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Do tourists visit what the tours industry offers? Sightseeing tours versus first-timers' photos

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Abstract

Tourist behaviour within destinations is a research topic of increasing interest. The most relevant approaches focus on demand itself with the aim of detecting factors affecting travel patterns or just revealing the mobility flows shaping tourism destinations. This paper adds another layer to this stream of research by including the offer-side and contrasting it with the demand-side. Specifically, this study aims at detecting potential market opportunities by overlapping the geographical distribution of geolocated user-generated photos (from the social media site Flickr) taken by first time visitors to Cartagena de Indias (Colombia) versus the attractions offered in city tours. A mixed-method approach is used for analysing the association between both datasets, including spatial analysis, correlation and cluster analysis. The results show that the correlation between attractions included in city tours and geotagged tourist photos overlaps only partially. This opens up the debate on the need for the tours industry to adapt its products to visitors' consumption of the city's spaces and attractions of interest.

Keywords: Visitor travel behaviour; first-time visitors; tourist attractions; city tours; supply versus demand

1. Introduction

Attractions, such as sights, monuments, museums, cultural elements or events, are essential elements of destinations that motivate tourist visits. Tourists are pulled to idealized sight images or icons, to visit them and to immortalize the moment by taking a photograph. This pulling effect is also promoted by the influence of several stakeholders at destinations: businesses, destination managers, local residents, media and the visitors themselves (Richards, 2002). In particular, the local industry, as expert products proposer, has been considered traditionally as a reliable indicator of the attractions of a destination, due to its role in shaping how tourists and visitors consume places.

Recently, tourism travel patterns have undergone important transformations, becoming more massive and flexible. Technological and communication changes in the past 20 years have promoted the self-organization of traveling and short breaks without the need of a supplier. Nowadays, the local tourism industry, such as city tours or guides, may not be a reliable measure of the tourists' visiting preferences. As a consequence, researchers have realized the importance of capturing and measuring tourist movements in cities in order to understand the consumer side of tourism destinations (Kádár, 2014; Mckercher & Lau, 2008; Shoval, McKercher, Ng, & Birenboim, 2011).

However, only a few works address the difference between what the destination offers and what the demand actually visits (Domènech, Mohino, & Moya-Gómez, 2020; Farmaki, 2013; Paül i Agustí, 2018). In particular, there is a lack of research focusing on the differences between the attractions included in private tours and the tourists' consumption of attractions in urban destinations. This is, therefore, the gap that this article seeks to fill and which leads us to the central research question:

- Do the attractions promoted by the local tourism industry in the city tours represent the tourists' preferences?

Although the private sector tends to adapt better to tourists' needs than other tourism stakeholders, such as public institutions, the analysis carried out in this study represents an interesting opportunity to detect the differences between offer and consumption. Thus, the study departs from a research question aimed at detecting potential market gaps and latent-business opportunities.

As such, this paper's goal is an inquiry into the behavioural patterns of tourists at a destination, as well as how this behaviour contrasts with the local tours industry. This is done by looking into the spatial offer (the tours and itineraries offered by local travel agencies) and comparing it with the spatial demand by the market segment which, according to the existing literature, is more likely to visit this kind of product: first-time tourists and visitors (Freytag, 2010; Lau & McKercher, 2004; McKercher, Shoval, Ng, & Birenboim, 2012; Oppermann, 1997; Sugimoto, Ota, & Suzuki, 2019). This comparison enables us to spot and explain similarities and differences between offer and demand. The main objective is, therefore, to detect opportunities for the tours industry, as well as to identify those places which are over- or undersupplied. To this end, it is essential that we understand the way tourists geographically consume the tourist spaces, in order to facilitate the tours industry with essential information on the demand in order to define future market strategies.

The studied case in this paper is a Latin American urban destination (Cartagena de Indias, Colombia), an area in the world with few studies on tourist behaviour based on the use of social

media data. In fact, a couple of datasets were used in the present study. On the one hand, a dataset containing the number of times attractions and places are included in the local travel agencies' tours. On the other hand, a dataset including the number of Flickr users taking a photo in or around tourist attractions and places. A classification criterion was implemented so as to analyse only the spatial patterns of first-time tourists and visitors. Subsequently, data mining through spatial analysis and clustering algorithms allowed us to analyse both datasets and achieve the main objective of the study. The methodology used (pitching offer against demand) may be replicated in any destination in need of fine-tuning its offer.

The results indicate a situation of partial matching. On the one hand, there are some oversupplied spaces, which seem hard for tourists to discover and visit. On the other hand, there are overconsumed places, which coincide with 'must-see' attractions, showing an iconic effect by pulling large chunks of the demand. Hence, the comparison shows there is room for improving the tours' and adapting them to demand.

The value of this study relies on the fact that it shows the local guiding industry how it can identify matches between their offer and the tourist behaviour patterns and, therefore, implement improvements to their offer, if considered necessary.

This paper is organised as follows. The following section sketches out the literature review, the background and state of research. The third section presents the methodology to capture the data, as well as the steps and methods followed to do the empirical analysis. Then, the case study is introduced. The fifth section consists of an explanation and discussion of the findings. Finally, the lastsection includes the general conclusions of the study, along with its limitations and the future lines of research.

2. Literature review

2.1. Visitors as activators of places

Over the last decades, tourists have considered visitor attractions as 'those attractive places' identified as such by 'official' tourist brochures, travel guides or the tourism industry offer. Particularly, the prescription power of the local industry as expert product proposers (be these guided tours or transportation at destination), has traditionally played an important role in how tourists geographically consume destinations.

As a matter of fact, tourism mobility patterns have been exponentially growing and becoming more complex in the last two decades. The technological and communication shifts provide a large amount of information to tourists, which empowers them to freely organize their own travels without the need of travel agencies or DMOs. Thus, the prescription power of classical supply channels is being progressively substituted by new ways of accessing information (Llodrà-Riera, Martínez-Ruiz, Jiménez-Zarco, & Izquierdo-Yusta, 2015; Prats & Marin, 2014). As a consequence, tourism mobility patterns have grown and become increasingly massive and flexible, challenging the detection of opportunities on the supply side, which may not be aware of the preferences on the demand side.

