

The Vision of the Main Mobile Apps Related to Caravanning: an Analysis of the Reviews Focusing on Users and Developers

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Abstract

Mobile applications (apps) are becoming an essential tool when it comes to sightseeing. There is even a specific category for trips in the leading app stores. These are no strangers to the rise of the itinerant travel style, the caravans. The study aims to understand the situation of the main caravanning apps in Spain. We have carried out a web scraping methodology using a sample of 1,601 Spanish reviews of the main apps related to caravanning. The most interesting findings, among others, are that we are getting to know a sector that up to now was unknown and that even has not been affected by the pandemic crisis. Besides, the paper has demonstrated that developers do not follow the right strategies in caravanning apps. The paper also shows users' most crucial concerns about these apps. Therefore, managers of caravanning apps could improve their strategies by focusing their attention on users' concerns and, most important, reviews to respond.

Key Words: Apps; Caravanning; Reviews; Web Scraping; Users; Developers

JEL Classification: Q55; Z32

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1. Introduction

Nowadays, we live in an increasingly digital world where the tourism sector and new information and communication technologies (ICT) have boomed, becoming two great allies (Purnomo, 2021; Rasoolimanesh et al., 2019). As a result, the tourism industry is immersed in a profound metamorphosis, where new technologies play a crucial role (Vidal, 2019; Liebana et al., 2020), in offering a complete experience to tourists.

Within the new technologies, smartphones and more specifically, mobile apps have become a basic resource in enhancing the experience of digital tourists since technologies have changed and revolutionised the way people travel (Pierdicca et al., 2019). As a result, tourists are increasingly familiar with the use of apps (Navarrete et al., 2020), which are essential in having a good tourist experience (Dickinson et al., 2014) because they make tourism easier for the users (Jarrar et al., 2020). This is due to the fact that the use of apps in this sector provides the user with a great saving of time before, during,

and after the tourist trip (Xu et al., 2019). As a result, the developers of the apps have had to carry out important efforts to comply with the expectations of the users (Fang et al., 2017).

In recent years, we have witnessed an increase in the popularity of apps, which have supplied the possibility of being able to publish comments online to evaluate them (Hassan et al., 2017), providing the opportunity for feedback to the developers of the apps. The same is true regarding the opinion of users, since comments play an important role in the evolution of apps (Koyani et al., 2004) when it comes to evaluating user satisfaction.

The functionalities of smartphones have been improved, becoming an important tool (Fang et al., 2017; Gupta & Droga, 2017; Wang 2019), allowing users to perform tasks through apps, for example book tourist accommodation, restaurants, search for travel information in a simple way etc. Therefore, it has great potential for users (Tan et al., 2017), allowing their developers to take advantage of comments and track the comments provided by users (Chen et al., 2014). In summary, it is considered that technology and tourism is a perfect combination.

Within the broad field of tourism, caravanning has become a very new way of tourism for those who are tired of traditional tourism (Brooker & Joppe, 2014; Hogue, 2016). Caravanning tourists would rather enjoy a free and independent way to travel as an alternative to pre-arranged or fully organised vacations in a hotel, apartment, cruise, or package tour (Dieckert, 2019).

When it comes to caravanning apps, although there are few apps related to this specific sector, they are well-known among caravanning users. These apps must have very specific characteristics since the developers have to adapt them to a tourism sector with particularities that distinguish it from the rest of the traditional tourism sectors.

According to Dieckert (2019), the success factors of the caravanning sector during the last thirty years are based on factors such as spontaneity and flexibility both in the way of travelling and the operators of motorhome areas, in the existence of simple, organised spaces, in achieving customer satisfaction in terms of location, facilities or prices and in personal identification with the operators. The digitization of this sector should be a useful tool capable of preserving these success factors, since going beyond the proven foundations of success can lead to failure (Escobar et al., 2022).

In the last decade, there have been many papers related to tourism and apps (Buhalis, 2019; Buhalis & Molinaroli, 2003; Liebana-Cabanillas et al., 2020; Castañeda et al., 2019). However, the tourism sector and more specifically the emerging caravanning sector presents a large gap. There are no studies that analyze these specific apps and the behaviour of its developers.

Therefore, the purpose of this paper is to understand the situation of the main caravanning apps in Spain. The appeal in studying the Spanish caravanning sector is that Spain is the European country with the largest growing interest in caravanning, more specifically, sales of motorhomes increased by 11% compared to the same period of the previous year. However, the numbers are still far from the figures of other countries such as Germany and France (ASEICAR, 2018). This is the reason why Spain is considered the main emerging country in this type of tourism in Europe. There are many researchers (Purnomo et al., 2020; Rinaldi and Salerno, 2019; Tretheway and Mak, 2006) who have been interested in studying countries that are emerging in different tourist areas due to their particularities.

After offering a brief introduction in this first section, the rest of the article is organised as follows: In Section 2 we present a review of the background. The data used in the research and the methodology followed are explained in Section 3. Section 4 presents the study findings. Finally, the main conclusions and implications are discussed in Section 5.

2. Literature Review

2.1 Apps del caravanning

In the last decade, the caravanning sector has been digitized. This sector began with management models that opted for clubs, associations or traditional paper editions. However, the digitization of the sector provided other types of solutions that were based on specialized apps in the caravanning sector. These apps tried to respond to the caravanning users' demands. Among the apps related to caravanning that have appeared on the app market in recent years, those aimed at locating overnight places and providing valuable information on geolocation, available services, images and comments from other users (Hernández-Garrido et al., 2020). These apps as others also offer to the users the possibility to write a review giving their opinion and evaluate it. This fact could be interesting to other caravanning users.

Regarding the evolution that this sector has undergone in Spain, the trend has been quite positive, increasing considerably in recent years (Statista, 2021). However, we cannot forget that the tourism sector has been strongly affected by the unexpected pandemic resulting from the COVID-19 health crisis. This has forced the tourism industry to adapt to the new situation (Florek, M., & Lewicki, 2022). In fact, the pandemic has caused many consumers to change their current purchasing habits or find new ones (Sheth, 2020; Svatosova, 2022). According to Laato et al. (2020), the reality of the business environment has been drastically changed by the recent COVID-19 pandemic. Despite all this, it can be said that the caravanning sector is one of the few that has not been affected by the pandemic, in fact, sales of new and second-hand caravans, motorhomes and campers increased during this period (Aseicar, 2022). Among others, this is due to the special characteristics of this type of tourism. According to Shamim et al. (2020), people were afraid of COVID-19, causing them to maintain social distance and generally pursue health security practices, characteristics that define this particular sector.

Based on this, it is intended to analyse if this trend is also reflected in specialized apps in this sector. Therefore, we formulate the following research question:

RQ1 How the adoption of caravanning apps has developed?

2.2 Behaviours of users

App stores have feedback mechanisms that allow users to rate an app using a five-star rating system and to write a review (McIlroy, 2015).

