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Touristification and Conflicts of Interest in Cruise Destinations: The Case of Main Cultural Tourism Cities on the Spanish Mediterranean Coast

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Abstract: Tourist demands and the ensuing commodification of habitability in cities have led to the emergence of resistance movements. This study aims to define patterns in touristified cities by measuring the presence of citizen initiatives, together with tourism intensification and related socio-demographic variables. All the indicators have been tested in the Mediterranean port cities of Barcelona and Malaga as they lead the cultural offer. Both municipalities have been analysed at census-section level and show a common urban pattern: the Airbnb offer has spread out in the old town in direct competition with traditional accommodation and replacing long-term rentals. Statistical analysis reveals a significant correlation among citizen initiatives with tourism services, which are the driver mechanisms behind the movements. Cluster maps show a clear centre-periphery pattern according to the tourism intensification set with high coefficient values for tourist accommodation. Bivariate spatial autocorrelation indicates that protest movements emerge in tourism specialisation areas with a high concentration of tourist facilities. Monitoring the proposed indicator system over time may serve as a basis for local administrations to promote new urban policies dealing with overtourism. Future research may redefine and include new variables, test other tourist destinations and consider a smaller non-administrative territorial unit of analysis.

Keywords: tourism intensification; gentrification; tourism gentrification; urban tourism; overtourism; indicator system



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1. Introduction

In recent decades, urban tourism has modified cities in line with tourist demands, together with the residential and commercial use to meet their consumption habits; a process known as touristification [1]. Tourists now not only want to visit the sightseeing highlights of a city, but also to feel like a local. This immersive experience of being part of a community means that the tourist demands are detrimental to residential use, and the displacement of residents from those neighbourhoods is reinforced by a strong pull for sharing economy companies [2]. This expulsion of residents is known as ‘tourism gentrification’ [3] and creates controversy around the relationship between residents and tourists [4], particularly in the old towns of main tourist destinations. Thus, emerging protest and resistance movements are demanding the right to the city [5], particularly in southern European cities with tourist intensification.

Urban tourism has brought new forms of hospitality such as private and shared rooms. This new type of accommodation can be booked online by people from all over the world

on different short-term rental platforms. Airbnb, with 6 million active listings worldwide in over 100,000 cities and towns as of 31 March 2022 [6], is probably the most popular. The Airbnb spatial dimension is a highly topical issue in the literature, and has been analysed not only at city level, but also on larger scales such as region [7,8], country [9], continent [10,11] and world levels [12]. Studies investigating the concentration of Airbnb listings at the city level are performed using different territorial units of analysis. For instance, it is common to find Airbnb listings assigned to districts [13] or city parishes [14], neighbourhoods [15], census tracts [16] and even statistical sectors [17]. The smaller the territorial unit, the more disaggregated the listings are. Thus, few research studies consider a regular grid in hexagons [18] or even squares through hotspot analysis [19,20], covering a smaller surface than the administrative statistical areas. Depending on the different types of Airbnb rentals—entire home/apartment, private room and shared room—other studies analyse them together [21] or separately (e.g., [22]), or even focus on ‘home sharing’—one or two rooms rented in the same household property—[23] or those dwellings that are rented out in full [24,25].

Other previous studies based on the Airbnb offer also include explanatory variables related to tourist facilities. Thus, recent studies on Airbnb listings analyse the location in terms of traditional accommodation [26,27] or even considering a single typology such as hotels [28,29]. For instance, Gutiérrez et al. [30] discover that Airbnb accommodation is located close to tourist attractions and directly competes with the hotel offer. Moreover, recreational amenities and tourist services—such as restaurants [31], terraces and souvenir shops [32], monuments [33] or even cinemas [34]—also determine the Airbnb offer. When the spatial contextual factors of short-term rentals are identified, Airbnb studies use the distance to the city centre as an explanatory descriptor (e.g., [35]). Furthermore, socio-demographic variables—such as inhabitants [36,37] and population change (e.g., [38]); together with housing [39,40] and long-term rental [41,42]—are taken into account in the spatial distribution of Airbnb listings. As regards the socio-economic variables, rental price [43], revenue [44,45] and rent gap [46] are the indicators also used to analyse the Airbnb phenomenon.

Indicator systems have been extensively analysed using density maps and, to a lesser extent, cluster maps [9,22,28,30,34,36,37]. In addition, the considered variables in each study have been likewise analysed using correlations [23,25,38,39,42,43,47] or regression models [8,9,28,30,34,35,40,43,48], and even both statistics used for the same study [12,36,37]. It should be noted that univariate global spatial autocorrelations (Global Moran’s Index)—rather than the bivariate one [9,28,30,49]—have been extensively performed in the studies [16,34–37,41]. Thus, the spatial dimension of Airbnb has been extensively analysed in quantitative indicators based on tourist facilities and traditional accommodation, together with socio-demographic and economic indexes. However, a qualitative point of view has not been considered given the difficulty to collect data from informal sources such as interviews, and through content and discursive analysis or even focus groups. Little research considers the perceptions of tourism pressure alongside explanatory descriptors for Airbnb (e.g., [31]), and informal data—such as social media photographs from Panoramio [30] or Flickr [27]—are rarely included in a mixed model with tourism statistics. In this regard, Garcia-Ayllon [49] proposes a mixed model relating static indicators—beds in tourist accommodation and short-term rentals, and the change in the rental housing market—together with variables that are dynamic in nature, such as peer-to-peer (P2P) tourist pressure, the rate of growth on the rental real estate market and its migratory movement, and the social conflict by means of touristification posts indexed in Google. However, not only do the quantitative or qualitative variables in the literature need to be redefined, but also new ones created in order to address the touristification phenomenon in a holistic way. This is the research gap that this paper aims to fill.

There are no studies that measure and geolocate the presence of protest and resistance movements due to conflicts of interest between residents, tourists and the other stakeholders involved. For this reason, this paper presents an indicator capable of evaluating

the social conflict using the geolocation of the different urban movements, neighbourhood associations, emerging platforms and other active actors to tackle overtourism. The proposed indicator, named *Citizen Initiatives* (I1), aims to estimate those urban areas at risk of being touristified or under tourism pressure. In this regard, an indicator system based on socio-demographic descriptors (citizen initiatives, population and housing) and tourism intensification variables (Airbnb, tourist accommodation, cultural amenities, terraces, nightlife and souvenir shops) is proposed to define the spatial relationship among them. As already evidenced, descriptors are mainly grouped into a specific family group of indicators in the literature; the choice of the two dimensions is therefore related to specific aspects expected to have a direct impact on the emergence of citizen initiatives. As already noted, recent studies have used variables that have been taken into account in the proposed indicator system, without counting the first indicator as a proposal. The tourist intensification indicators and related socio-demographic variables are combined together to estimate emerging citizen initiatives as the main contribution. Thus, the hypothesis of the research is as follows: tourism intensification leads to the emergence of citizen initiatives such as neighbourhood associations, social movements or participatory platforms among other stakeholders dealing with touristification. In this study, all indicators were tested in the port cities of Barcelona and Malaga, which are the main cultural tourism destinations on the Spanish Mediterranean coast. The findings of the analysis have shown how each descriptor is determinant in the presence of citizen initiatives in the whole municipality of both cities at census section level.