Tourists are a central figure in the process of defining a tourism destination and they affect the destination in many terms: contributing to the social construction of places and their meaning, promoting the spatial activation of places, enhancing economic activity, and determining travel mobility (Urry & Larsen, 2011). Many business-oriented studies consider tourism as a social process initiated by the demand side, and which needs to encourage private supply and public services (Asero, Gozzo, & Tomaselli, 2015; Baggio & Scaglione, 2017; Stienmetz & Fesenmaier, 2015). Tourists', through their visits, rescue sights from indifference and encourage destination planners and markers to include them or re-project their image (Donaire, 2012). Furthermore, tourists' 'touch points' are crucial to generating various improvements such as transport management, avoiding the saturation of places of interest, optimizing routes or extending the geographic distribution of visitors and their spending (Thornton, Shaw, & Williams, 1997). Therefore, the tourists' point of view of the destination and its attractions is essential.

2.2. Visits within urban destinations

Each tourist, by acting socially, creates his own tourism place or space (Framke, 2002) and generates specific geographical patterns within destinations, which are influenced by factors related to both destination characteristics and the tourists' own characteristics and interests (Lew & McKercher, 2006; Richards, 2002). Identifying factors that affect them is the first step to understanding aggregated tourists' social action in space, in order to be able to detect generalized behaviours. Despite its complexity, a variety of studies have explored tourist behaviour within urban and cultural destinations in order to understand how tourists geographically consume a destination, and to highlight the reasons behind the observed patterns.

Some authors have attempted to theorise behaviour from a phenomenological point of view by examining tourists spatial patterns with regard to their relationship with the visited location (Cohen, 1979; Donaire, 2012; Galí-Espelt, 2005). They have detected some profile classifications based on consumption styles generated by different personalities, motivations, engagement level and comfort with cultural distance. For example, a more Fordist pattern at one end (i.e.

following a generally determined pattern and trying to recreate home elements in the tourism space), to a more explorative or globetrotter pattern at the other end (i.e. visitors going 'off the beaten track'). In spite of these classifications, in urban and cultural destinations, the pushing effect of tourists towards idealized sight images or icons promotes a ritual effect where tourists tend to follow very similar itineraries and timings (Donaire, 2012; Richards, 2002). This can generate an overcrowding effect in more popular sites and main routes within those sites (Bauder & Freytag, 2015; Domènech, et al., 2020; Milano, Novelli, & Cheer, 2019).

From a geographical approach, research into different aspects of tourist behaviour has been in progress since the 1990s (Lue, Crompton, & Fesenmaier, 1993; Oppermann, 1995). Several authors have analysed tourists' movements considering different perspectives: the tourist's time-space strategies (Grinberger, Shoval, & McKercher, 2014), distance travelled from accommodations (Shoval et al., 2011), the differences between first-time and repeat visitors (Caldeira & Kastenholz, 2017; McKercher et al., 2012), or how different expenditure levels imply different mobility patterns (Domènech, Gutiérrez, & Anton Clavé, 2020). Although researchers have identified multiple factors affecting tourists' travel patterns within destinations (González, Hidalgo, & Barabási, 2008; Lew & McKercher, 2006; Mckercher & Lau, 2008), literature agrees in pinpointing the attractiveness level of places and their spatial characteristics as the most relevant factors determining mobility patterns within destinations. Thus, in general terms, tourists feel compelled to visit renowned and unique attractions and are willing to travel further away to visit them (Lew & McKercher, 2006; Pearce, 1989).

Attraction characteristics also influence tourism behaviour within the destination. Dredge (1999) pointed to the destination atmosphere as a result of the specificity and cohesiveness of its attraction nodes. Due to destination atmosphere, tourists' behaviour and itineraries may be limited to a zone, city, town, suburb, precinct, site, or room. Furthermore, regarding spatial characteristics, point attractions encourage a higher concentration of tourists in specific areas than line attractions, such as beaches or area attractions such as landscapes (Wall, 1997).

Travels within a destination are also strongly influenced by prescriptors, who have historically played an important role in the process of the iconization of attractions (Leiper, 1990), and transit Markers found along an itinerary path, which can have a significant influence on determining the places to be visited, their order and the length of the visit (Dredge, 1999).

2.3. Travel photography as an indicator of tourism activity

There is a long list of previous research focusing on developing techniques for analysing tourist travelling behaviour. Popular methods for collecting data have traditionally been travel diaries, surveys or observation methods, in spite of their associated biases (Gartner & Hunt, 1988).

The emergence of technologies has, however, facilitated the monitoring of spatiotemporal tourist behaviour by increasing quality and 'number of responses' in a temporal and economic cost-effective way (Asakura & Iryo, 2007; Paulino, Prats, Blasco, & Russo, 2016; Shoval & Ahas, 2017). Studies on different geographical scales can be developed and, according to the needs of each study, the data source used differs. For instance, GPS tracking is precise and effective due to the spatial and temporal data accuracy. Thus, studies at a highly disaggregated level of analysis can be developed, but the sample tends to be reduced due to the added difficulty of involving participants in the study (Donaire, Gali, & Royo-Vela, 2015; McKercher et al., 2012; Orellana, Bregt, Ligtenberg, & Wachowicz, 2012; Shoval et al., 2011).

Some researchers have used other technology-based methods such as smart destination cards, or passive mobile phone data (Baggio & Scaglione, 2017; Birenboim & Shoval, 2015; Versichele et al., 2014; Zoltan & McKercher, 2015) with also important limitations concerning territorial scope, tourists' participation or cost (Paulino et al., 2016).

The smartphone era has led to the emergence of new ways of enjoying traveling by searching information, buying or sharing experiences on the move. This interaction through new technologies and social media is, in fact, a very rich source of data made up of a tourist's digital footprint with a geographical basis. Sightseeing is one of the most popular forms of tourism activity in cities. Sightseeing, together with the photo sharing phenomena via popular social media sites such as Flickr, Facebook or Instagram (Girardin, Blat, Calabrese, Dal Fiore, & Ratti, 2008; Kádár, 2014; Vu, Li, Law, & Ye, 2015), or the geo-located content through Twitter (Hawelkaa et al., 2014), provides researchers with an important source of big data to study tourist behaviour.

Considering the role of photography in the tourist experience (Urry & Larsen, 2011), geo-tagged pictures can provide valuable information for a variety of applications in tourism studies, such as identifying tourist hotspots or frequented routes (Alivand & Hochmair, 2017). In fact, this data is representative of the tourists' perspective, since photos represent a selection of certain attributes found in the space which attracts tourists (Noronha-Pereira & Gonçalvez-Santiago, 2017).