When a user posts a review, they include a rating for a specific app and also add comments explaining the rating. The reviews that they post can be positive, neutral or negative. According to Cheng et al. (2006), a positive review refers to a favourable experience and, as a result, a recommendation of the product or service to other users, whereas a negative review refers to an unfavourable experience of the users and consequently dissuades others from buying that product or service (Cheng et al., 2006). Each user review can contain valuable information for developers and other users about issues that need to be fixed and enhancements and new features required (Maalej & Nabil, 2015). Therefore, it is crucial to analyse the opinion that users leave in their reviews.

User reviews are a crucial part of user experience because of the influence of satisfaction in acceptance (Koyani et al., 2004). In fact, user reviews are one of the most influential factors when downloading an app or buying within it. Nowadays the importance of a review and its rating is so high that 77% of users will not download an app that has a rating that is lower than 3 stars (Poschenrieder, 2015). In addition, reviews are not only important for users but also for stores such as Apple or Google, which highlight in their algorithms those applications that have a good rating and a large number of reviews. Furthermore, it is necessary to consider that nowadays there are a massive presence of consumers' opinions posted online and, as a result, it is easy to find negative reviews that can negatively affect purchase decisions (Sen & Lerman, 2007; Owsley Sood et al., 2011; Ekiz et al., 2012). In fact,

according to many researches (Cheung et al., 2009; Petrick et al., 2006), reviews with lower rating reviews have a higher influence than reviews with higher rating. It is because users usually perceive positive reviews as more useful than positive reviews (Eslami et al., 2018; Lee et al., 2017).

Furthermore, according to literature (Alicke et al., 1992); Berkowitz, 1970; Berger, 2014), the more negative the attitude of users towards the brand, the greater their desire to vent. Therefore, users that have had negative experiences are more prone to extensive reviews rather than brief reviews. However, it is noteworthy that most of the brief comments have a positive trend (Hassan et al., 2018).

In summary, considering the impact that the users' reviews have and the importance to analyse these reviews, it is essential not only to know the opinion of the users' but also their feelings and their behavior when they write a review. Furthermore, In spite of the fact that there is an increasing literature regarding reviews and the tourism sector, little attention has been paid to how users act and post. Furthermore, the research has been focused on traditional tourism, but there are no studies that analyze the digitalization of the caravanning sector, focusing on apps. As a result, it is crucial to carry out the analysis of the caravanning users. Therefore, we formulate the following research question:

RQ2 What do users think about apps related to caravanning?

RQ3 What is the feeling of the most supportive reviews by users?

RQ4 How do users behave themselves based on reviews?

2.3 Behaviours of developers

From the point of view of app developers, reviews can not only provide important information but also provide a direct communication channel with users and can help developers in many aspects (Palau, 2019). As a result, the proper use of reviews by developers can have great advantages. Among the main advantages we highlight obtaining feedback from the app, identifying possible problems in certain versions or specific devices of the apps, and obtaining ideas and suggestions for improvement as well as helping in reputation management thanks to the response given to the user and so on (Liébana, 2016).

We also must take into consideration that academic studies on the topic of online word-of-mouth have highlighted the impact of consumer reviews on the purchase decisions (Mauri & Minazzi, 2013). Therefore, addressing user feedback is a crucial part of developing and maintaining popularity in app stores. A viable mechanism for addressing user feedback is through personally responding to a particular user review (McIlroy et al., 2015). In order to take advantage of this, they should start the process of communication that consists of starting a dialogue once a user has posted a review, by responding to the review. However, in spite of the fact that since 2013 app developers have had the chance to reply to Google Play reviews, it seems that many apps' developers still have not taken the advantage of this opportunity to connect with users. In fact, 97% of Google Play app reviews are not answered by app developers (Appbot, 2021). Appropriate communication through apps can be a key aspect in order to obtain a competitive advantage (Stefko et al., 2022). Therefore, how should developers answer the reviews? Savarimuthu et al. (2017) explained the norms that developers should follow in app development. Regarding the answers, according to Palau (2019), the more reviews they answer, the better. Therefore, developers also should be able to respond to negative reviews including complaints or to positive reviews thanking the user for a kind review of the app. However, developers have limited time and there are many apps that receive so many reviews that it is nearly impossible to answer all of them. As a result, developers must decide which are the reviews that need a response. According to Hassan et al. (2018), the longest and lowest reviews seem to be the most crucial for users. As a result, it is essential that developers respond first to these types of reviews.

Furthermore, according to Hassan et al. (2018), there are no studies previous to them in the literature that analyse the communication between users and developers. However, they analyse the

dialogue of the free apps in Google Play. Therefore, it is interesting the dialogue in the tourism sector in general and the caravanning sector in particular.

Based on this, it is intended to analyse if this behavior is also carried out in specialized applications in the caravanning sector by developers. Therefore, we formulate the following research question:

RQ5 How developers behave when responding to reviews?

3. Methods

3.1. Source for data

This study focuses on the digital distribution platform for mobile applications, Google Play, as a source for data. It is widely accepted in the everyday users' community. Besides, although its main competitor, Apple Store (IOS), has larger earnings, Google Play (Android) leads in application downloads (Möller et al., 2012). In addition to the fact that Android is the operating system with the largest share of the smartphone market in the world, Android devices represented just over 84% of units sold in 2020, and Apple iOS almost the remaining 16% (IDC, 2020). The same happens in the Spanish case, the market share of Android is greater than that of the Apple Store, 82% compared to 18% respectively (StatCounter, 2020). Regarding the tourism apps, more than 64% of tourism apps are available on Android (84,542 apps) instead of in the Apple Store (54,424 apps) (42matters, 2022). For these reasons, this application store was chosen as the source for data for this analysis.

Google Play can be seen as a method of interaction between an app's developers and its users. The reason is because it offers a unique two-way interaction through posting users' reviews and allowing apps' developers to reply to them. However, it must also be pointed out that it is a unique two-way communication and not continuous because there can only be one answer per app review. All developers can respond to reviews of their applications and immediately the response appears publicly next to the review, and by default, the user who left the review receives an email notification that they can only respond by editing their app review, and the developer is not notified when this occurs.

App reviews now become a widespread information stream to help users make a download decision. In fact, 79% of people take into account reviews before they install an app (Apptentive, 2020). In addition, reviews along with ratings influence the Google Play ranking algorithm. An app's position is an important user acquisition factor; higher-ranked apps are more visible. Apps need not only positive ratings and reviews, but also a large number of them (Apptentive, 2020). For this reason, it is necessary to analyse all reviews and not only a sample of reviews. To take all of them into account, they will be automatically collected using web scraping techniques.

3.2. Sampling and data collection

To obtain a complete analysis that obtains findings that are very close to reality, it is necessary, as mentioned above, to take into account all the reviews of the sample of chosen apps. The sample for this study is made up of the main apps in the caravanning sector. These are 6 apps: park4night – camper van, CaraMaps – Motorhome Areas, CampingCard ACSI Campings, Perfect Furg, Campercontact and ACSI Campings Europe. This sample is scarce because there are no more considerable apps in the caravanning sector. Hence, all relevant caravanning apps are being considered.

Only the reviews of the Spanish users will be taken into account. Google Play shows the average of the scores (stars) worldwide, but the reviews that appear are not those of users from all countries. Google Play only shows reviews that come from the same country. In this case, the scope of study is Spain.

