authors

Table 8 shows the variation matrix and the centres of the components. The average of the variation matrix elements is 1.205. Pairs of parts with a log-ratio variance below $0.2 \times 1.205 = 0.241$, if any, would be considered to move proportionally. In this case, we can see that any pair of topics is close to zero, and the lower variance is 0.776. In general, topics do not behave proportionally. In other words, the pairs of topics PRICE_EFF.RENTALS versus OTHER and PRICE_EFF.RENTALS versus ABB_PROBLEMS have comparatively high log-ratios variances, meaning that press sources with relatively more news published about PRICE_EFF.RENTALS tend to publish relatively less news about ABB_PROBLEMS and OTHER topics.

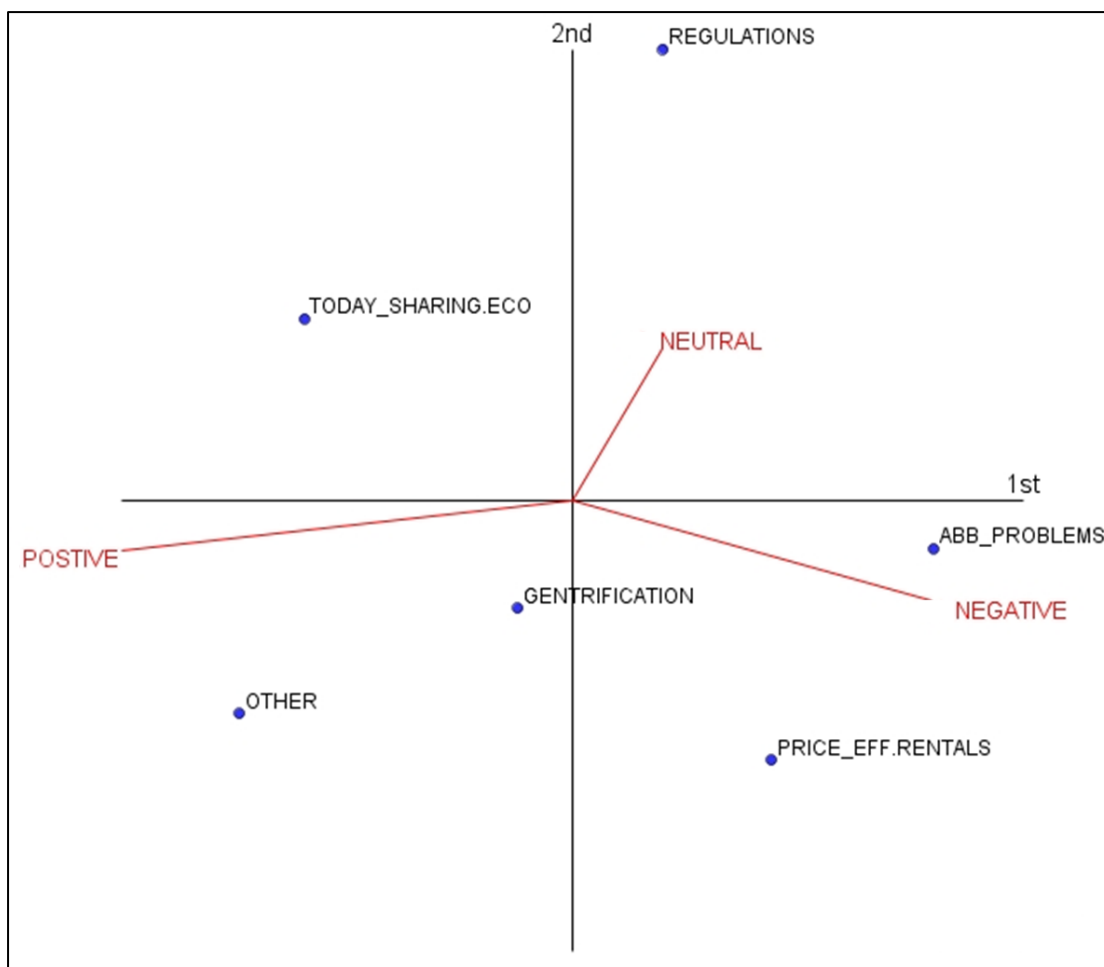
The centre column shows that the most-often-quoted topics of news are REGULATIONS (47.5%), GENTRIFICATION (17%) and TODAY.TOUR_SHARING.ECO (16.1%). The least-quoted topic in the news analysed is PRICE_EFF.RENTALS (4.1%).