2. Study Area

The area selected for study is the main cultural tourism cities with a cruise ship port on the Spanish Mediterranean coast. Thus, the study population is located in Barcelona and Malaga according to the 2019 Spanish ranking of quality and innovative cultural offer [50]: both port cities are towards the top of the ranking with the former in second place and the latter in fourth behind Madrid and Bilbao, respectively. It should be noted that Malaga climbed nine positions in the national ranking to fourth place between 2009 and 2019, rising in almost every year, while Barcelona dropped from first to second place over the same period (see Table 1). This significant cultural and leisure offer is reinforced not only by both cities having a cruise port, but also as there is extensive access by air due to the appearance of low-cost flights in the last decade [51]. However, the study population is different in size according to the 2019 municipal census data [52], as there were 1,666,530 inhabitants in Barcelona and 574,654 in Malaga. Despite the fact that the population of Barcelona is almost three times the size as that of Malaga, both cities have experienced growth in the floating city users of urban tourism between 2009 and 2019 (see Table 1):

1. The total number of airline passengers increased in all years of the period analysed in the case of Barcelona, and for Malaga, except in 2012. In that year, Malaga received 2611 fewer flights than in the previous one due to the air traffic instability of two national airlines. One stopped flying at the end of January, meaning there were only 58 flights compared to 1412 in the previous year. The workers of the other company went on strike several times to protest against the workforce adjustment plan to adapt to a low-cost company. Despite the 2012 decline in Malaga, the annual number of airline passengers increased year-on-year in both cities, with an average growth rate of 80% over the same period [53].
2. There was no clear trend in the number of visitors arriving by cruise ship each year, with the figures rising and falling. Even though only Barcelona achieved a growth rate close to 50%, Malaga posted practically net growth over the whole period under consideration. However, it should be noted that Malaga had achieved 35% growth in the early 2010s due to the new cruise terminals, but the number of cruise passengers fell to its lowest point in 2013 as the number of cruise ships arriving dropped by 15.88%, with 47 fewer ships. Despite the fact that annual arrivals steadily increased

from then onwards, the total number of cruise passengers in 2019 was practically the same as ten years previously [54].

Table 1. Tourism data in Barcelona and Malaga from 2009 to 2019: airline and cruise passengers, and cultural activities.

Year	Barcelona Malaga					
	Cultural Activities ¹		Airline Passengers ²		Cruise Passengers ³	
	Score (%)	Ranking (#)	Travellers (No.)	Ranking (#)	Travellers (No.)	Ranking (#)
2009	83.5 2	1 13	27,421,682 11,622,429	2 4	2,151,465 487,955	1 5
2010	77 7.5	2 10	29,209,536 12,064,521	2 4	2,347,976 659,123	1 5
2011	78 8.5	2 9	34,398,226 12,823,117	2 4	2,657,244 638,845	1 5
2012	88 7.5	2 10	35,144,503 12,581,944	2 4	2,408,634 651,517	1 5
2013	86.5 18	2 5	35,216,828 12,925,186	2 4	2,599,232 397,098	1 6
2014	73.5 23.5	2 5	37,558,981 13,748,976	2 4	2,364,292 407,870	1 5
2015	67.5 21	2 5	39,711,237 14,404,206	2 4	2,540,302 418,503	1 5
2016	78 35	2 5	44,154,722 16,673,151	2 4	2,683,594 444,176	1 5
2017	56.9 35.6	2 5	47,284,346 18,626,581	2 4	2,712,247 509,644	1 5
2018	64.5 40.9	2 5	50,172,689 19,021,779	2 4	3,041,963 507,421	1 5
2019	72.1 54.8	2 4	52,688,455 19,858,656	2 4	3,137,918 476,973	1 6
$\Delta_{2009-19}$	-11.4 +52.8	-1 +9	+92.14% +70.86%	0 0	+45.85% -2.25%	0 -1

Source: Spanish tourism data retrieved from ¹ Observatorio de la Cultura [50], ² Aeropuertos Españoles y Navegación Aérea [53] and ³ Puertos del Estado [54].

This paper focuses on the municipality as the study analysis area in Barcelona and Malaga (see Figure 1). Both cities are defined on the same statistical territorial scale as a subdivision of the Nomenclature of Territorial Units Level 3 (NUTS3) for regions defined by Eurostat [55]. Thus, the census section level is defined as the territorial unit to analyse the whole municipality of Barcelona (N = 1068) and Malaga (N = 434), with 2019 taken as the analysis date. Each of the census tracts is shaped according to the electoral division rather than representing the urban pattern as a neighbourhood. However, the former is considered for gathering data because it is on a smaller scale than the latter, and as it is the smallest territorial unit for which municipal census is available as part of Local Administrative Units (LAU) in 2019 [56]. Despite the fact that the samples (N) in both cities differ because of population data from the municipal census [52], data aggregated by census tract have been standardised per inhabitants—in 100,000s—rather than the surface area, solely for population density, to show the areas under tourism pressure in terms of who lives there and to avoid the difference in scale size of the territorial unit of analysis. The overall aim is to ensure a comparative analysis at census section level within and among cities. Therefore, open data platforms from regional and local governments were used to build a geolocated

database with the 2019 census tracts divisions available as shape files [57,58]. It should be noted that the coastline was redefined to consider the real land of those census sections on the waterfront as population density is calculated by hectare.

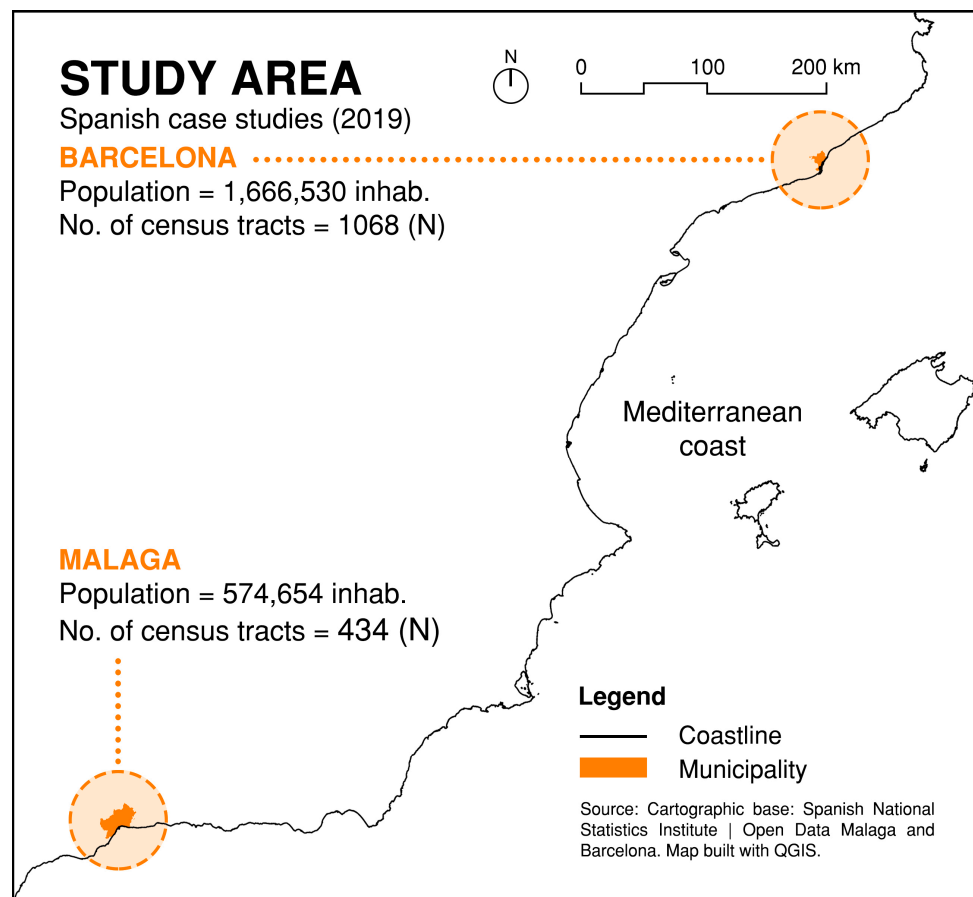


Figure 1. Municipality as the study analysis area in Barcelona and Malaga.