In this context, Flickr is one of the most popular photo-sharing platforms for both users and researchers in urban tourism. Users share and organize photos with the option of referencing them geographically. When a picture is uploaded and georeferenced, the system pinpoints its longitude and latitude and retrieves the time of capture from the photo-associated metadata. The free available Application Programming Interface (API), enables querying its public data for non-commercial purposes, i.e. photos and their geo-referenced data. It enables delimiting a geographical space to identify the users which have been taking pictures within that area, and then accessing those user profiles to gather the whole range of pictures about that area. Besides, metadata allow us to build algorithms, for example using day period limitation to separate tourists from locals (Girardin, Dal Fiore, Blat, & Ratti, 2007; Kádár, 2014; Vu et al., 2015).

This user-generated, georeferenced information contributes enormously to understanding how people travel and experience the city (Girardin et al., 2007). Furthermore, the costless access via the API and the geographical information associated to each photo, reduces the cost of data gathering and processing. Although some deviation is expected due to the strong relationship between age, education and the willingness to post photos on these platforms, Flickr can be considered a reliable data source for analysing tourist behaviour (Lo, McKercher, Lo, Cheung, & Law, 2011).

3. Study context

Cartagena de Indias (Colombia) was founded in 1533 by the Spanish conquerors and soon became a key port in the Americas. The city developed in the 16th and 17th centuries, endowing itself with palaces and churches, many of them still standing and contributing to the uniqueness of the place. As a military stronghold, it was also fortified with city walls and other fortresses, which make up the city's charm today, and which have been distinguished as UNESCO heritage sites since 1984.

The city of Cartagena de Indias (see Figure 1) is currently a prime destination on the Caribbean coast. It welcomes around 3 million visitors per year, out of which 300,000 to 350,000 are foreigners. It also welcomes around 200 cruise ships per year. The lodging offer is around 14,000 rooms, consisting of hotels, luxury hotels, boutique hotels, hostels, apartments, etc. The average visitor spends 3 to 4 nights in the city.

Since the 1960s, Cartagena has developed into a sun and sand destination, following the world trends from that era. It was only in the 2000s that its cultural heritage was promoted as the destination's main attraction. Since around 2010, the city's (military) built heritage has been considered its main interest, and nowadays it is one of the destination's main pulling factors (Pinillos Castillo & Hernández Vargas, 2017; Quintero & Bernal, 2007).

Figure 1. Study area: Cartagena de Indias (Colombia).

Source: authors

4. Data and methods

4.1. Data

In the present study, the empirical approach consists of a twofold data collection, concerning the visitation patterns to attractions and the local tourism offer by tours and guides in Cartagena de Indias. Thus, two different datasets were used and afterwards integrated to carry out the analysis. On the one hand, the offer-side dataset was built on the geolocation of the visitor attractions of Cartagena de Indias, together with the number of times they are offered by enterprises in tourist tours and guides. Any permanent resource mentioned by the local offer was considered, as well as other permanent resources developed by the offer with the purpose of attracting visitors (Leask, 2016). In order to create this dataset three steps were followed. First, the enterprises offering tours and guides in the city were identified by using the local official tourism statistics database (SITUR from the acronym in Spanish Sistema de Información Turística). A total of 215 potential enterprises were detected, all of them officially registered in the National Tourism Register of Colombia. However, at the time of looking for the offered tours (between October and December 2019) not all of them had information available online or were operating in the city, so this left 64 enterprises offering 82 different tours. The second step consisted in counting how many times the different tourist attractions/sites were offered in the tours. Here, a total of 107 unique attractions were discovered. Finally, the coordinates (longitude and latitude) of the tourist attractions/sites were included in the dataset in order to allow their representation on a map.

Concerning the consumer side dataset, photos taken by tourists and shared online via Flickr were selected for being a reliable and costless source of big data to study tourist behaviour and for enabling the attractions to be identified geographically. After obtaining a Flickr API key, data was downloaded by the end of July 2019 by means of the QGIS plugin "Flickr Metadata Downloader" (https://github.com/samanbey/flickrd). This plugin allows downloading the metadata of geotagged public photographs uploaded on Flickr for a given geographic quadrangle (defined by boundary latitudes/longitudes). The metadata of a total of 49,653 photos belonging to 3,412 users were automatically downloaded.

Downloaded Flickr photos were filtered considering the accuracy of coordinates and the photographers' profile. Following a previous classifications of Flickr users according to the time spent at the destinations (Kádár, 2014), photographers were profiled according the criteria presented in table 1: day-visitors (users with a mean difference of days per year between the oldest and the most recent photo, shorter than 1 day), tourist (users who have a mean difference of the maximum and minimum dates between 1 and 60 days) and residents (users with a mean difference higher or equal to 60 days). Long-stay tourists may be purposely included in the group of residents, as they tend to show a similar behaviour to residents (Ono, 2008). Both, tourists and one-day visitors are classified as first-timers and repeaters, according to the number of years they have been detected in the city. Only pictures taken by first timers of both tourists and one-day visitors were included in the analysis, since they are the market segment that not only is more interested in exploring and participating in a wide range of geographically dispersed activities, but also the profile that is more likely to consume city tours. Furthermore, repeat visitors tend to concentrate in fewer spots visiting a considerably lower number of attractions, because they are more interested in shopping, eating, and spending time with family and friends in already well-known places (Freytag, 2010; Lau & McKercher, 2004; Oppermann, 1997; Sugimoto et al., 2019). Finally, the data was filtered by date and the coordinate accuracy level. Only photos taken between 2010 and 2018 (both years included) with street level accuracy were