Additionally, the polarity variable (positive, negative or neutral valence of news) has been correlated with the first two dimensions of biplot in order to see how the different press sources approach the news about Airbnb content in Spain. To use the polarity variable as a numerical variable, it has been quantified as an index. Since the unit of analysis is the press sources per each year, that index has been computed as the mean of the pieces of news published being positive (value 1), negative (value -1) or neutral (0). A value close to zero means the majority of news published by the corresponding press source is neutral (e.g., *La Voz de Galicia* 2018). Further from zero and positive means the majority of news is positive (e.g., *El Periodico* 2016), and as further from zero but negative means the majority of news has a negative valence (e.g., *La Razón* 2017).

Figure 3 depicts the six topics as individuals and the polarity as components. In the biplot, we consider how many pieces of news about each topic are positive, negative or neutral and illustrate how distant topics are from each other considering the polarity of content in the pieces of news analysed. Each component, whether positive, neutral or negative, goes in one direction; however, neutral and negative directions are closer to each other than to the positive direction, meaning that topics containing more negative pieces of news included more neutral pieces as well.

As we expected, the topics PRICE_EFF.RENTALS and ABB_PROBLEMS contained proportionally more negative pieces of news, because they were closer to the negative ray. By contrast, topics TODAY_SHARING.ECO and OTHER contained more positive pieces of news, whereas REGULATIONS was close to neutral—that is, contained more pieces of news of neutral polarity. Last, the topic GENTRIFICATION, which was closest to the centre, included more news of each polarity.

Figure 3. CoDa biplot of topics polarity



Source: Authors

Table 9. Index (-1 to 1) of polarity per each source and year

Press sources	2016	2017	2018
<i>El Pais</i>	-0.31	-0.41	-0.28
<i>El Mundo</i>	0.10	-0.30	-0.24
<i>La Vanguardia</i>	0.27	-0.05	0.16
<i>La Voz de Galicia</i>	-0.13	-0.11	0.00
<i>ABC</i>	0.10	-0.15	-0.14
<i>El Periodico</i>	0.50	-0.23	0.05
<i>El Correo</i>	-	-0.30	0.00
<i>La Razón</i>	-	-0.71	-0.55

Source: Authors

Table 10. Correlations between biplot dimensions and press source polarity (mean over news published by press source)