Considering all the Spanish reviews, from the launch of each of the apps, July 2013 is the earliest review, up to January 2021. We have collected 1,601 reviews of Spanish users. Although this may not

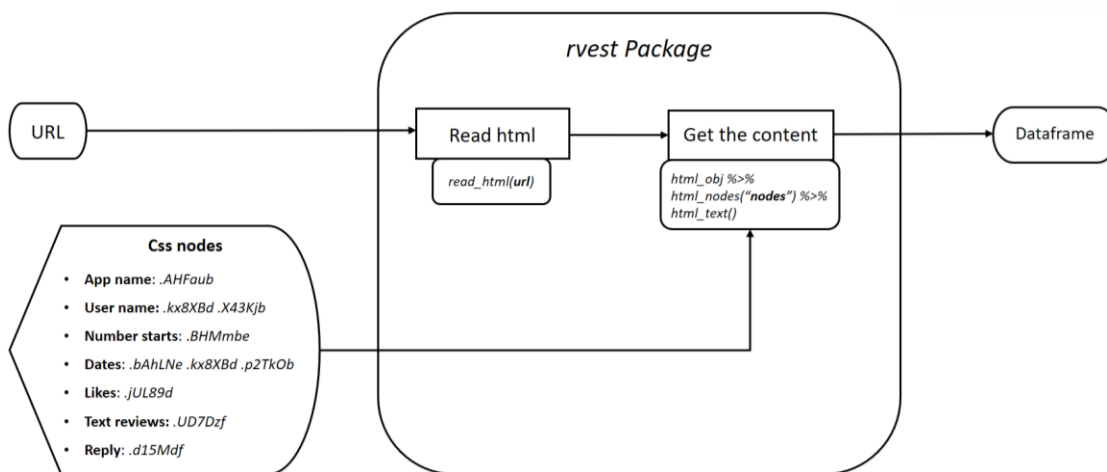
seem like a significant amount, this number takes into account all the reviews of the main caravanning apps. We collect until the last revision that appears at the bottom of the web page, where the following content is no longer automatically loaded since there is no more. Google Play uses an infinite scroll page, where the next content will automatically load when the end of the page is reached.

As Google Play is an infinity scroll page, we cannot scrape its web page as it is, since this would only collect the data of the first visible segment. The scraping technique needs to reach the end of the web page so that the following content will load automatically and it can scrape all required elements. This repeats until reaching the end of the page where it is not updated again because there is no more information available. For this reason, to scrape this kind of page it is necessary to simulate human behaviour with specific tools, such as rvest.

A code has therefore been designed that acts as a robot that automatically navigates through the Google Play website and allows for obtaining the required data. A web scraping technique is used. All revisions are scraped using the open-source software, R (R Core Team, 2018).

The R package used for scraping reviews is rvest. It makes it easy to download, then manipulate, HTML and XML and is designed to work with magrittr package to make it easy to express common web scraping tasks (Wickham, 2021). In short, rvest allows for performing web scraping, which automated the collection process. The web scraping's basic flow that we followed was to first analyse web page structure, second parse HTML content, third obtain the URL, fourth get page source, fifth select data and finally process the data. The figure 1 shows the flowchart of scraping of reviews on Google Play. Having analysed the structure of the web page and identified the Css nodes that correspond to the contents of the web that are to be collected, the web link is indicated by means of the URL, thus allowing for obtaining the HTML source of the web page for each data that is going to be processed in the study.

Figure 1. Flowchart of scraping of Google Play



Source: own elaboration

In the process, each of the reviews has been analysed in terms of its content, its number of likes, its evaluation, its date and whether it has received a response from the developers of the app. Therefore, a mixed analysis was applied, where quantitative and qualitative data were addressed. The quantitative data was the metrics related to the number of likes, valuation, dates and whether they have received a response from the developers, which were studied through a statistical analysis to understand the behaviour of users and developers. The qualitative data such as the content of the reviews was analysed using text mining to identify the frequency of each word and thus see what the users think the most.

In short, we have used a powerful technique to collect data from reviews of Google Play apps that has allowed us to obtain all of them, avoiding the barriers and limitations of existing alternative methodologies for this process. Barriers of a high payment to access the functionalities were bypassed by the analytical platforms of apps 42matters and Apptweak. Limitations on processing reviews were avoided with PlayDrone, a tool for accessing the metadata and source code of 880,000 free Android apps. It discovered that 25% of apps on Google Play were just copies of others or simply spam. It is the system's ranking of the most popular apps was not always accurate and that the program code in 15% of apps contained errors (Viennot et al., 2014).

3.3. Data analysis

To analyze the reviews we use text mining by studying the frequency of words. The R 'tm' library (Feinerer et al., 2017) was used to obtain the most frequent words that appear in the reviews provided by users. The tm package is a text mining framework that provides functions for processing text, a so-called corpus, which represents a collection of text documents. To clean a corpus, we use various functions, such as stopword removal, lemmatization, whitespace removal, etc. We can use the functions stopwords ('spanish'), content_transformer, tolower, tm_map and several quantitative functions for text analysis, such as DocumentTermMatrix, findFreqTerms, findAssocs and removeSparseTerms (Varangaonkar, 2017). Word frequency is plotted on a bar chart, based on review rating: positive, neutral, and negative.

In order to study how users behave with other users, through likes or the developers with users through the responses, significance analysis was applied.

Therefore, in the review process, users first have the possibility to interact with other users of the app, giving a like to their review. The correlation between the score of a review and the number of likes received is studied. Therefore, their relationship is studied using a Kendall's rank correlation tau, checking previously that both variables (scoring and likes) cannot be assumed to be normal. After that, developers have the opportunity to interact with users' reviews through responses. Therefore, it was intended to study whether it depends on the score of a review or its number of likes or neither or both, for a developer to respond or not. A binomial multivariate statistics analysis, Generalised Linear Model (GLM) was applied. The equation is as follows:

$$\{\text{Reply} = \beta_0 + \beta_1\text{Likes} + \beta_2\text{Rating}\}$$

GLM are a very popular tool in many subjects (Kolyshkina et al., 2004) and have been shown to be effective in the field of tourism (Amin and Atique, 2021; Stumpf et al., 2020; Zanin and Marra, 2012, among others). Among the various GLM models that exist, the familiar logistic model with binomial data is a GLM with a logit link function, which is appropriate for probability outcomes (Dias et al., 2014). Although it appears to be simple, it is based on some key assumptions: linearity, homoscedasticity, independence and normality of the errors). A detailed description of the GLM methodology is beyond the scope of this article and can be found in other sources such as McCullach and Nelder (1989).