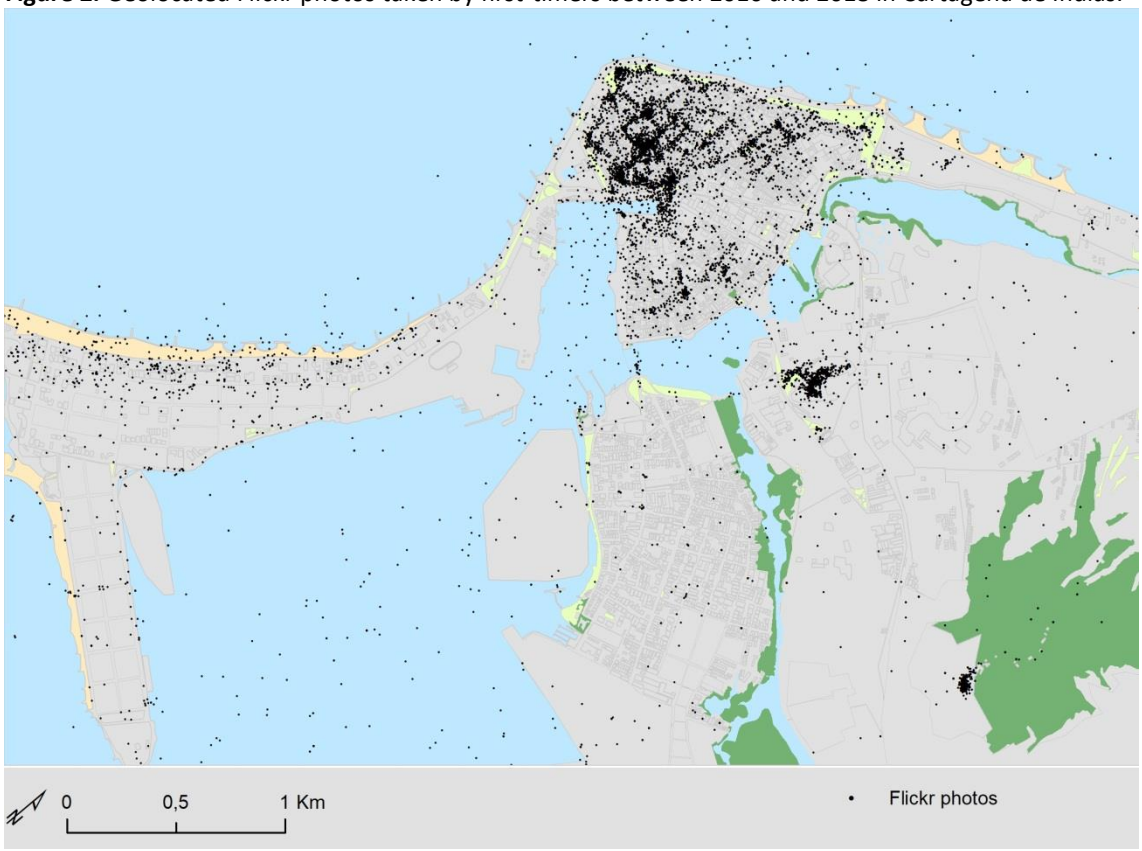
kept. It finally represented a total of 20,955 photos from 1,523 users. The geolocation of the selected photos is mapped in Figure 2.

Table 1. Criteria to classify Flickr users according to the metadata of their photos.

User type	Years active (period 2010-2018)	Mean of the difference between MAX and MIN dates (per year)
One-day visitor		
First-timer	=1	<=1
Repeater	>1	<=1
Tourist		
First-timer	=1	>1 and <60
Repeater	>1	>1 and <60
Local	-	>=60

Source: Authors

Figure 2. Geolocated Flickr photos taken by first-timers between 2010 and 2018 in Cartagena de Indias.



Source: Authors

4.2. Methods

The methods of this study are aimed at representing and comparing the correlation between the consumption and the offer of attractions via city tours. The first step consisted in carrying out an exploratory analysis of the spatial distribution of attractions using density maps, considering the attractions offered in city tours versus the attractions visited. To do so, we took into account the number of times the sites were offered in the routes/city tours versus the number of users taking photos in and/or around attractions and places. Data related to the offer was represented through sized circles representing the number of times offered in tours. Whilst, data on the consumer side downloaded from Flickr was represented in a hexagonal grid of 1 square kilometre per cell and street segment. Concretely, instead of considering the number of

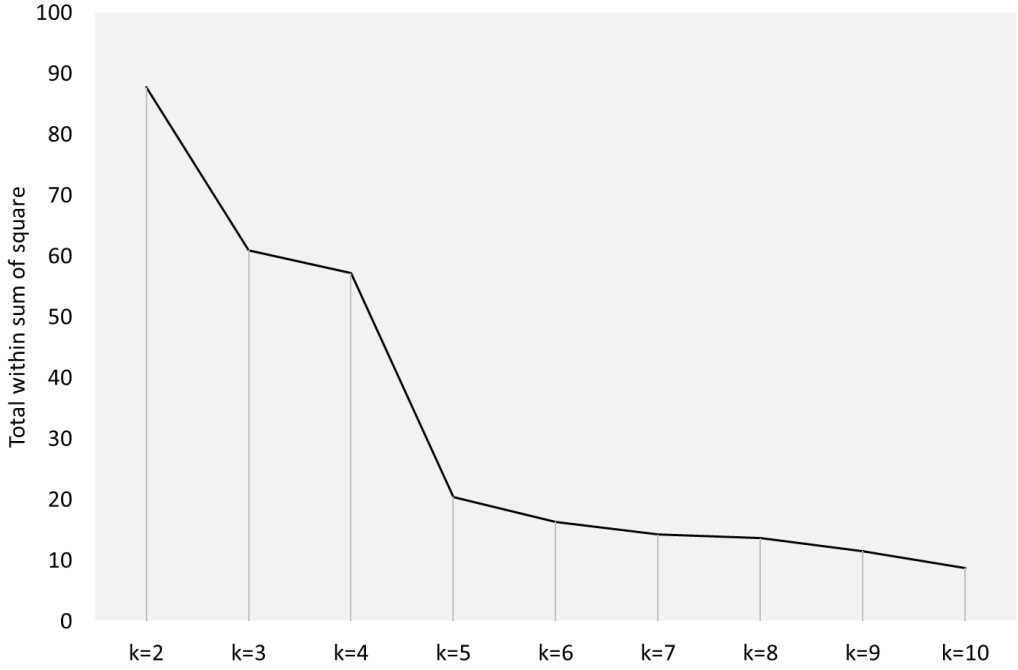
photos taken, the number of users per cell and street segment was considered. This allowed us to obtain a very precise and reliable approach to the presence of users at the different spaces in the city, rather than the number of photos, as this may be distorted by the different usage of the users' social network.

Then, according to the research objective, the number of times the attractions, places or streets were offered by the local tourist industry, as well as the number of users located in/or around each attraction, place or street were used to cluster the tourist attractions/sites. This allows us to detect potential (mis)matching between the tourism offer (number of routes) and the first-time tourism demand (Flickr users). The number of users that took a photo near a tourist attraction, place or street was identified by calculating the distance from the photos to the nearest tourist attraction/site. Then, all the photos located around 100 meters of each tourist attraction, place or street were analysed and the number of unique users was identified.