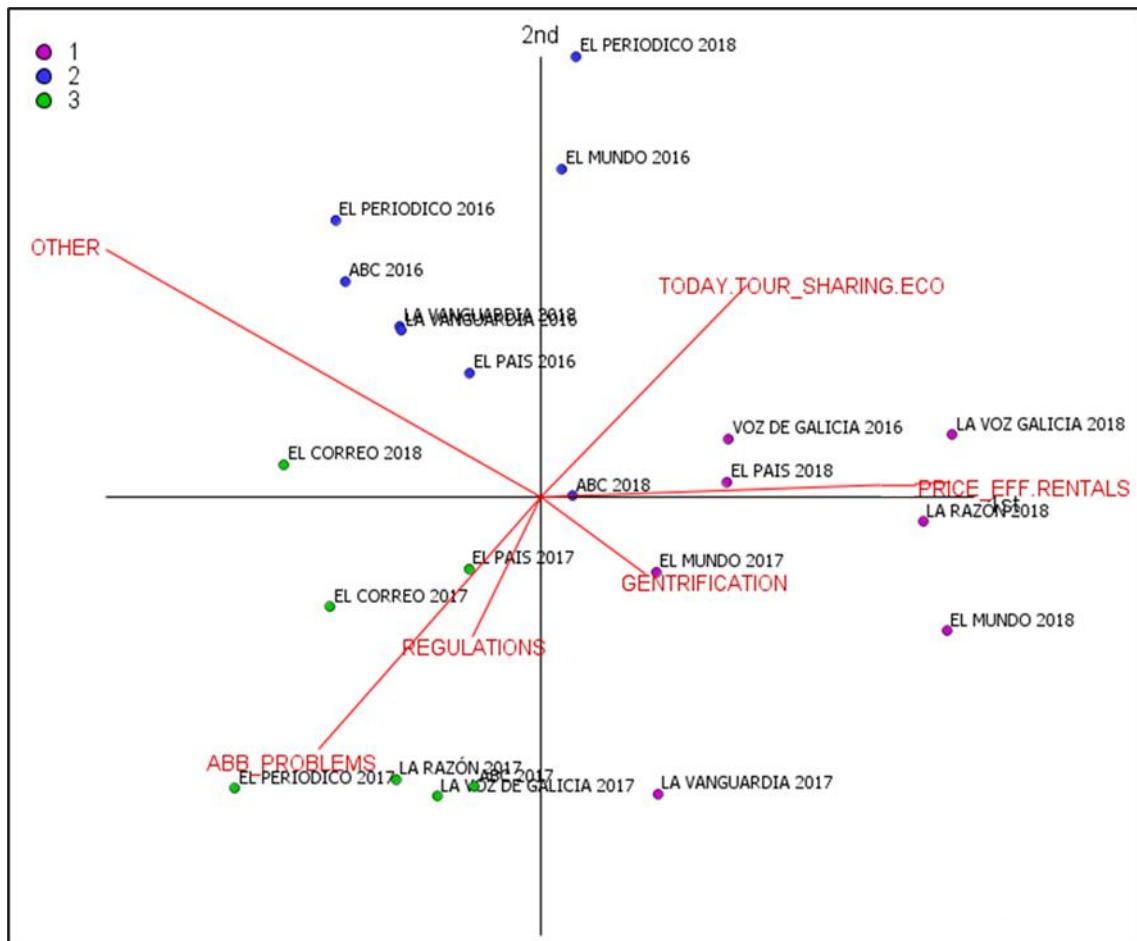
	1 st dimension (horizontal axis)	2 nd dimension (vertical axis)
Press source polarity (mean)	-0,248	0.594

Source: Authors

Correlations presented in Table 10 show that press sources located at the top of vertical axis tend to publish news with positive polarity, while those located at the right side of horizontal axis publish news with negative valence. Thus, press sources located at the bottom-left quadrant of the biplot (Figure 3) are the ones with highest negative polarity. This coincides with pieces of news published in 2017 and content related to regulations and Airbnb problems.

In order to make the interpretation clearer, a cluster analysis (*k*-means method) has been carried out (as done by Ferrer-Rosell and Coenders, 2018), and three clusters of press sources emerged. As can be seen in Figure 4, the first group of press sources is located at the right side of the biplot, and it publishes relatively more news about PRICE_EFF.RENTALS. The second group is mainly located at the top of the biplot and mainly publishes news related to OTHER and TODAY.TOUR_SHARING.ECO topics. The third cluster is located at the bottom and left side of the biplot. Press sources included in this third group publish more news related to REGULATIONS and ABB_PROBLEMS. That the same press source maybe included in each cluster, depending on the year. For example, *El País* 2016 belongs to Cluster 2, *El País* 2017 belongs to the third cluster, and *El País* 2018 is included in the third cluster. However, in all three years, this press source appears quite close to the centre of the biplot, meaning that it behaves as the mean of the whole sample. Other press sources, such *El Periódico*, are included in Cluster 2 for the years 2016 and 2018, but moves to Cluster 3 in 2017. There are no differences between *La Vanguardia* 2016 and *La Vanguardia* 2018 (completely overlapped), but, in 2017 it moves to Cluster 1 and to the bottom of the biplot.