The clustering techniques are almost indispensable as a tool for data mining, especially techniques based on agglomerative hierarchical clustering that constitute one of the most frequent approaches in unsupervised clustering (Almeida et al., 2007). For this reason, we applied this clustering technique. The algorithm starts by working on each review as a single group, and then the pairs of groups are successively merged until all the groups are merged into one large group that contains all the reviews (El Bouchefry & de Souza, 2020). In this way, a tree-based representation of the objects is obtained, called a dendrogram. The method used is Ward's minimum variance clustering. The choice of this method is due to the fact that it is the most popular in fields such as linguistics, since it generally creates compact groups of uniform size (Szmrecsanyi, 2012). To assess whether the clustering algorithm is appropriate, Dunn's Index (1974) is used. Its objective is to identify sets of compact clusters, with low variance between the cluster members and well separated, in which the means of the different clusters are sufficiently far from

the interior of the cluster variance (Zippo, 2021). Therefore, the higher the value of Dunn's index, the better the aggregation.

4. Results

Before presenting the obtained findings to provide answers to the research questions raised above, we present in Table 1 a descriptive statistic of the caravanning apps.

Table 1. **App statistics**

	<i>Minimum</i>	<i>Average</i>	<i>Maximum</i>	<i>Std. Deviation</i>
Reviews	70	266.83	588	192.62
Rating	2.2	3.68	4,4	0.78
Downloads	100,000	316,666.67	1,000,000	371,034.59
Likes*	0.71	1,44	2.22	0.64
Replies*	25.32%	57.72%	100.00%	0.31
* <i>per reviews</i>				

Source: own elaboration

The preliminary results obtained by analyzing the main caravanning apps show that they are rated with a reasonable average rating (3.68), while the minimum rating of one of them is 2.2 and the maximum is 4.4. App ratings are based on a maximum 5-star cap. The app with the fewest downloads is appropriately 10,000 downloads while the maximum is 1,000,000 downloads. The average number of downloads of the caravanning apps is 316,666.67. The average number of reviews that have been published is 266.83, the app being the most commented with 588 reviews while the one with the least interest has 70 reviews.

These reviews received an average of 1.44 likes each and are answered by the developers just over half, 57.72% of them. The app that received the least likes per review had 0.71 likes, while the app with the most likes tripled in the number of likes it received for each review, 2.22 likes. There is an application whose developers answer 100% of the reviews, while for one of the apps its developers only answer 25.32% of the reviews.

There are clearly substantial differences between these types of apps in terms of the number of reviews, ratings, downloads and likes due to their high standard deviations. The differences between the proportion of reviews with responses from the developers, although not very high, are considerable.

Our main objective was to to understand the situation of the main caravanning apps in Spain.. That is why we identified the five related research questions in this paper, as answered below.

RQ1 How the adoption of caravanning apps has developed?

The reviews show in Table 2 how the trend in the reception and interest in caravanning apps by caravanning users has been growing over the years. It has risen from 0.25% of reviews in 2013 to 24.25% of reviews in 2020. There have only been two decreases in the number of reviews compared to the previous year. From 2017 to 2018, reviews dropped by 31.84% and very slightly from 2019 to 2020.

At the same time, it is also very representative as the reviews are higher in the summer months (July, August and September), with a total of 43.10% of the reviews. After summer, the most active

season for users of caravanning apps is spring (April, May and June), which represents 20.74% of reviews. Very closely together are the winter (January, February, March) and autumn (October, November and December) periods with 18.62% and 17.55% of the total reviews, respectively.

Table 2. Evolution of reviews

Years	Variation year		Months	
<i>2013</i>	0.25%	-	<i>January</i>	5.50%
<i>2014</i>	1.26%	80.16%	<i>February</i>	6.06%
<i>2015</i>	4.79%	73.70%	<i>March</i>	7.06%
<i>2016</i>	9.78%	51.02%	<i>April</i>	8.00%
<i>2017</i>	18.80%	47.98%	<i>May</i>	5.56%
<i>2018</i>	14.26%	-31.84%	<i>June</i>	7.18%
<i>2019</i>	25.74%	44.60%	<i>July</i>	14.49%
<i>2020</i>	25.24%	-1.98%	<i>August</i>	16.99%
			<i>September</i>	11.62%
			<i>October</i>	6.93%
			<i>November</i>	4.87%
			<i>December</i>	5.75%

Source: own elaboration

When focusing monthly by year, to visualize the effect of the pandemic on the use of caravanning apps, Table 3 is prepared. For this, only the last three years of the study are visualized (2018, 2019 and 2020). We see how during the year 2020 in the months before the start of the confinement, January and February had more reviews than in 2018 and 2019. Which implies that in those years this type of app was used more than in the same months of previous years. Naturally, during the three months of confinement (March, April and May) the reviews dropped quite a bit. The next months of 2020, in June and July there was a relaxation in the mobility restrictions, so it is clearly visible how the reviews increase in those months, surpassing those of 2018 and 2019. In the following months, the mobility restrictions are tightened again. mobility due to increases in COVID-19 infections, so reviews decrease a bit in some months. However, despite the fact that tourism is one of the sectors most affected by the pandemic, the caravanning sector has not been so affected, and even in some months it has been favored, as the analysis of caravanning apps has shown.

RQ2 What do users think about apps related to caravanning?

Focusing the research magnifying glass on users, we analysed the most frequent bigrams of the reviews according to their ratings. We divided the reviews into positive (4 or 5 stars), neutral (3 stars) and negative (1 or 2 stars). From now on we indicate the most used words in the reviews, already translated into English. The original language of the reviews was Spanish.

Figure 2 shows the 15 most frequent bigrams of the positive reviews that have been published about the caravanning apps. The most prevalent bigram in the 11,271 positive reviews is ‘best app’ with 6.37% of uses. Afterwards, the bigrams ‘works well’, ‘good app’ and ‘useful app’ follow very closely among them. And the remaining 11 words occur between 2% and 3% frequency of use.

Table 3. Evolution of the reviews before and during the COVID-19 crisis

	Before COVID-19		During COVID-19
	2018	2019	2020
<i>January</i>	11	5	28
<i>February</i>	7	18	23
<i>March</i>	29	21	17
<i>April</i>	18	32	15
<i>May</i>	24	19	13
<i>June</i>	12	29	35
<i>July</i>	31	50	85
<i>August</i>	29	91	69
<i>September</i>	19	51	53
<i>October</i>	19	31	27
<i>November</i>	14	25	15
<i>December</i>	13	36	20
<i>Total</i>	226	408	400