The implemented clustering algorithm was the k-medians, a variation of the k-means. This algorithm allows for a better clustering of the attractions, since, instead of assigning each attraction to the group whose mean is closest, it uses the median. The number of clusters (k) is defined when the total intra-cluster variation (known as total within-cluster variation) is minimized, but also when the number of observations assigned to each cluster are not lower than 1% of the total observations (Akogul & Erisoglu, 2017).

Multiple k-median solutions with different numbers of clusters k (k=2,…,K) were calculated and compared. To detect the model with the optimal number of clusters from the set of K solutions, a scree plot was used to search for a link in the curve generated from the within sum of squares (WSS) for all cluster solutions (see Figure 3).

Figure 3. Total within sum of square per number of clusters.



Source: Authors

Another criterion used for detecting the optimal number of clusters is the η2 coefficient (see Table 2), which is similar to the R2 (Makles, 2012). The results of these indicators pinpoint clustering with k=5 to be the optimal solution. At k=5 there is a kink in the WSS. η2 points to a

reduction of the WSS by 87% and, although it continues reducing slightly for k>5, the interpretation of the results is more understandable when k=5.

Table 2. Criteria to select the best k-medians clustering with the variables number of Flickr users per tourist attraction and number of times offered in routes.

N clusters (k)	WSS	η2	n attraction per group									
			1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**
k=2	87.71	0.43	56	22								
k=3	60.98	0.60	42	20	16							
k=4	57.15	0.63	28	19	16	15						
k=5	20.43	0.87	27	18	15	14	4					
k=6	16.32	0.89	22	15	13	13	11	4				
k=7	14.21	0.91	18	15	15	12	9	5	4			
k=8	13.64	0.91	14	14	12	11	9	9	5	4		
k=9	11.52	0.93	15	12	9	9	9	9	8	5	4	
k=10	8.78	0.94	15	9	9	9	9	8	7	5	4	4

Notes: WSS= Total within sum of square; η2 = Ratio of between to total sum of squares
Source: Authors

5. Results and discussion

This section presents the results and discuss them following 4 main thematic results: The analysis of the offered tours, the analysis of the demand side, the comparison and correlation between offer and demand and the detection of latent opportunities. To do so, we use the following figures that allows the interpretation of results:

Figure 4 represents the number of first-time visitors and tourists and the location of points of interest offered in city tours. The number of visitors is represented in a cell of one square kilometre, whilst the attractions are represented by circles of different sizes according to the number of times they were offered in city tours. Thus, Figure 4 allows to visually compare the overlapping between attractions offered and visited.

Similarly, Figure 5 allows the visual comparison between consumption and offer, but showing the promenades and streets most frequented by tourists when visiting the city, which pictures the way tourists geographically consume the destination. Instead of visitors per cell, it represents the number of first-time visitors and tourists per street segment. This broadens the perspective of linear attractions (Wall, 1997), allowing the detection of several streets in the core of the historical centre, which make up the absolute prime areas in the destination in terms of demand.

Figure 6 shows a dispersion graph that compares the number of first-timers that took photos around the points of tourist interest versus the number of times that these sites are offered in the tourist routes by the tourism industry.

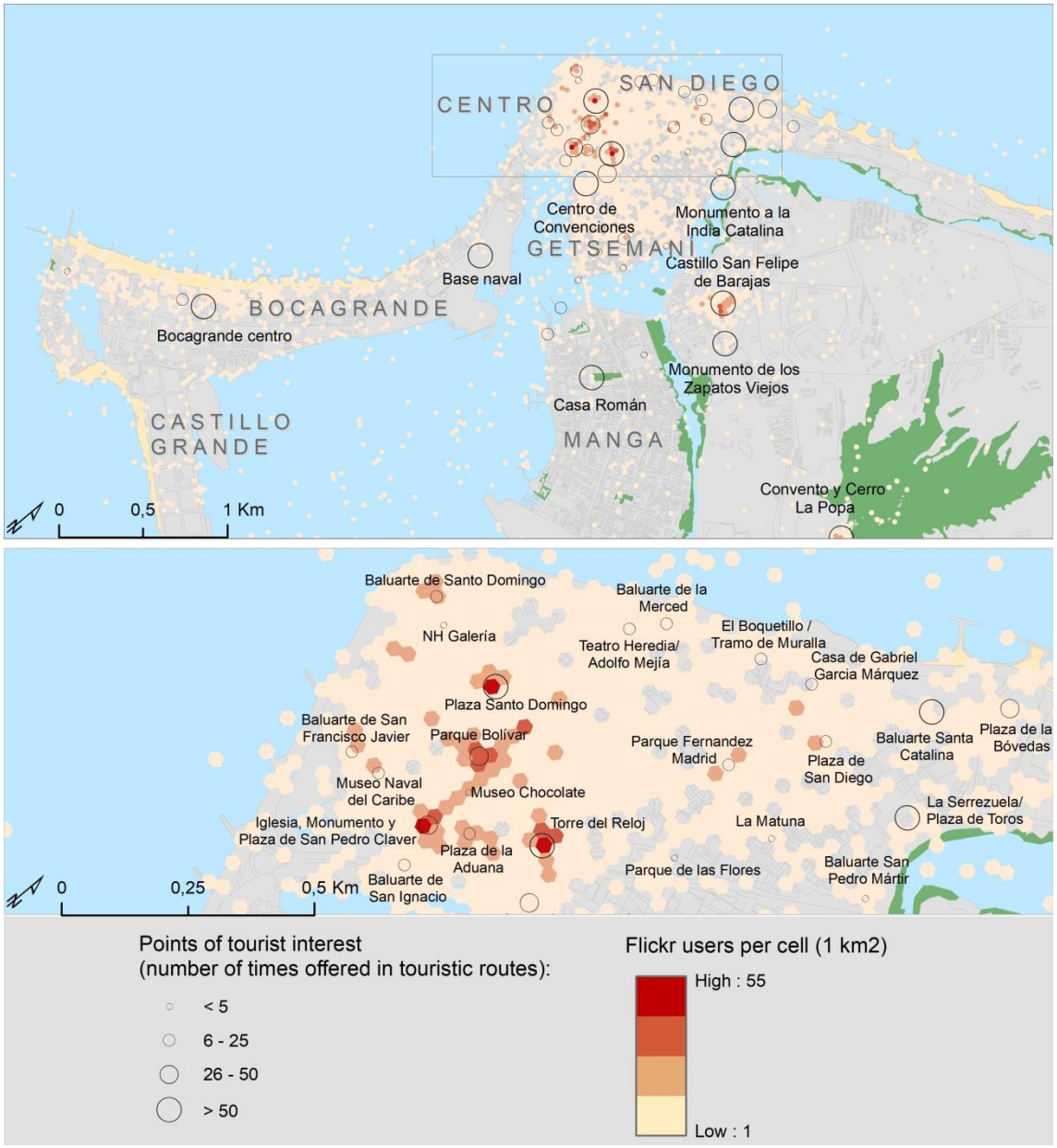
Finally, Figure 7 presents the results of the 5 clusters obtained via k-medians. Here, different groups of attractions have been detected with different degrees of similarity/difference between offer and demand, representing different possible solutions for adapting offer to demand.