3. Methodology

This research is based on an indicator system to measure tourism intensification from tourist facilities and related socio-demographic variables, all of which mainly use georeferenced data from several open access sources (see Table 2). Open data collected by local or regional governments are the main source of information, but web scraping from Google Maps was conducted to gather listings by http requests for data not available by administrations. In the case of the citizen initiative collection (I1), regulated associations are not only considered but informal and active ones as well; a content analysis was therefore developed from the most-read local newspapers to list all stakeholders. Once actors mentioned in the press were identified, all of which have been map located according to their headquarters, notification address or place where the different participants involved are manifested. After data collection and with the aim of building comprehensive database gathering files in different formats, data implementation was developed using tabulation processes and data binding. For this purpose, GIS implementation were used to create a dataset at census section level from listings with latitude and longitude coordinates, addresses or census code assignation, by means of geolocating, geocoding or georeferencing processes, respectively.

Table 2. Tourism intensification indexes and related socio-demographic variables: indicator name, unit at census section level, definition, data collection and source.

Ref. Indicator Name Unit	Definition	Data Collection Barcelona Malaga	Source Barcelona Malaga
I1_Citizen Initiatives No. of citizen initiatives/ 100,000 inhab.	Reported citizen initiatives in most-read local newspapers: neighbourhood associations, urban movements, emerging platforms and other stakeholders that take part in the conflicts of interest between residents, tourists, and other actors involved.	Agents mentioned in news items published up to and including 2019 from mainstream local newspapers according to the number of daily readers measured by the <i>Asociación para la Investigación de Medios de Comunicación</i> (AIMC) media audit.	<i>Most-read local newspaper</i> (no. of readers from April 2019 to March 2020): <i>La Vanguardia</i> (395,000) <i>Diario SUR</i> (148,000), <i>Málaga hoy</i> (16,000), and <i>La Opinión de Málaga</i> (10,000)
I2_Population No. of residents/ha	Population density calculated using the official register of inhabitants.	1 January 2020 31 December 2019	Municipal census data in 2019 [52]
I3_Housing No. of houses/ 100,000 inhab.	Residential use: properties from the housing census listings.	Year of construction up to and including 2019.	National cadastral Information— <i>Sede Electrónica del Catastro</i> [59]
I4_Airbnb No. of beds/ 100,000 inhab.	Airbnb listings: entire home/apartment, private room and shared room.	12 August 2019 30 July 2019	Inside Airbnb platform [60]
I5_Tourist Accommodation No. of tourist accom./ 100,000 inhab.	Regulated tourist accommodation: (1) P2P accommodation (2) Hotel (3) Tourist apartment (4) Guest house (5) Boarding house (6) Shelter	Registrations up to and including the year 2019—last registration date from listings: (1) 1 October 2021 30 December 2019 (2) 13 December 2019 27 November 2019 (3) 21 September 2018 12 December 2019 (4) 23 May 2018 19 July 2019 (5) 2019 27 June 2019 (6) 23 May 2018 2019	(1–6) Open Data BCN [61–64] (1–5) Establecimientos y Servicios Turísticos—Junta de Andalucía [65], (6) Web scraping from Google Maps
I6_Cultural Amenity No. of amenities/ 100,000 inhab.	Leisure activities and recreational facilities: (1) Auditoriums (2) Cinemas (3) Cultural centres (4) Monuments/main tourist points (5) Museums, together with art galleries, conference rooms and showrooms (6) Theatres	Art and cultural facilities active in 2019—last registration date from listings Data collection updated monthly since: (1) 24 November 2014 25 April 2018 (2) 18 April 2018 11 May 2017 (3) 28 June 2017 22 June 2020 (4) 6 November 2017 22 June 2020 (5) 17 May 2017 25 April 2018 (6) 13 December 2019 11 May 2017	Open Data BCN [66–68] Datos Abiertos Ayto. Málaga [69–77]
I7_Terraces No. of terraces/ 100,000 inhab.	Terraces in public space for restaurants and food shops whose authorisation is allowed.	1 January 2020 19 October 2019	Open Data BCN [78] Datos Abiertos Ayto. Málaga [79]

Table 2. Cont.

Ref. Indicator Name Unit	Definition	Data Collection Barcelona Malaga	Source Barcelona Malaga
I8_Nightlife No. of establishments/ 100,000 inhab.	List of music and drinks venues	Registrations up to and including the year 2019—last registration date from listings: 30 Septembers 2019 2019	Open Data BCN [80] Web scraping from Google Maps
I9_Souvenir Shops No. of shops/ 100,000 inhab.	Souvenirs shops welcome visitors and open their doors even weekends and bank holiday.	Census of ground floor premises categorised by souvenir and/or bazaar uses in 2019 Shops belonging to the Malaga Cruise Shops network in October 2019	Open Data BCN [81] Malaga Cruise Shops—Ayto. Málaga [82]

Source: Authors.

3.1. Indicator System

The proposed indicator system (see Table 2) is based on two sets of variables: socio-demographics (I1–3) and tourism intensification (I4–9). Despite the fact that the first three indicators defined do not in themselves measure the degree of tourism intensification, the last two have been considered in recent studies and show the following common urban pattern: the Airbnb offer spreads over those mainly residential areas where (1) protest and resistance movements have emerged against tourism gentrification [83], (2) there was a higher resident population before the eruption of P2P accommodation phenomenon [47], and (3) traditional accommodation such as hotels are in direct competition with short-term rentals [30]. Thus, data have been aggregated by census tracts as territorial unit of analysis and standardised mainly taking into account the number of residents per 100,000 inhabitants, and just the surface area in hectares in the case of the population (I2) index. Furthermore, normalised data batched by ranges at census section level in Barcelona and Malaga were used to spatially compare tourism intensification within and between the cities using descriptive statistics, density maps and statistical analyses. The following nine indexes have been measured at census section level to explain contextual factors with respect to the considered variables:

1. Citizen Initiatives (I1): Social organisations such as neighbourhood associations, urban movements or citizen participation platforms engaged in the conflicts of interest resulting from tourism specialisation. Thus, the qualitative software Atlas.ti 22 was used to conduct a content analysis of the most-read newspapers in Barcelona and Malaga to identify protest and resistance movements in the press. The sum of daily readers on paper or *Kiosko y Más* and *Orbit* is the indicator to measure the significant press impact provided by the AIMC media audit (see Table 3). Newspapers with local circulation in Barcelona (*La Vanguardia*) and Malaga (*Diario SUR*, *Málaga hoy*, and *La Opinión de Málaga*) are considered, but those covering regional or national news or dealing with sport and off-topic quantitative data in economics were not included.

Table 3. Daily readers of local newspapers from April 2019 to March 2020.

City	Ranking (#)	Newspaper	Daily Readers (In 1000s)	Location	Off-Topic	
					Sport	Economy
Barcelona	1	<i>La Vanguardia</i>	395	Barcelona		
	2	<i>El Periódico</i>	273	Catalonia		

Table 3. Cont.