Figure 4. CoDa biplot of Airbnb news per cluster



Source: authors

Table 11. Centres of topics in each cluster

	Cluster 1	Cluster 2	Cluster 3
GENTRIFICATION	0.196	0.158	0.131
PRICE_EFF.RENTALS	0.089	0.031	0.022
REGULATIONS	0.414	0.383	0.567
TODAY.TOUR.SHARING.ECO	0.225	0.213	0.068
ABB_PROBLEMS	0.054	0.063	0.135
OTHER	0.022	0.151	0.078

Source: Authors

Table 11 shows that even if regulations are the most common topics in the three clusters, press sources included in Cluster 3 publish relatively more news related to this topic (56.7%), and press sources in Cluster 2 publish relatively less news (38.3%) about this topic. Press sources included in Cluster 2 publish relatively more news related to other contents (15.1%), and press sources included in Cluster 3 publish less content about tourism today and the sharing economy (6.8%) compared to press sources included in Cluster 1 (22.5%) and Cluster 2 (21.3%).

5. Conclusions

The topic and keyword analysis have shown that the topics that appear most in the news are legal issues and regulations, followed by gentrification and new forms of tourism and the sharing economy, mainly treated by a negative perspective and presenting a situation of confrontation among different agents. These results coincide with Hassanli et al. (2019), who showed that the most recurrent topics in the press were the costs of Airbnb to the community and issues related to regulation. Moreover, they also discovered that underlying the topics was a controversy discourse of hosts' rights to profit versus community wellbeing. Taking into account that press news about a topic generates public opinion about the topic (Ghanem and Evatt, 1995), and the treatment of the topic influences public opinion (Entman, 1993), the study has shown that Spanish press news generates a negative vision of the Airbnb platform among public opinion.

However, the longitudinal analysis has shown that the most recurrent topic (legal issues/regulation), generally treated with a negative approach, is losing presence and interest over the years, while other topics with more positive treatment (tourism today/sharing economy) are increasing. Therefore, the influence on public opinion must be changing (Jasperson et al., 1998). In the same line, polarity in sentiment analysis of the news text has evidenced that during 2017, the press treatment of Airbnb news was in general more negative, but the negative news decreased and the neutral increased in 2018. Therefore, an evolution about the topics and the sentiment treatment of the Airbnb news in press going in a more wide and positive direction can be observed.

The compositional analysis has shown and visualized that each newspaper, also depending on the year, deals mostly with some issues or others. For example, *La Vanguardia*, a newspaper of centre-right ideology located in Barcelona, published relatively more news related to other content in a more neutral or positive approach in 2016 and 2018. However, *El Periódico*, a centre-left ideology newspaper also in Barcelona, published more news about Airbnb problems in a negative way in 2017. On the other hand, *El País*, a press-quality newspaper with centre-left ideology located in Madrid and *El Correo*, a liberal newspaper located in Bilbao, mainly published news about regulation. Therefore, the identity, ideology and location of the newspapers seems to influence the topics and the treatment of them in news about Airbnb. That dynamic could prompt a division in public opinion about Airbnb according to political ideology, with leftist voters being more critical of the platform and defending housing prices and citizens' quality of life, while right-wing voters would remain in favour of the platform and defend the interests of the owners and hosts. Nevertheless, the topics and the treatment also evolve for the same newspapers over the years, in general towards a more positive vision.

Besides, this study has contributed by providing a straightforward methodology which combines different useful and complementary techniques, to achieve a more comprehensive and in-depth analysis of the content of news on a certain "hot topic" and its evolution. Topic and keyword analysis evidenced the most published topics; polarity and sentiment analysis showed the positive or negative treatment of the news, and compositional analysis allowed the

visualization of what press is talking about in different quadrants of a biplot enabling the creation of clusters of press sources depending of the topics and the treatment.