5.1. The offered tours

In terms of the attractions offered by the tours industry, they are primarily focused on the built heritage, which is concentrated in and around the city centre, except for the Bocagrande area, San Diego quarter, San Felipe Castle (Castillo de Sant Felipe de Barajas) and la Popa monastery, among others (see top part of Figure 4).

By looking at the most offered attractions in the city centre (lower part of figure 4), we can observe not only how the offered attractions are scattered throughout the area, but also how the occurrences in city tours also tend to form a balanced distribution. Therefore, the tours industry tries to offer a balanced perspective of the destination to their visitors by including not only the main sights in their tours, but also some points which are not highly visited – although we would not call these points 'off the beaten track' spots.

Figure 4. Number of first-time visitors and tourists per cell (1km^2) and location of the points of tourist interest sized according to the number of times offered in city tours.



Source: Authors

5.2. The consumption patterns

Considering the number of first-timers per cell, an important thing to notice is that they tend to overcrowd a few places of Cartagena (see Figure 4) considered tourist spots: the old city (especially the Centro quarter) and the San Felipe Castle. These results come as no surprise as these are the 'par excellence' tourist places in the city (Alivand & Hochmair, 2017). This levels Cartagena with a myriad of destinations worldwide where a common pattern might be seen, i.e. that the 'tourist city' is a relatively small area compared to the whole destination or, conversely, that few spots in the destination attract the overwhelming majority of visitors (Bauder & Freytag, 2015; Domènech, et al., 2020; Milano et al., 2019).

Looking at Figure 4, examples can be found of a high concentration of first-timers taking photos around different clustered monuments offering a critical mass, as well as satellite attractions located nearby these more iconic sights (Lue et al., 1993), whereas other isolated attractions located out of the main tourists flows are photographed less. The most significant example is the Centro quarter within the historical centre, especially due to the remarkable density of monuments from San Pedro to Santo Domingo via Parque Bolívar. The high concentration of both first-time visitors and monuments available there, suggests a clustered multi-nodal area, promoting a cumulative effect of attractions which might create fluid and fuzzy limits between single attractions (Lue et al., 1993).

Figure 5 shows how certain streets or promenades connect with one another, representing the flows that visitors may have drawn (Alivand & Hochmair, 2017). This result points to a predominance of Fordist or psychocentric visitors whose visit to the city is characterised by the ritual effect, where tourists tend to follow very similar itineraries towards the more popular sites and through the main routes (Donaire, 2012; Richards, 2002). In recent times, such a trend has been related to overtourism (Milano et al., 2019), with all the problems that this entails.

A methodological learning arises when comparing the different representations of the number of first-time visitors in both Figure 4 and Figure 5. The street segment map is able to demonstrate the salience of certain attractions and areas in the city that cannot be detected with the cell map (Figure 4). This is the case of the beach area of Bocagrande, a linear attraction (Wall, 1997), and the Centro de Convenciones, where the places' spatial features allow for a physical dispersion of visitors, making the level of user concentration much lower. This, therefore, reinforces the need to use several processing tools when researching into matters of spatial consumption.

An interesting fact here is that the city walls (one of the city's most salient monuments) are not perceived as a linear attraction, but as different nodes: the different densities of visitors per street segment show that this monument is not uniformly visited/photographed, and that but some spots are more interesting than others, such as the rampart of Santo Domingo. Both findings show that Wall's model needs to be mediated according to what is found on the ground, i.e. whether something is a point, a line or an area is not defined 'ad hoc' by the space of the attraction, but by the way tourists interact with it. The tourist's point of view of the destinations should be the primary criterion for classifying spaces rather than their geographical shape, their planning rules or the marketing actions promoting them (Donaire, 2012; Dredge, 1999; Urry & Larsen, 2011).

Figure 5. Percentage of first-timers per street segment.