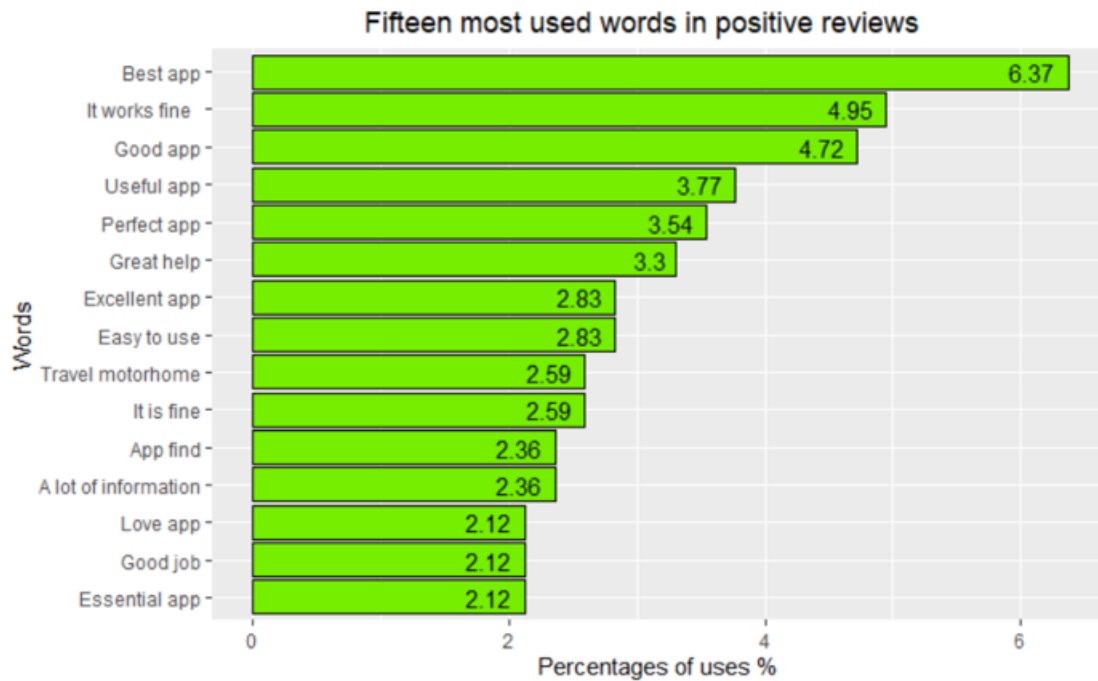
Source: own elaboration

The neutral reviews number 109, which have a very similar speech of frequent words as shown in Figure 3. The bigrams ‘I can see’, ‘many times’, and again ‘good app’, are the most frequent with 4.76% of use. Later, with 3.57% of use, the bigrams ‘new update’, ‘works well’ and ‘create route’ appear more. The remaining 9 were used 2.38% each. These reviews tell us the functionalities of the apps, which users do not like or dislike. Since, for example, the ‘I can see’ bigram indicates both that a functionality cannot be seen and that it can be seen. The impediment of being able to see one of the functionalities is usually preceded by some latest update. The ‘Two things’ bigram determines that there is more than one reason for the user to highlight to give that score to caravanning apps. Developers should therefore not ignore these reviews, although their attention should be especially devoted to negative reviews.

Figure 4 shows the 15 most frequent bigrams of the negative reviews that have been published. The 365 negative reviews show that the bigram that appears the most refers to ‘last update’ with a usage of 6.25%. The rest of the bigrams that are also most used include both the paid versions of the app, as well as the concern about data storage. It is worth mentioning that in these comments they also speak of

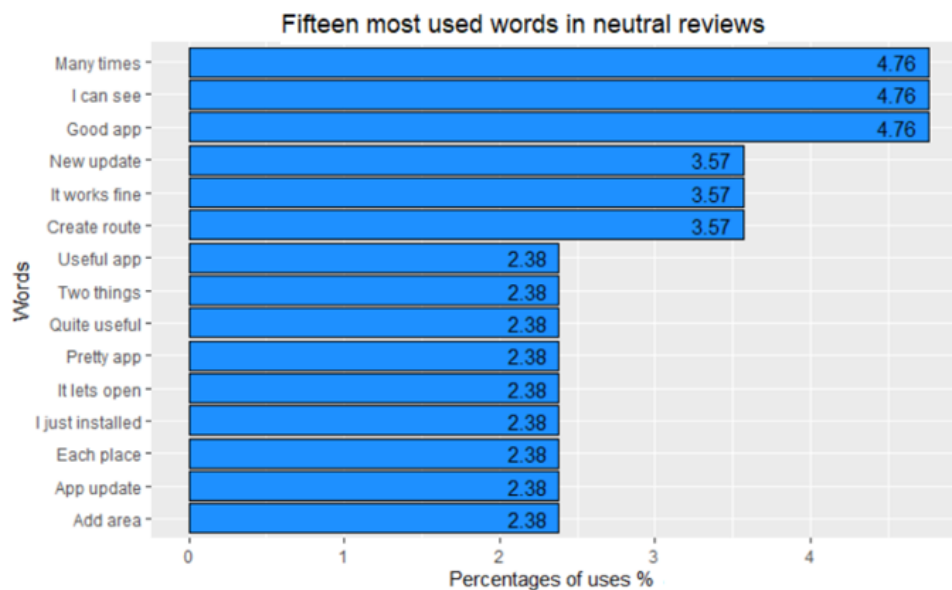
positive connotations of the app such as ‘app works’ or ‘good app’, however, despite this, there are problems with its use.

Figure 2. Most frequent bigrams of the positive reviews



Source: own elaboration

Figure 3. Most frequent bigrams of the neutral reviews

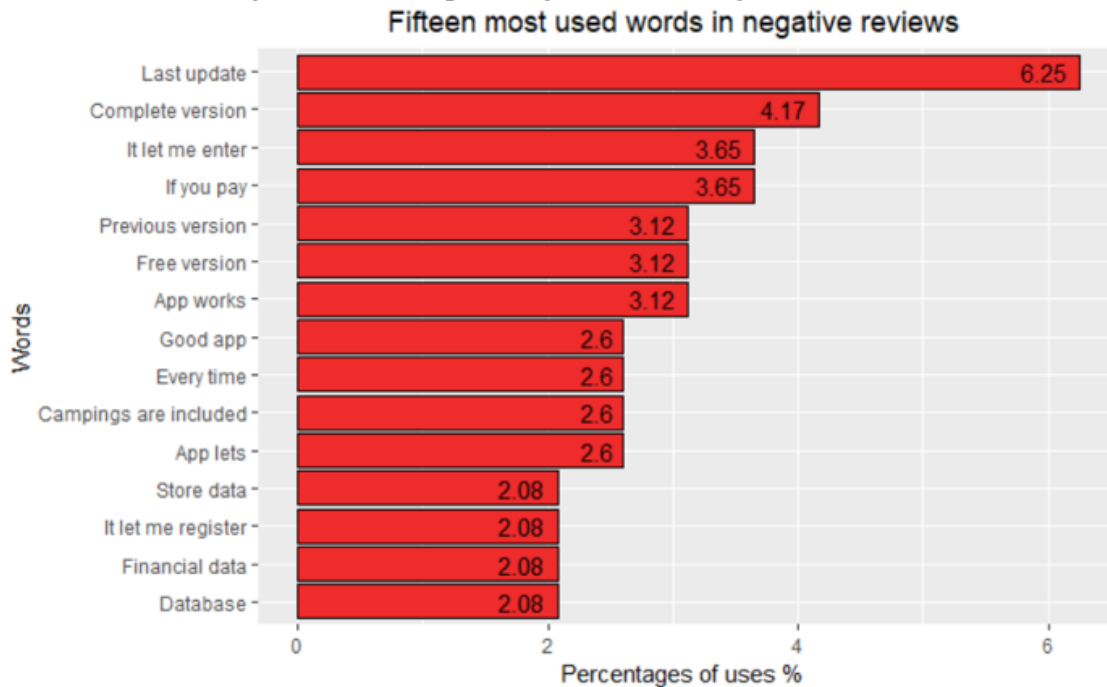


Source: own elaboration

RQ3 What is the feeling of the most supportive reviews by users?