City	Ranking (#)	Newspaper	Daily Readers (In 1000s)	Location	Off-Topic		
					Sport	Economy	
	3	<i>Mundo Deportivo</i>	157	Spain	•		
	4	<i>Sport</i>	122	Spain	•		
	5	<i>20 Minutos</i>	106	Spain			
	6	<i>Ara</i>	74	Catalonia Balears Islands Comunidad Valenciana Andorra			
	7	<i>Marca</i>	66	Spain	•		
	8	<i>El País</i>	59	Spain			
	9	<i>El Punt Avui</i>	43	Catalonia			
	10	<i>As</i>	32	Spain	•		
	11	<i>El Mundo</i>	26	Spain			
	12	<i>Regió7</i>	26	Catalunya Central, Catalonia			
	13	<i>Expansión</i>	22	Spain		•	
	14	<i>ABC</i>	12	Spain			
	15	<i>La Razón</i>	8	Spain			
	16	<i>Cinco Días</i>	4	Spain		•	
	17	<i>Diari de Tarragona</i>	2	Campo de Tarragona, Catalonia Tierras del Ebro, Catalonia			
	18	<i>Segre</i>	1	Ponent, Catalonia Alto Pirineo y Arán, Catalonia			
	Malaga	1	<i>Diario SUR</i>	148	Malaga		
		2	<i>Marca</i>	60	Spain	•	
3		<i>El País</i>	38	Spain			
4		<i>As</i>	28	Spain	•		
5		<i>El Mundo</i>	20	Spain			
6		<i>ABC</i>	17	Spain			
7		<i>Málaga hoy</i>	16	Malaga			
8		<i>La Razón</i>	10	Spain			
9		<i>La Opinión de Málaga</i>	10	Malaga			
10		<i>Viva</i>	8	Andalusia			
11		<i>20 Minutos</i>	7	Spain			
12		<i>Ideal de Andalucía</i>	6	Andalusia			

Table 3. Cont.

City	Ranking (#)	Newspaper	Daily Readers (In 1000s)	Location	Off-Topic	
					Sport	Economy
	13	<i>Mundo Deportivo</i>	4	Spain	•	
	14	<i>La Vanguardia</i>	2	Spain		
	15	<i>Sport</i>	2	Spain	•	
	16	<i>Expansión</i>	2	Spain		•
	17	<i>El Periódico</i>	1	Andalusia		
	18	<i>Diario de Sevilla</i>	1	Seville		
	19	<i>Cinco Días</i>	1	Spain		•

Source: AIMC.

Once the most-read local newspapers from April 2019 to March 2020 were selected, the collection of news items was carried out using online archives and searching for the following keywords: (1) ‘*turistificación*’ (touristification), (2) ‘*gentrificación*’ (gentrification), and (3) ‘*apartamentos turísticos*’ (peer-to-peer accommodation). The first two topics have been used in recent studies on content and/or discursive analysis of actors reported in the media, offering insight into the struggles with the touristification [84–86] and gentrification [87–89] phenomena, together with other related terms such as Airbnb [90–92]. However, the last keyword considered was used as a broader and more holistic concept related to non-traditional tourist accommodation rather than a P2P platform, and for including other Spanish related terms, such as ‘*alquiler turístico*’ (short-term rental), ‘*apartamentos vacacionales*’ (holiday apartments) and ‘*viviendas turísticas*’ (holiday housing). Thus, all written news items that included the selected searching keywords within the title and the body of the published news were analysed up to and including the year 2019. Once coded and all stakeholders quoted in the press had been coded and listed, every citizen initiative was mapped according to the geographic coordinates of its social and/or notification address, or the public space (street, square or neighbourhood) where it operates. Moreover, geolocated data are stored by census tract in order to measure the presence of actors over the city.

- Population (I2): Total residents by census tract of municipalities selected were used. The municipal census data according to the official registry of inhabitants were obtained from Spanish National Statistics Institute listings [52]. Taking 2019 as the analysis date, georeferencing processes were performed to relate population data listings batched by census code assignment to every census section polygons from the available shape files posted on municipal open-data platforms [57,58]. The latter cartography base was used to define the surface area in hectares once the waterfront was redrawn according to the real coastline covering the land area alone; with defining the population density being the overall aim.
- Housing (I3): The cadastral information available from the Spanish *Sede Electrónica del Catastro* platform [59] is the basis for the housing statistics. Data compiled for residential use in comma separated values (csv) format were downloaded for the municipalities of Barcelona and Malaga. Those housing census listings contain ample information—except for the name of the property-owner and cadastral value—such as the property register code, address, building data (floor area, year of construction) and even the location with latitude and longitude coordinates. Thus, the stored geographical coordinates correspond to the centroid of each plot or building, and a point layer map in a GIS geodatabase was created to assign a sum of properties to every census tract. Housing listings gathered at census section level were also filtered taking analysis date as up to and including the 2019 construction year.

4. Airbnb (I4): Airbnb listings are obtained from the Inside Airbnb platform [60]. It is an open-access dataset with the supply of regulated and informal short-term rentals in main world tourist destinations. P2P accommodation posted on Airbnb refer not only to entire homes or apartments, but also private and shared rooms, and each offer is web-scraped to one day a month. Moreover, the number of beds per listing is also collected and therefore considered instead of the sum of accommodation to take into account the contribution of Airbnb for floating city users. Data compiled for Barcelona and Malaga are available monthly in text files called *listing.csv* throughout 2019. Although December was the month with the highest number of listings in 2019 (see Table 4), the data collected in summer are considered to be representative due to the high tourist activity, so the dataset collected at just before or shortly after the beginning of the month of August were used, as had been the case in previous studies for the months of July [14] and August [26,35]. Once the collection date had been selected, the Airbnb listing month in question was converted to a point layer using the latitude and longitude coordinates included in the spatial database in order for a sum of listings to be assigned to every census tract.

Table 4. Total of Airbnb listings per month in 2019.

Month	Barcelona		Malaga	
	Date Collection	Airbnb Listings	Date Collection	Airbnb Listings
1	14 January 2019	18,033	22 December 2018	4894
2	6 February 2019	17,763	30 January 2019	4899
3	8 March 2019	17,807	24 February 2019	4925
4	10 April 2019	17,899	31 March 2019	5056
5	14 May 2019	18,302	1 May 2019	5236
6	7 June 2019	18,837	30 May 2019	5442
7	10 July 2019	19,833	30 June 2019	5738
8	12 August 2019	20,556	30 July 2019	5983
9	17 September 2019	20,404	1 September 2019	6085
10	16 October 2019	20,147	30 September 2019	6051
11	9 November 2019	20,428	31 October 2019	6028
12	10 December 2019	20,843	30 November 2019	6145

Source: Inside Airbnb platform [60].

5. Tourist Accommodation (I5): Regulated tourist establishments and service buildings operating up to and including 2019. The following six typologies are considered to be tourist accommodation: (1) short-term rentals excluding nonregulated P2P accommodation, together with the traditional accommodation sector; (2) hotels; (3) tourist apartments; (4) guest houses; (5) boarding houses and (6) shelters. Tourist accommodation data were mainly taken from the municipal or regional registers of Barcelona [61–64] and Malaga [65]. The records for each type of tourist accommodation considered contain data on the registration date, postal address and geographical coordinates, but the number of rooms and beds for each typology is not always available. Therefore, the geolocation of these accommodation facilities was carried out using official listings with latitude and longitude coordinates by GIS. It should be noted that shelter listings are not available from the authorities in the case of Malaga; http requests were therefore conducted to web scrape a shelter geodatabase taken from Google Maps. Thus, official and Google Maps listings with latitude and longitude coordinates make it possible to geolocate all tourist establishments by points, batched by GIS to assign a sum of listings by every census tract.