The appeal of CoDa is that it serves as the most appropriate tool to visually represent the analysis of content. This study, thus, has validated the viability of representing, in an intuitive way, the analysis of content published in the media. The empirical analysis carried out in this article opens a new research line based on visually representing the media content, and thus putting in value the relative importance of between-media sources and topics.

In terms of social implications, the press's current negative treatment of Airbnb has forged a negative image of Airbnb in public opinion, which could easily prompt more critical stakeholders of the platform and more restrictive regulations by governments (Gunther, 1998; Hassanli et al., 2019). However, the evolution towards a more positive treatment of Airbnb involves a change of its image both in society and in the press, which could more positively impact public opinion in the future. In turn, the impact could generate greater acceptance and use of the platform, which could exert an even greater impact on the tourism and accommodation industry, loosen regulations and temper Airbnb's impact at destinations with greater tourist demand.

Regarding its business model, Airbnb acts as an intermediary so that hosts and guests interact and can agree to a short-term rental outside the traditional hospitality industry (e.g. hotels, motels and bed and breakfasts). Each property is associated with a host, whose profile includes the recommendations of other users, the reviews of previous guests, response ratings and a private messaging system, all to generate users' trust (Chua et al., 2019). Therefore, Airbnb's treatment in the press is key to generating a high level of confidence among all users involved, and our study suggests, in line with Ma and Kirilenko (2020), that adjustments and shifts in mass media are necessary to achieve effective, trustworthy communication about Airbnb. At the design level, managers of such platforms need to develop platforms in consideration of users' interaction so that opportunities for communication, enjoyment and information sharing are readily available (Cristobal-Fransi et al., 2019).

In terms of managerial implications, the analytical method has afforded local and national authorities insights into public opinion about a controversial phenomenon and how such opinion has changed over time. With such information, they may be able to adjust their policies and strategies accordingly. The method has also afforded Airbnb, its stakeholders and the affected destinations information about the platform's most relevant aspects that appear in the press and their evolution, thereby raising awareness of the most concerning issues and regulations to be adopted, all so that the possible effects of those measures on the platform and on destinations and their residents can be anticipated.

Scope & Limitations

Regarding the method used, the main limitation is related to the presence of zeros. This is a common limitation mentioned in CoDa, because it is not an appropriate method for databases with a high frequency of zeros (Martín-Fernández et al., 2015). To avoid this limitation, the most common approach is to have large databases, that is, to have a large number of data

covering a wider number of sources and journal articles. Another option to minimize this limitation is to code (or categorize) the topics in a two-phase process, allowing the inclusion of several subtopics within a wider/global topic. In CoDa, this process is known as amalgamation.

Future Research

Because our analysis examined coverage of Airbnb in the Spanish press only, future studies could extend the analysis to the international level by comparing it to other peer-to-peer accommodation platforms (Medina-Hernandez et al., 2020), or to other controversial tourist topics. Concerning methodology and treatments of text, the method of text analytics based upon machine learning could be used to elicit additional insights for analysing not only the content of texts but also their structure and design, as well as how other elements function and interact within the larger context. Last, conducting a sentiment analysis of Airbnb users' tweets to characterise public opinion on the subject and compare the results with the press's treatment could help to evaluate the press's true impact on public opinion about Airbnb. Beyond that, the study could be expanded over time to analyse how COVID-19 has impacted Airbnb and how the press has also treated that adjacent topic. Because COVID-19 has extremely restricted human mobility and international tourism, its impact on Airbnb has undoubtedly been quite negative (Dolnicar and Zare, 2020). At the same time, as tourist destinations reopen amid a lingering fear of the contagion in public accommodation spaces, Airbnb may be an initial solution to the crisis for the tourism industry, and analysing the press's treatment of that dynamic would also be worthwhile.

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