When analyzing how users act with the reviews of other users through the likes, a significant negative relationship was detected between the rating given in each review and between the number of likes that each review receives as shown in Table 4. This means that the most negative comments (with the lowest rating) have a greater number of likes than the other comments.

Figure 4. Most frequent bigrams of the negative reviews



Source: own elaboration

Table 4. Relation between scoring and likes

Dependent variable	Independent variable	Kendall's tau	Significance	Conclusion
Rating	Likes	-0.18828	2.20E-16	***Confirmed
*** Significant at p <0.001 (2-tailed)				

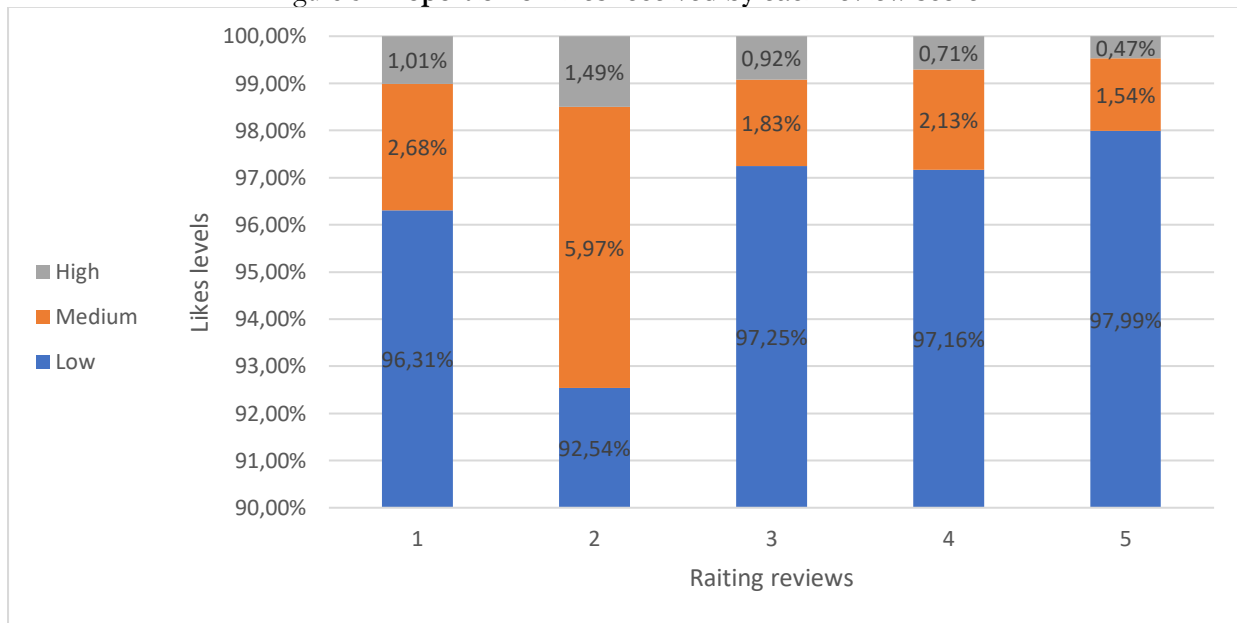
Source: own elaboration

To better understand it, Figure 5 is shown, where the average number of likes received by each comment rating is represented. We divide the number of likes into three levels. The low-level groups are the comments that received from 0 to 10 likes, the medium level groups are those that received between 10 to 20 likes and the high level that includes those that have already received more than 20 likes. In this way, we see how the reviews that gave the applications the maximum rating of 5, were the ones that received the fewest high likes. Only 0,47% of its reviews received a big number of likes. Reviews with a 2-star rating were the reviews that received the highest and medium likes. That is why the reviews with this score are the ones that generate the most consensus among users.

RQ4 How do users behave themselves based on reviews?

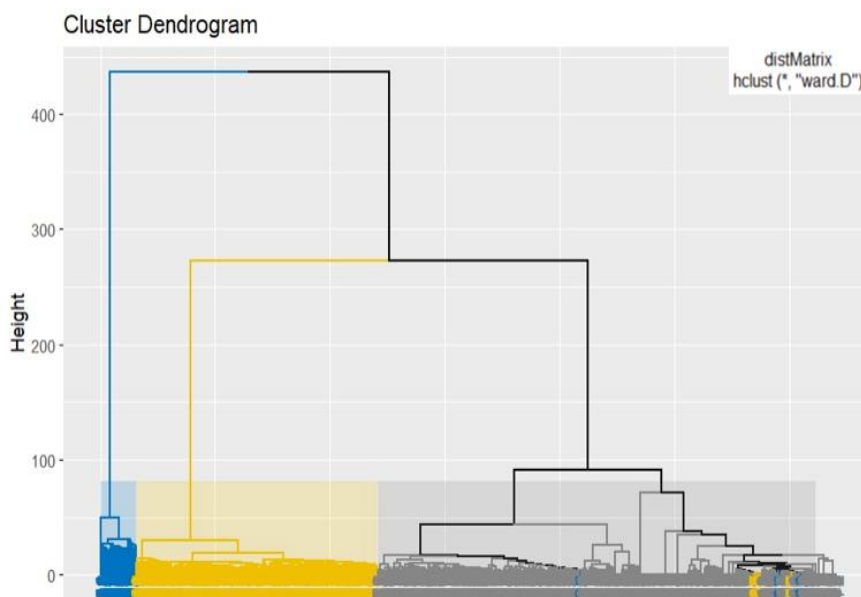
To identify a similar pattern, the reviews are agglomerated in different clusters to study how the users (and developers in the next research question) act according to the group of reviews. As Figure 6 shows, through Ward's hierarchical agglomerative clustering method, three clusters are identified. One with a briefer dimension, another with a regular dimension and a third with a larger dimension. Dunn's index is the method chosen to assess clustering. A Dunn index value of 0.08793156 is obtained. Although it is not a high value, it indicates that the grouping consists of compact and separated clusters.

Figure 5. Proportion of likes received by each review score



Source: own elaboration

Figure 6. Agglomerative hierarchical clustering analysis



Source: own elaboration

These three clusters have grouped the reviews according to their length (number of words). The three groups are: Cluster 1 (blue) – Extensive reviews, Cluster 2 (yellow) – Regular reviews, and Cluster 3 (grey) – Brief reviews.

Once the clusters have been identified, Table 5 presents the results obtained from each group in order to better understand how developers act in response to each type of review.