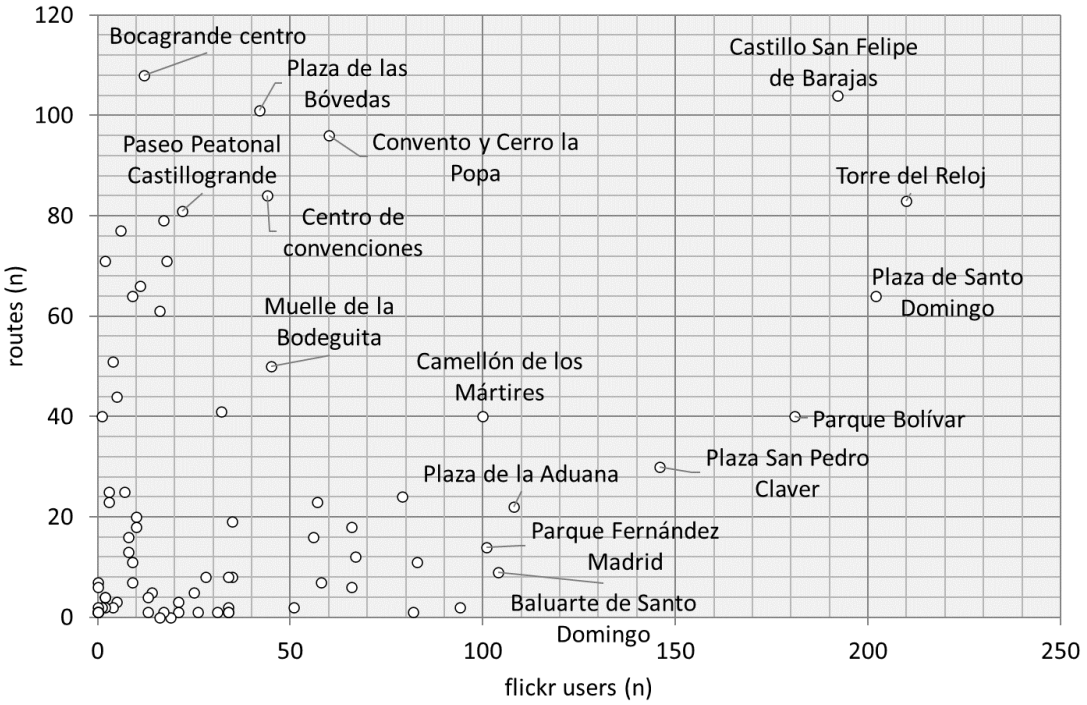
Source: Authors

5.3. Correlation between offered and visited attractions

As for our research question, i.e. whether first-time tourists and visitors visit the attractions offered by the tours industry in Cartagena de Indias, we see that there is only partial overlapping. Similarly to Paül-Agustí (2018), some offered attractions are also strongly visited, but some other attractions are not, as can be observed in Figures 4 and 5. This might be due to the trend of first-time visitors staying in central areas of the destination and visiting the main city's icons (Donaire, 2012; Richards, 2002). However, we cannot exclude other causes like Flickr users' demographics, or a certain significant amount of city tours potentially wrongly planned, i.e. touching on spots that are not of interest to first-time visitors.

Figure 6 shows a strong coincidence between offer and demand, regarding the 3 top attractions points of Plaza Santo Domingo, Torre del Reloj and San Felipe Castle. Some coincidence still exists regarding other renowned attractive points, such as plaza de San Pedro Claver or Parque Bolivar.

Figure 6. Correlation between attractions offered and attractions visited: Calculation done by number of users that took photos around the points of tourist interest versus the number of times that these sites are offered in the tourist routes.



Note: Number of Flickr users defined as users that took a photo located up to 100 meters around points of tourist interest.
Source: Authors

Regarding the mismatches between offer and demand, on the one hand there are certain attractions that can be considered undersupplied, since first-timers show substantial interest compared with the offer. This is in the case of Plaza de la Aduana, Parque Fernandez Madrid and Baluarte de Santo Domingo, among others. On the other hand, some attractions seem to be offered much more than visited, such as the northern section of the historic center (the quarter of San Diego), or the non-waterfront section of the Bocagrande. Concerning the San Diego quarter, the street map segment (Figure 5), shows that most flows follow the sea front, whereas the tours industry seems to offer attractions to non-waterfront proximal areas in an attempt to diversify. Looking deeper into that area, we see that city tours very frequently offer attractions such as Baluarte de Santa Caterina, Plaza de las Bóvedas, and la Serrezuela/Plaza de Toros, whereas first-timers rarely show interest in these attractions.

With regard to the Bocagrande beach, this represents highly visited attractions from the perspective of a linear attraction (Wall, 1997) (Figure 5), but it is not mentioned 'per se' in most tours. However, the tours do frequently mention a couple of point attractions located close to the Bocagrande beach: e.g. the Bocagrande Base Naval, as if they took it for granted that Bocagrande is a top attraction and tried to expand the offer (Lue et al., 1993; Richards, 2002). When comparing the efforts of the offer to the consumption behaviour of the demand, the emerging picture is one of highly concentrated demand versus an offer trying to disperse this demand to nearby attractions. Despite the tours industry efforts to expand the demand, the 'tourist city' is a relatively small area compared to the whole destination which maps more than 300 attractions (Quintero & Bernal, 2007). This trend towards a smaller number of attractions which are flagged at a destination has been long studied (Domènech, et al., 2020) and is referred

to as the 'iconicity effect' of some destination's assets (Donaire, 2012), so Cartagena replicates this effect to a very significant degree.

5.4. Looking for business opportunities according to demand

The final picture of the relationship between offer and demand as far as the city's sights are concerned may be depicted with the clustering analysis.

Cluster 1 includes underconsumed and undersupplied attractions, representing very few routes and very few Flickr users. Here, we suggest the tours industry does not put much effort in to promoting or including these attractions in the tours, since they are not going to make the tours more attractive.

Cluster 2 includes spots visited by a significant number of Flickr users which can be categorized into two typologies: 'off the beaten track' spots, which may attract globetrotter tourists, and the secondary attractions located in the main routes, which may attract both globetrotter and Fordists (Donaire, 2012). The tours industry, however, is virtually excluding these attractions from the city tours. As such, they represent an example of how tourists have activated places and this should encourage private supply and public services to reinforce the offer around them (Asero et al., 2015; Baggio & Scaglione, 2017; Stienmetz & Fesenmaier, 2015). Therefore, here there is an opportunity for the tours industry to offer more attractive tours, as well as a more customised and differentiated tour by including and promoting these secondary attractions which may be attractive for a more globetrotter segment of tourist.

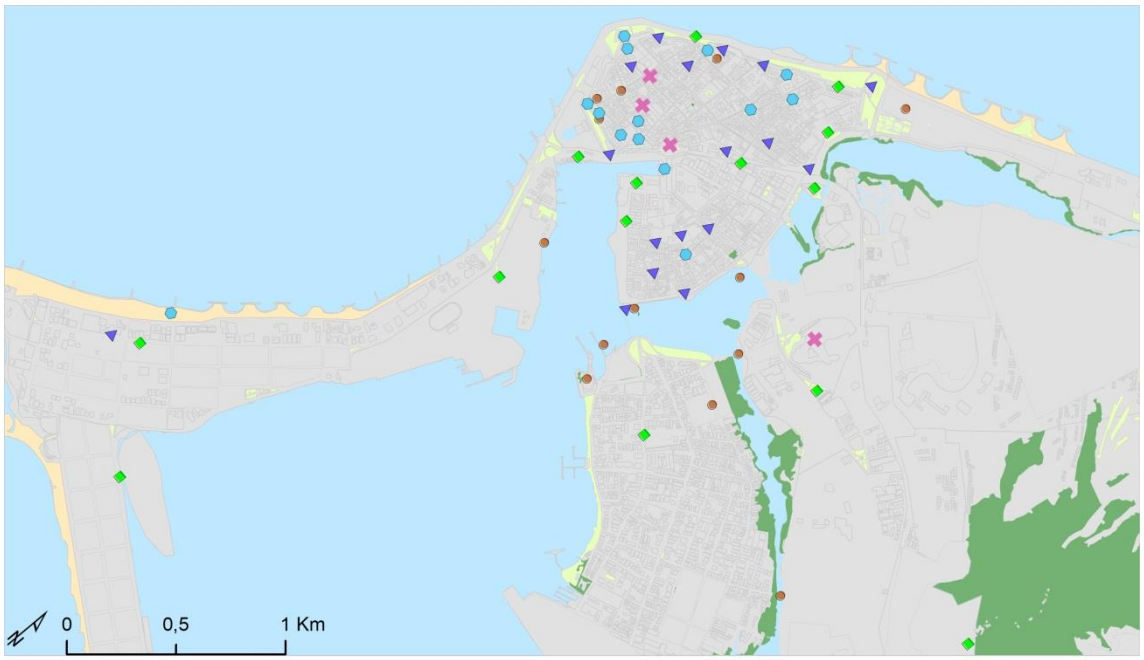
Cluster 3 groups tertiary or complementary attractions which tours tend to offer in excess compared to the level of interest detected by the Flickr users. Here we suggest slightly reducing the effort by the tour industry, so as to be able to concentrate efforts on other attractions which will provide more added value to the tours.