6. Cultural Amenity (I6): Cultural and art facilities that were active in 2019. The following six local recreational amenities offering cultural services are considered: (1) auditoriums, (2) cinemas outside of the commercial route and film archives—commercial cinemas are not included, (3) cultural centres, together with cultural foundations and civic centres, (4) main tourist points—monuments with the sightseeing highlights, (5) museums within other culture and leisure spaces such as art galleries, conference rooms and showrooms, and (6) theatres. Data stored in several '.csv' files openly published by the municipal governments of Barcelona [66–68] and Malaga [69–77] were downloaded. Cultural services listings contain information on several leisure spaces and could be filtered by category according to the cultural amenity in question. Moreover, all records for every establishment store the geographic coordinates, allowing geolocation of cultural facilities at point level, with the aim of assigning how many recreational activities are spread across each of the census tract of both cities.
7. Terraces (I7): Authorised terraces for restaurants and food shops in public space trading in 2019. These are hospitality services authorised for activity outdoors. Data on terraces were taken from the census of permits for ordinary terraces in public-use spaces in Barcelona [78] and Malaga [79]. Terrace listings contain data on surface area and location—full postal address and the geographic coordinates—for both cities, but just the number of tables and chairs in the case of Barcelona. Therefore, the longitude and latitude coordinates were used to create two-point layers/terraces in each municipality. Although the area occupied by each stored terrace was available, their presence at census tract level was measured in terms of the number of restaurants with outdoor service because the defined indicators are mainly standardised by the number of residents apart from the population (I2) index normalised in hectares.
8. Nightlife (I8): Music and drinks venues—such as bars and pubs, cocktails, discotheques, karaoke, nightclubs, ballrooms and flamenco shows—operating in 2019. Data on music and drinks' spaces were taken from the census of nightlife venues in the city of Barcelona [80]. Open data collected for Barcelona were downloaded and stored in a file called *opendatabcn_cultura_espais-de-musica-i-copes.csv*, which contained information on the typology of entertainment venues, the registration date and the geographic coordinates. The latitude and longitude coordinates were used to create a point layer for each record in GIS. However, official listings from Malaga were not available, so web scraping was used as a research instrument to gather information on nightlife establishments posted on Google Maps. Downloading generated '.csv' files for each http request with the following Spanish word searches: '*discotecas*', '*copas*', '*pubs*' and '*tablaos flamencos*'. The resulting listings include the Google Maps location for each record and those data were geolocated by GIS once all listings had been filtered to delete duplicates. The point layers created with the geolocated leisure establishments for Barcelona and Malaga were batched according to the census tract in which each record was located.
9. Souvenir Shops (I9): The 2019 ground floor premises census was the basis for souvenir shop listings. Data on souvenir shops were taken from the economic activities census of the city of Barcelona [81]. A file called *2019_censcomercialbcn_detall.csv* was downloaded. It contains ample information on each listing with respect to the economic activity (sector and name) and location (postal address and geographical coordinates). The records categorised by '*souvenirs*' and '*souvenirs i basars*' were selected and geolocated by GIS from the x and y coordinates stored. In the case of Malaga, the souvenirs shops belonging to the Malaga Cruise Shops networks in October 2019 were considered [82]. The souvenir shops on the municipal census welcome visitors and open their doors even at weekends and bank holidays. Each record on the shop listings contains the location based on the full postal address and those data were geolocated using Google Maps address matching. The resulting point layers for souvenir shops in Barcelona and Malaga were batched at census section level to measure their presence in each census tract.

3.2. Data Analysis

GIS software (ArcGIS 10.8) was used to build a comprehensive geodatabase—considering the census tracts as territorial units in both cities—in order to measure the indicator system defined (see Table 2) for case studies. Once data had been classified at census section level in terms of absolute values, the dataset was standardised by the number of inhabitants in 100,000s or the area measured in hectares to compare the census tracts between them for each city separately and jointly. Moreover, density and cluster maps per indicator and city were built using GIS implementation (QGIS 3.10), together with univariate and bivariate global spatial autocorrelation (ArcGIS 10.8 and GeoDa 1.20.0.22, respectively). However, density normalised data of indicators were analysed statistically using IBM SPSS v27 but separately in Barcelona (N = 1068) and Malaga (N = 434). The methodological approach was designed in seven steps to study the spatial dimension of the variables considered:

1. Data batched by census tract were standardised for descriptive statistics but separately in each city, in order to determine the tourism intensification and the degree of concentration of the socio-demographic variables.
2. Normalised data tagged by ranges were used to produce density maps for each indicator. A colour gradient was defined to show where the offer is spread through the same intervals for both cities, with the aim of measuring the concentration spatially and identifying common patterns.
3. Pearson correlations coefficients between indicators were calculated to define the relationship among them for each city, including the level of significance to measure how strongly the variables correlate.
4. Regression analysis to investigate the drivers of the spatial distribution of protest and resistance movements together with all stakeholders involved in the conflicts of interest resulting from tourism specialisation. A classic linear standard regression model—Ordinary Least Squares (OLS) estimation—was used. The outcome variable is the number of citizen initiatives per 100,000 inhabitants (I1) at census section level, which is linked to the tourism intensification indicators (I4–9) following the multiple linear regression function:

$$y_{I1} = \beta_0 + \beta_{I4}x_{I4} + \beta_{I5}x_{I5} + \dots + \beta_{I9}x_{I9} + \varepsilon, \text{ where:} \quad (1)$$

- y_{I1} is the response variable and refers to the citizen initiative index (I1);
 - x_{I4} to x_{I9} are the predictor variables which refer to the tourism intensification indicators (I4–9);
 - β_0 is the constant term, and β_{I4} to β_{I9} are the regression coefficients to be estimated for the independent variables (x_i); and
 - ε is the model's error.
5. The Global Moran's Index tool was used to measure the spatial autocorrelation based simultaneously on locations and feature values for all the defined indicators in each city, with the aim of evaluating whether the pattern expressed is clustered, dispersed or random.
 6. Univariate spatial autocorrelation (Anselin Local Moran's Index) was used to produce Local Indicator of Spatial Association (LISA; [93]) maps to measure the level of spatial penetration of the tourism specialisation and the agglomeration of socio-demographic values by clusters in both cities.
 7. The bivariate Global Moran's Index was used to measure the degree to which the presence of citizen initiatives (I1) at a location is correlated with its neighbours for each tourism intensification index (I4–9).

4. Results and Discussion

4.1. Spatial Representation of Tourism Intensification

Descriptive statistics (see Table 5) and dataset mapping (see Figures 2 and 3) of tourism intensification indicators together with related socio-demographic variables serve as a basis

for the spatial representation of the proposed indicator system. The average number of citizen initiatives per 100,000 inhabitants at census section level (I1) is 15.5 in Barcelona, but it is only just over two points fewer in Malaga with 13.36 (see Table 5). However, the maximum number of citizen initiatives per census tract in absolute terms is 11 in Barcelona and 5 in Malaga, but the presence of protest and resistance movements according to the total number is 257 and 61, respectively. Moreover, it should be noted that the local citizen initiatives spread over 138 (12.92%) census tracts in Barcelona, but just over 32 (7.37%) in Malaga with greater dependence on the city centre (see Figure 3).