Table 5. **Agglomerative hierarchical clustering**

	Lengthy	Medium	Small
<i>Reviews</i>	4.81%	31.48%	63.71%
<i>Words</i>	130.26	27.46	7.66
<i>Likes</i>	5.70	2.54	0.62
<i>Replies</i>	73.32%	76.79%	75.33%
Positive			
<i>Negative</i>	40.26%	36.51%	14.71%
<i>Neutral</i>	11.69%	10.12%	4.80%
<i>Positive</i>	48.05%	53.37%	80.49%
<i>Deviation</i>	0.191	0.218	4.501

Source: own elaboration

It shows that extensive reviews represent 4.81% of reviews with an average number of 130.26 words. Each has an average number of 5.70 likes. When it comes to regular reviews, they represent 31.48% of reviews, with an average number of 27.46 words. Each one has an average number of 2.54 likes. Regarding to the brief reviews represent 63.71% of reviews with an average number of 7.66 words. Each has an average number of 0.62 likes. Finally, brief reviews contain the greatest disparity in the number of positive and negative reviews, while extensive reviews are those with a similar proportion of positive and negative reviews.

RQ5 How developers behave when responding to reviews?

We focus on the figure of the app developer; to understand how they respond according to the reviews published by users.

The clusters identified in Figure 5 and Table 4, where reviews are grouped by dimension, show that developers respond in a similar way to reviews, whether brief, regular or extensive. The developers respond to 73.32% of extensive reviews, 76.79% of regular reviews and 75.33% of brief reviews.

Table 6 took into account whether or not the developer responded to the reviews, but no significant relationship was found in terms of the number of likes each review received. However, there was a significant positive relationship to the rating given by each review. This means that whether the developer responded or not to a review is not associated with the number of likes of the review, but positively with the rating. Whether a comment has more or fewer likes does not depend on the response

from the app developer, but the developers do respond more to positive comments (those with more ratings).

Table 6. Multivariate statistics – Generalised Linear Model (Binomial)

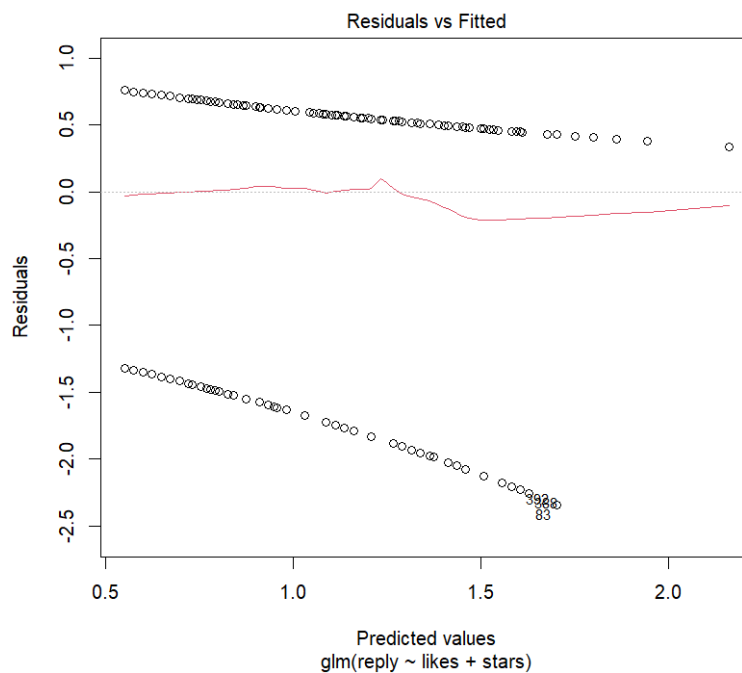
Independent variable	Dependent variable			
	<i>Replies</i>			
	Estimate	Std. Error	z value	Sig.
<i>(Intercept)</i>	0.37335	0.14937	2.500	0.0124 *
<i>Likes</i>	0.02417	0.01825	1.324	0.1853
<i>Rating</i>	0.17873	0.03610	4.951	7.39E-07 ***

* Significant at $p < 0.01$ (2-tailed)
 *** Significant at $p < 0.001$ (2-tailed)

Source: own elaboration

Before the specificity of the model is correct, its assumption must be tested. To do this, it must be verified that (1) if there is a linear relationship between the predictors (x) and the result (y), (2) the residual errors have a mean value of zero, (3) the predictors (x) are independent and are observed with negligible error, and (4) the residual errors have constant variance.

Figure 7. Check the linearity of the data



Source: own elaboration

First, it is checked in Figure 7 that there is linearity of the data, in which the red line is approximately horizontal at zero. What it also indicates is that the residual errors have a mean value of zero.

In addition, the Durbin Watson test is performed to verify the assumption of independence and the non-constant error variance test (NVC) to verify if the variance is constant.

Table 7. Durbin Watson test

Dependent variable	Independent variable	Autocorrelation	D-W statist	p-value
Likes, Stars	Reply	0.6034196	0.7915825	0.0589
*** Significant at p <0.05 (2-tailed)				

Source: own elaboration

Table 8. Non- Constant Error Variance (NVC) Test

Dependent variable	Independent variable	Chisquare	Df	p-value
Likes, Stars	Reply	11.9435	2	0.0548
*** Significant at p <0.05 (2-tailed)				

Source: own elaboration

By obtaining p values >0.05 in both tables, the null hypothesis is not rejected. This would give us enough evidence to state that our independence and residual errors assumptions are met. In this way we check with these four assumptions that the model is correctly specified.

To better understand how developers and users of the applications interact, we present the descriptive statistics of their interactions in Table 9, where it can be seen that the more positive the review, the fewer likes it receives from the users and how the developers of the apps respond more to positive comments, thus verifying that the findings of the analysis collected in Table 2 and Table 5 are true.

Table 9. Proportion

	Negative	Neutral	Positive
%	22.80%	6.81%	70.39%
Likes	2.52	1.52	1.12
Replies	64,93%	76.15%	77.46%

Source: own elaboration

Of the 1,601 comments, 22.80% are negative, 6.81% are neutral and 70.39% positive. Each negative comment has 2.52 likes, each neutral has 1.52 likes and each positive comment has 1.12 likes.

Developers responded to 64.94% of negative comments, while 76.15% of neutral comments have responses and in positive comments, 77.46% have responses.

5. Discussion and Conclusion

This paper has focused on understanding the situation of the main caravanning apps in Spain. Therefore, the results obtained could be useful for the developers of these applications in creating future marketing strategies.

Regarding the analysis of the evolution of the main apps related to caravanning over the years, the results show that the caravanning users are growing. This fact is because caravanning is a booming sector that is growing more and more. Furthermore, the peak season is the period in which users are more prone to use caravanning apps. The spring period is the second most active period. Nonetheless, winter and autumn are when users less use caravanning apps. This remarkable aspect shows that national caravanning tourism predominates in the summer period (Hosteltur, 2019).

When it comes to the effect that pandemic crisis has had in this specific sector, results show that caravanning sector has not been affected by the COVID-19 crisis. In fact, during this period the activity of the users has even increased.