Cluster 4 includes highly attractive places that are of relevant interest for Flickr users, but most tours tend not to mention them. Most of them are located in the historical centre by the main routes (figure 5), except for the Bocagrande beach, plaza de la Trinidad in the Getsemaní quarter, and some places in the San Diego quarter. Since there is a large number of potential consumers interested in these attractions, here there is a great opportunity to add great value to the tours. Businesses should put a substantial amount of effort in to including these attractions in the tours, not only to provide the visitors with more complete city tours, but also to obtain a comparative advantage with respect to those tourism firms not offering them.

Cluster 5 groups top attractions with a correct correlation between offer and demand. These top attractions are totally visited by Fordist or allocentric tourists, and also by most of the globetrotter first-timers because they represent must-visit iconic places representing the tourist image of Cartagena de Indias (Donaire, 2012; Richards, 2002). Businesses should maintain the offer of these attractions and continue to put a substantial amount of effort in to promoting the tours using these must-visit attractions.

Finally, focusing on the geographical distributions of the clustered attractions, there is a latent potentiality in developing tours to the Gestsemaní quarter, which is nowadays undersupplied. By combining Plaza de la Tinidad from cluster 4, with several satellite complementary attractions from cluster 2, tours can offer a critical mass promoting a cumulative effect of attractions greater than the sum of its parts (Lue et al., 1993).

Figure 7. Location of attractions and identification of the cluster to which they belong



Cluster name	Cluster centres (median)		Suggestion
	Flickr users	Offered routes	
C1 - Underconsumed & Undersupplied	3.0	4.0	Maintain offer
C2 - Medium consumed & Undersupplied	31.5	2.0	Increase offer
C3 - Complementary & Oversupplied	16.0	71.0	Reduce offer
C4 - Highly consumed & Undersupplied	82.5	15.0	Increase offer
C5 - Highly consumed & Highly supplied	197.0	73.5	Maintain offer

Source: Authors

6. Conclusions

6.1. Main findings

The present study allows us to detect de (mis)matching between the offer of attractions in city tours and the consumption of first-time visitors in the city of Cartagena de Indias. The findings suggest that the tours industry offer is fairly balanced throughout the destination centre, showing a much more even distribution pattern than the demand. Although there is a strong coincidence among the most offered and the most visited attractions, overall it might be said that the offered tours are not totally following the activation process initiated by the demand side in certain areas of Cartagena de Índias (Asero et al., 2015; Baggio & Scaglione, 2017; Stienmetz & Fesenmaier, 2015). Even though the demand is exerting some influence, it is not a compelling one. If the tours industry does not recognize the tourists' point of view regarding the destination, this tendency might even dwindle due to technological changes. Since non-Fordist tourists may lack tours tailored to their tastes, they may feel even more empowered to freely organize their own travels without the need of travel agencies (Llodrà-Riera et al., 2015; Prats & Marin, 2014).

This 'disagreement' is not necessarily a bad thing: it may be said that the tours industry tries to push the demand away from the most visited spots, so they are a force helping to better manage the spatial overcrowding that the demand shows (Milano et al., 2019; Richards, 2002). However, the results denote that the tours industry tries to push the tourists out of the centre in the wrong directions. The clustering algorithm used to detect the different degrees of similarity/difference between offer and demand, reveal where there are business opportunities by adapting to demand interests. Following the consumer side, Getsemaní and Bocagrande have latent potentiality, compared to other areas where the offer is trying to push the demand. With this information, the tours industry has the opportunity to fine-tune their offer and increase their market share by increasing or reducing the offer according to demand needs.

In terms of zone planning, it is interesting seeing that spaces that are promoted as whole large units, like Cartagena's historic centre, may reveal different offer-demand patterns inside them. Whereas the southern section of the historic centre calls for a more 'ritual' behaviour of the demand pushed by the icons, the northern part, with less icons but nonetheless a significant offer, calls for more exploring behaviour and a lesser degree of coincidence between offer and demand timings (Donaire, 2012; Leiper, 1990; Richards, 2002). In general, the destination is not immune to iconicity effects and demand concentration as seen in other places in other regions of the world (Bauder & Freytag, 2015; Domènech, et al., 2020; Milano et al., 2019). Therefore, similar measures might be considered for these highly demanded spaces, such as setting up pedestrian streets or different urban improvements to increase the satisfaction level of visitors to overcrowded sections of the city.

6.2. Limitations and future research lines

The study shows that data from open access repositories of georeferenced photos such as Flickr allows implementing a cost-effective analysis of tourist behaviour both in terms of economic and temporal perspectives. However, these data induce deviations and biases connected with user penetration of the social network, user profile, and differentiated usage of the social media site in terms of a recurrent use of the repository and the selection of photos uploaded. Therefore, the use of other data sources should be explored in order to complement the results obtained with the data used from Flickr (Domènech, et al., 2020).

Furthermore, this study has not looked into differences between visitor profiles such as locals or repeat visitors (Encalada, Boavida-Portugal, Cardoso Ferreira, & Rocha, 2017). Thus, future research should address this comparison to discover potential overlapping and differences between them. The study of these behaviour patterns will complement what has been said here about first-timers and may offer a business opportunity for tour organizers to fill this gap.

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