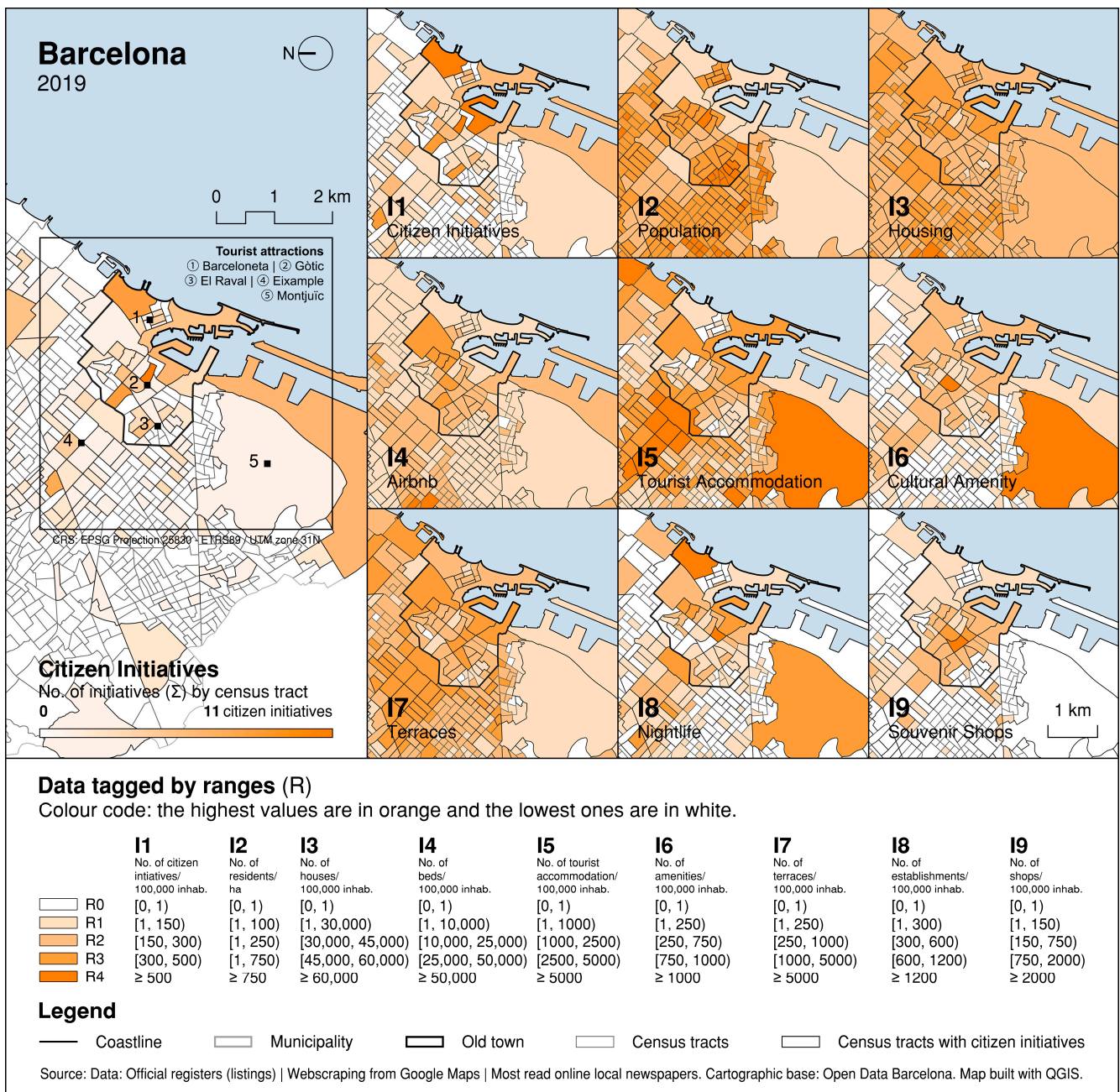


Figure 2. Tourism intensification indicators and related socio-demographic variables in Barcelona.

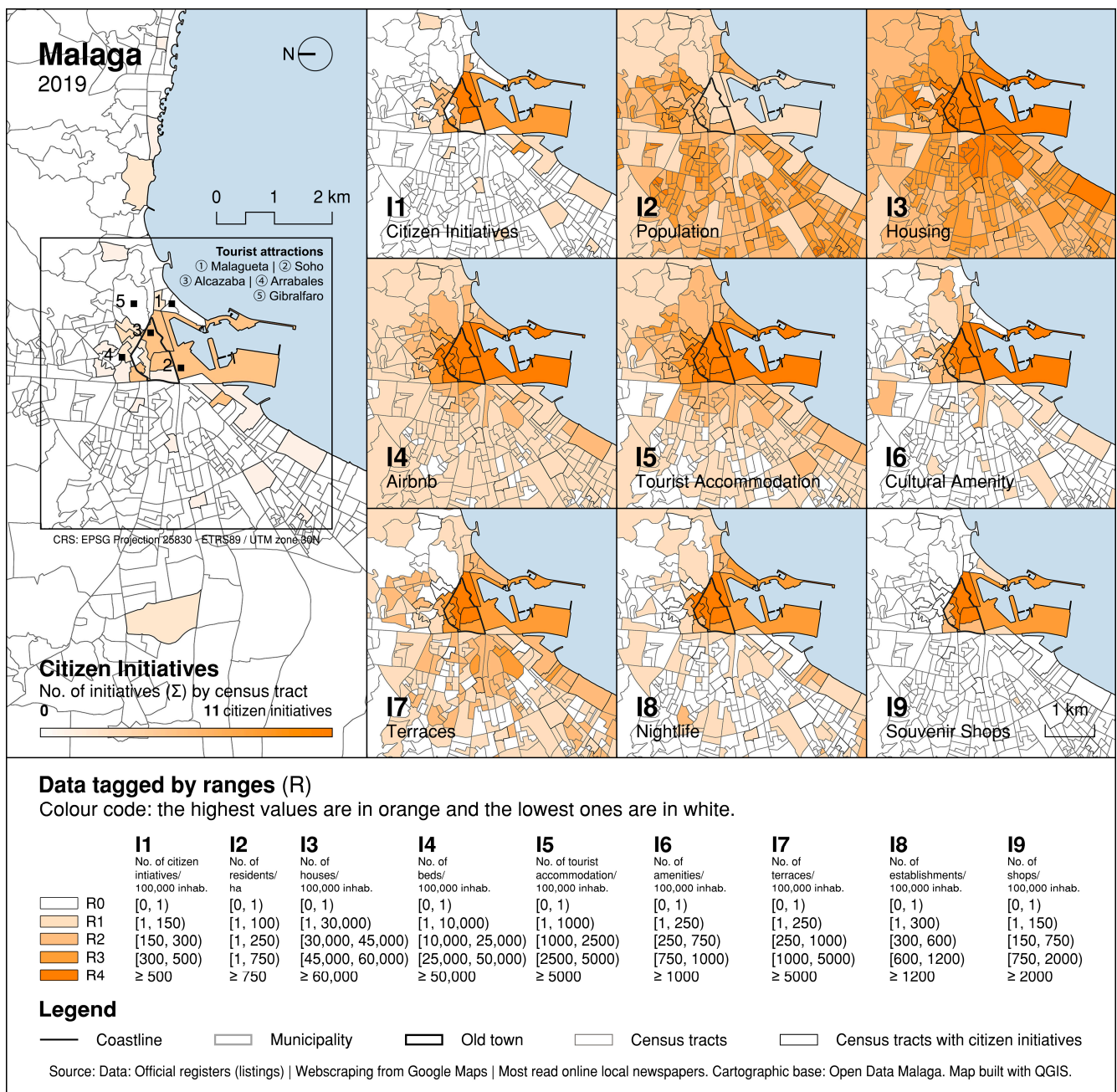


Figure 3. Tourism intensification indicators and related socio-demographic variables in Malaga.