From the user's opinion, using an analysis of the most frequent bigrams of reviews, the findings shows that in general users give positive feedback for these apps, using phrases like 'best app', 'works well', 'good app' and so on. In addition, users indicate the large amount of information that these apps provide about location, services, score and so on. These reviews generally inform about the functionalities of the apps. In addition, an analysis of negative reviews has also been carried out due to the importance negative reviews have in the purchase decision (Sen & Lerman, 2007; Owsley Sood et al., 2011; Ekiz et al., 2012). In regard to caravanning apps, users highlight the great problem of facing a new update due to the need for more advanced mobiles, among other reasons. In addition, some updates may bring errors, which negatively affect the intention to use the app. Another notable negative aspect are references to the premium versions since they are paid. For example, you can get to a place without an internet connection if you have the paid version. Nonetheless, they seem unsatisfied with the idea of paying for these extra services. In addition, there is great concern on the part of users in reference to the personal data required by the apps. It could have a great impact on tourism managers that play a key role in growth strategy because it shows the main concerns and issues about new features required (Maalej & Nabil, 2015; Pantano & Pietro, 2013) by the caravanning users.

When it comes to the feelings of the most supportive reviews by users, a test for Kendall's tau shows that the users of caravanning apps seem to have a preference for comments with negative denotations. This finding is in line with the results of some previous research (Petrick et al., 2006). In fact, several researchers demonstrated that consumers tend to perceive reviews with lower ratings more useful than the positive ones (Eslami et al., 2018; Lee et al., 2017). It is also consistent with Cheung et al. (2009) that found that negative messages on discussion forum are perceived more credible than the positive ones. For instance, if a user downloaded a caravanning app to find a place to stay overnight and the user did not find it easy to use, it is very likely that the user would write a negative review about it. It is also very likely that this comment will be more popular than positive comments about this app.

Regarding the behavior of the users, an agglomerative hierarchical clustering analysis demonstrates that 63.71 % of the reviews are brief, 31.48% medium and only 4.81% are extensive reviews. Therefore, most people provide brief reviews. Nonetheless, it is striking that negative reviews predominate in the most extensive reviews rather than the shorter ones. According to Alicke et al. (1992), Berkowitz (1970) and Berger (2014), the more negative the attitude of users towards the brand, the greater their desire to vent. Therefore, users with negative experiences are more prone to extensive reviews rather than brief reviews. However, it is noteworthy that most of the brief comments have a positive trend.

Therefore, the most extensive and lowest rated reviews seem to be the most important to users and, consequently, the ones to which developers should give the most importance. This result coincides with previous articles (Hassan et al., 2018).

From the point of view of the developers of apps related to the caravanning sector, the agglomerative hierarchical clustering shows that there seems to be a common trend in the response of developers to user reviews, not appreciating a significant difference depending on the length of the comments.

Furthermore, a generalised linear model shows that there is a significant positive correlation between the rating and the response of the developers of the application itself to said reviews. This means that the higher the rating, the greater the probability of a response from the app developers. This is remarkable because, according to previous studies such as Hassan et al. (2018), it is crucial that app developers always respond to negative reviews instead of reviews with higher ratings. Therefore, if we are analysing a business that can not respond all the comments, it is necessary that developers respond firstly to negative reviews instead of positive reviews.

However, it is highlighted that there is no significant correlation between the likes of a review and the response of the developers of the application itself to such reviews. That is, whether a comment has more or fewer likes does not depend on the response from the app developer, but it does depend on the number of ratings. Furthermore, according to Table 5, the proportion of neutral and positive comments with responses from developers is higher than negative comments. Therefore, caravanning apps developers are more prone to respond to comments with more stars than others. This shows that the developers are not giving relevance to the negative comments that they should be concerned about.

5.1 Theoretical implications

The theoretical contribution of this study can be summarised as follows:

In the first place, we consider that this research contributes to the field of caravanning since it is a booming sector of which there are hardly any scientific studies. In Spain, there is only a Spanish association of the caravanning industry and trade (ASEICAR) that carry out specific small articles about the sector. Moreover, there is no statistical data in Spain about this sector. Recently, the public organization statistics National Institute (INE) is collecting monthly information about caravanning data through the Spanish caravanning business but these data are not public yet. Therefore, considering that this sector is at its peak, it needs more studies carried out in order to know an unknown sector.

Secondly, this paper is the first paper regarding caravanning and app reviews. In fact, there are no studies that have analysed the relationship between users and developers of the apps related to caravanning. The digitalization nowadays is affecting the tourism sector in general and the caravanning sector in particular. Therefore, this type of studies could have crucial theoretical and practical implications for marketing practitioners of the caravanning sector or tourism in general. Nonetheless, there are no studies that analyse this topic in spite of its importance.

Thirdly, despite the rapid growth of apps in the tourism sector, there are limited studies on its current situation and the behavior of users and developers. Therefore, this paper offers knowledge for future tourism studies examining the situation of the main apps related to caravanning in Spain and the link between users and developers.

Lastly, we believe that this study contributes to the web scraping's methodology because thanks to its use, we were able to automatically obtain all the reviews of the apps that users had written.

5.2. Practical implications

The main practical findings based on our results are summarised below:

Firstly, this study helps to understand the situation of the main apps related to caravanning in Spain. It is useful for developers to know the specific sector and its development. As the study shows that people tend to use this type of app more during the summer period, app users could focus on developing strategies that encourage users to increase their use in the winter or autumn period.

Secondly, the presented findings of this paper show that the reviews that developers must respond to are the most extensive and negative ones. However, we note that developers do not take advantage of the potential of the reply mechanism, as they respond equally to comments regardless of attributes such as their length. Besides, they are more prone to answer positive reviews. Therefore, one practical implication is that it would improve their response mechanisms and marketing strategies if managers responded to the negative reviews and more extensive reviews. In order to get it, developers could design their apps highlighting reviews that need a response, that is, more extensive reviews with lower ratings.

Thirdly, the findings of this paper highlight the main concerns raised by users regarding caravanning apps. Among the main concerns are general issues with their use as updates, personal data and paid versions. Developers should focus on responding to the most common concerns raised by users in their reviews. Furthermore, given that according to the reviews the most important user concerns seem to be updates, personal data and paid versions, app developers should focus their marketing strategies on these aspects, improving these app characteristics.

5.3 Limitations

This study is subject to several limitations. Firstly, caravanning is a type of tourism that has not been studied in the academic literature. There are only press releases or information from associations or specialized platforms in this sector. Therefore, no research articles compare the results with other countries or contexts. Future research could be carried out in other tourism contexts to compare the results obtained.

Furthermore, the results are based on reviews of Spanish travelers that have previously used an app related to the caravanning sector. As a result, we cannot generalize the results obtained. Because of that, future studies must be carried out to compare the obtained results with other countries where the caravanning sector was a crucial sector. Nonetheless, in spite of the fact that we only studied Spanish reviews, the findings of this paper allow us to learn about the behaviour of users and of apps related to caravanning.

Another reason why the results cannot be completely generalized is in the case that we only take into account the reviews that appear on Google Play, even though this is the predominant one, and not those on the App Store, for justified reasons previously. That is why a future line of research is proposed to see if the behaviour of Android and iOS users is different in the field of caravanning. This will happen when the reviews on iOS are a considerable number to be able to carry out a consistent analysis.

In addition, this study is based on the reviews received by caravanning users between 2013–2020. Therefore, this investigation could be carried across time to analyse whether the results are consistent since, being a booming sector, the results could be modified.

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