When the focus is on the tourism intensifications indicators, it should be noted that the average number of Airbnb beds (I4) and traditional accommodation (I5) in Malaga is nearly double the figure for Barcelona (see Table 5). When comparing the distribution of short-term rentals and tourist accommodation, its spatial distribution shows the same urban pattern by census sections tract in the case of Malaga rather than in Barcelona. That suggests that the Airbnb offer replaces residential use as it is in direct competition with hotels and other regulated types of accommodation. This fact is again reinforced in the case of Barcelona in 2019 according to the figures for hotel and Airbnb beds, which is as to be expected given the growth of the Airbnb offer there since 2015 [30]. Moreover, short-term rentals contribute to the drop in population density (I2) as can be clearly seen in the case of Malaga (see Figure 3) with 908 residents fewer in the old town alone from 2009 to 2019 (−17.48%) according to the municipal register [52]. This decrease leads to an increase in the housing ratio per 100,000 inhabitants (I3) in Malaga city centre, where

long-term rentals or even usual residences are offered as P2P accommodation. Moreover, the eruption of short-term rentals also decreases residential use as shown in the paper by Cerezo-Medina et al. [26] on Malaga in 2019 at census tract level, using an indicator which measures the percentage of short-term rentals out of total number of homes.

Table 5. Basic statistics on tourism intensification indicators and related socio-demographic variables according to census sections in 2019.

City No. of Census Tracts (N)	Statistic	Indicators								
		Socio-Demographic				Tourism Intensification				
		I1	I2	I3	I4	I5	I6	I7	I8	I9
Barcelona 1068	Min.	0	1.53	9005.1	0	0	0	0	0	0
	Max.	693.13	1838.19	65,837.6	84,826.76	14,759.93	1523.7	3141.67	1584.65	3363.91
	Sum	16,549.86	484,884.33	45,323,967.82	4,141,419.26	670,469.29	55,303.12	382,240.63	37,547.28	24,773.56
	Mean	15.5	454.01	42,438.17	3877.73	627.78	51.78	357.9	35.16	23.2
	SD	55.06	290.3	5422.35	6117.03	1298.22	118.97	403.72	122.87	143.86
Malaga 434	Min.	0	0.07	17,536.81	0	0	0	0	0	0
	Max.	772.8	1527.78	143,122.1	187,789.8	35,085.01	6017.19	11,437.4	6931.96	5444.13
	Sum	5797.65	123,951.3	19,480,316.22	2346,013.4	464,423.57	22,113.25	130,062.57	54,179.85	14,764.02
	Mean	13.36	285.6	44,885.52	5405.56	1070.1	50.95	299.68	124.84	34.02
	SD	68.14	267.87	12,578.52	17,046.98	3476.5	329.75	934.22	566.33	353.8

Abbreviations: Min. = minimum; Max. = maximum; SD = standard deviation.

According to the tourism intensification indicators apart from the emerging and traditional accommodation, it should be noted that the average number of cultural facilities (I6) is nearly the same in both cities, but its spatial concentration is mainly located in the old town and surroundings in Malaga (see Figure 3). The same urban pattern is shown for souvenir shops (I9) for Malaga and to a lesser extent in the city of Barcelona along the Paseo de Gracia axis in the Eixample districts beyond the Ciutat Vella city centre (see Figure 2), together with the terraces (I7) and nightlife venues (I8). However, the spatial concentration of restaurants with outdoor activity (I7) with music and drinks venues (I8) are distributed mainly over the city centre in the case of Malaga (see Figure 3). It should be noted that the high listings per inhabitant are found in the city centre and non-urban areas (e.g., Montjuïc, see Figure 2). However, that greater pressure is due to the low resident population there as determined in previous studies (e.g., [22]).

4.2. Pearson Correlations

Once the data have been batched at census section level and standardised, Pearson correlation analyses (see Table 6) show the correlation coefficients (r) between indicators to measure bivariate correlations together with the level of significance (p) in each sample of Barcelona ($N = 1068$) and Malaga ($N = 434$) separately. Comparing the two correlation analyses, it is noted that there are mainly significant correlations in both samples but just Malaga shows over moderate correlation coefficients ($r > 0.4$) with the exception of the relationship between terraces for restaurants and food shops in public space (I7) with nightlife venues (I8) in Barcelona ($r = 0.434$, $p < 0.001$). This shows how the spatial distribution of tourism specialisation is located over the same urban area for the tourism facilities analysed (I4–9) in Malaga due to the Centre district acting as a hub (see Figure 3), whereas the tourism intensification is spread throughout the city of Barcelona in a distributed manner with less dependence on the old town (see Figure 2).

Table 6. Correlations among tourism intensification indications and related socio-demographic variables for Barcelona and Malaga.

	Indicators								
	Socio-Demographic				Tourism Intensification				
	I1	I2	I3	I4	I5	I6	I7	I8	I9
I1	-	-0.123 *	0.53 ***	0.769 ***	0.718 ***	0.751 ***	0.721 ***	0.52 ***	0.781 ***
I2	-0.179 ***	-	-0.02	-0.143 **	-0.117 *	-0.11 *	-0.108 *	-0.12 *	-0.08
I3	0.031	-0.136 ***	-	0.69 ***	0.704 ***	0.49 ***	0.622 ***	0.533 ***	0.503 ***
I4	0.216 ***	0.015	0.214 ***	-	0.975 ***	0.705 ***	0.831 ***	0.792 ***	0.708 ***
I5	0.256 ***	-0.207 ***	0.022	0.226 ***	-	0.645 ***	0.771 ***	0.756 ***	0.638 ***
I6	0.335 ***	-0.291 ***	0.022	0.13 ***	0.319 ***	-	0.779 ***	0.637 ***	0.922 ***
I7	0.26 ***	-0.241 ***	0.11 ***	0.312 ***	0.513 ***	0.209 ***	-	0.815 ***	0.851 ***
I8	0.385 ***	-0.14 ***	0.072 *	0.281 ***	0.39 ***	0.346 ***	0.434 ***	-	0.645 ***
I9	0.205 ***	-0.081 **	0.05	0.224 ***	0.189 ***	0.271 ***	0.219 ***	0.245 ***	-

Notes: Malaga (N = 434) values are above the diagonal and the Barcelona (N = 1068) ones are under it. Significance codes: * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

As regards the Malaga correlation analysis, it is noted out that there is a statistically significant relation with a very strong correlation coefficient between Airbnb (I4) and tourist accommodation (I5) indexes ($r = 0.975$, $p < 0.001$). However, this relation is defined with an under moderate correlation coefficient ($r = 0.226$, $p < 0.001$) in Barcelona which could be explained by the implementation of the Special Urban Plan for Tourist Accommodation (PEUAT; [94]) in 2017. That regulation establishes zero growth for tourist accommodation in some central urban areas to distribute the offer over the city [95], and ended the previous moratorium on all kinds of accommodation approved in 2015 after new short-term rental licenses were limited in 2014 [23,96]. As the city of Malaga is less regulated regarding the introduction of short-term rentals, there is a very high correlation coefficient between Airbnb (I4) and tourist accommodation (I5) mentioned above, but it should be noted that the latter also considers the regular offer of short-term rentals which is counted for the former together with the illegal supply, so collinearity could occur between the I4 and I5 indexes.

Correlation analysis in Malaga also shows a highly significant correlation between cultural amenity (I6) and souvenir shops (I9) indicators ($r = 0.922$, $p < 0.001$) as shown by data mapping (see Figure 3). The latter is calculated using 121 premises spread over just 10 census tracts (2.3%) from the old town to the port, where there are 107 cultural amenities: almost half of the total cultural and leisure offer (218) in absolute terms. This cultural specialisation of Malaga city centre is the outcome of the rise in cultural amenities for the European Capital of Cultural 2016 candidacy in 2004 [97]. Even though Malaga's application was not successful, the number of museums has risen from 22 in 2007 [98] to the current figure of 40 [99].

As regards the citizen initiative index (I1) with tourism intensification indicators (I4–9), there is mainly a high level of significance ($p < 0.001$) in both cities, but only strong ($r = 0.70$ – 0.89) and moderate ($r = 0.40$ – 0.69) correlation coefficients in Malaga. As observed on the data mapping (see Figures 2 and 3), the total number of emerging protest movements in Barcelona is four times the amount of data in Malaga in absolute terms, but more concentrated in the latter over the old town and nearby neighbourhoods. Due to this strong dependence on the city centre where tourism facilities are likewise located, correlation coefficients are high, but more so in Malaga than in Barcelona, where the urban pattern shows a spatial distribution of the tourism intensification throughout the city of Barcelona far away from the Ciutat Vella (Old Town).

Table 6 shows that positive relations predominate whereas the negatives ones between population density (I2) with the rest of the indicators are as expected. That suggests a displacement of the local population in those areas under tourism pressure [48,100], especially in the old town and nearby neighbourhoods due to Airbnb supply as observed in Malaga, Valencia and Palma in 2019 but at a neighbourhood level [101]. Despite population (I2) and Airbnb (I4) indexes not being significantly correlated in the case of Barcelona ($p = 0.632$), this negative relationship is significant between the former and the tourist accommodation indicator (I5) as noted from data collected in 2013 and 2014, respectively [30]. The low values of correlation coefficients and the lack of significance between population index with the rest could be explained by the population census referring to the number of inhabitants at a collection date instead of considering the increase or decrease of residents for years—population change—to evaluate local community displacement [29]. Moreover, it should be noted that the municipal register has limitations as it does not differentiate between a person who really resides in the dwelling and one who is a householder offering the property for short-term rental. Therefore, further research should consider not only redefining this indicator in order to measure who is local, but also include a new index to count the floating city users due to urban tourism. This might reveal whether the residential and floating population densities correlate with the other indexes in a negative and positive way respectively.

4.3. Multiple Regression Models (OLS)

Table 7 presents the OLS regression results for the samples of Barcelona and Malaga. The multiple regression model obtained for emerging protest movements and citizen platforms dealing with touristification (I1) therefore has a high explanatory capacity (adjusted $R^2 = 0.75$), according to the tourism intensification indexes (I4–9) in the case of Malaga. Thus, citizen initiatives mainly emerge in those areas under tourism intensification but their presence decreases where the different types of tourist accommodation (I5) and nightlife venues (I8) are located ($\beta < 0$) in Malaga. Taking ‘2019’ as the analysis date again, but ‘neighbourhood’ as the territorial unit, a previous OLS regression model—including population within the group of predictor variables but without considering either music and drinks venues or souvenir shops—explains around 94% of the distribution of citizen initiatives in Malaga [101]. This suggests that the smaller a territorial unit of analysis is, the more reliable the result of the model; new research could therefore consider a regular grid of squares or hexagons at a lesser scale than census tracts, as administrative boundaries could present problems of adjustment to the tourism phenomenon spatially [18].

Table 7. OLS regression for the Citizen Initiatives (I1) dependent variable linked to the tourism intensification indicators (I4–9).

Independent Variables	Dependent Variable: I1	
	Barcelona	Malaga
I4	0.001 ** (0.000)	0.004 *** (0.001)
I5	0.002 (0.001)	−0.004 (0.002)
I6	0.094 *** (0.014)	0.017 (0.013)
I7	0.008 (0.005)	0.000 (0.005)
I8	0.107 *** (0.015)	−0.044 *** (0.005)
I9	0.02 (0.011)	0.086 *** (0.015)
Constant	−0.318 (2.152)	0.295 (1.859)
Observations	1068	434
Adjusted R ²	0.209	0.75
F-value	48.036 *** (df = 6; 1061)	217.148 *** (df = 6; 427)

Notes: Standard errors in parentheses. Significance codes: ** $p < 0.01$, *** $p < 0.001$.

On the contrary, the driven mechanisms that explain the pattern of citizen initiatives are more complex in Barcelona. Its tourism specialisation spreads not only in the old town and surroundings but in a great variety of urban areas as well (see Figure 2), as the model only explains around 21% of the citizen initiative distribution (adjusted $R^2 = 0.209$). However, the eruption of Airbnb offers and hotel supply in Barcelona in 2015 is explained at census section level by tourism intensification variables such as leisure and restaurants, and shows/performances, together with other explanatory variables: both multiple regression models explain around 55% and 22% of their distributions, respectively [30]. Nevertheless, Table 7 shows the F-value associated with a very small p -value ($p < 0.001$) in both Barcelona and Malaga; the predictor variables (I4–9) therefore show a statistically significant relationship with the response variable (I1): the group of tourism intensification indicators (I4–9) reliably predicts the emerging of citizen initiatives (I1).

4.4. Spatial Autocorrelation

Table 8 presents the results regarding the univariate Global Moran's I statistics for the proposed indicator system (I1–9) and indicates that the location patterns shown in Figures 4 and 5 through LISA cluster maps are statistically significant. Spatial statistical analysis confirms a strong positive autocorrelation in both cities (Moran's $I > 0$, p -value < 0.001) and the high and low values are spatially clustered together (z -score > 0 , p -value < 0.001). When comparing the coefficients, the larger values for Airbnb supply (I4) and all kinds of regulated tourist accommodation (I5) indicate that both offers exhibit a higher level of concentration in Barcelona rather than in Malaga. This reveals that the rest of the indexes show a more dispersed location apart from the population index (I2) for Malaga. Both Global Moran's Indexes presents a higher value according to the number of Airbnb listing per census tract in 2019: with a Moran's I of 0.78 in Barcelona and 0.76 in Malaga [36]. This suggests that the data should be normalised to make them more accurate and comparable among the territorial unit selected for the analysis, even though data could show a Poisson distribution in absolute terms. It should be noted that Airbnb beds batched by census tracts but standardised by hectares in 2015 for the city of Barcelona show a higher spatial autocorrelation with a Moran's I of 0.7 [30] before the implementation of PEUAT. When considering the Airbnb beds from Barcelona per hectare instead of 100,000 inhabitants, the Moran's I value decreases to 0.20 (z -score = 58.67, p -value < 0.001) as expected. However, the normalisation by population could be more accurate to avoid the differences in scale size between territorial units of analyses.

Table 8. Global Moran's I statistics.

City No. of Census Tracts (N)	Statistic	Indicators								
		Socio-Demographic			Tourism Intensification					
		I1	I2	I3	I4	I5	I6	I7	I8	I9
Barcelona 1068	Global Moran's Index	0.09	0.08	0.03	0.23	0.22	0.06	0.21	0.13	0.08
	z -score	27.59	23.75	9.1	67.04	63.96	17.82	59.94	38.71	27.76
	p -value	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Malaga 434	Global Moran's Index	0.04	0.17	0.09	0.12	0.12	0.03	0.05	0.06	0.02
	z -score	10.1	38.88	20.55	28.19	28.91	10.75	12.0	16.09	6.41
	p -value	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001

Figures 4 and 5 show the spatial clustering distribution of the nine indicators for Barcelona and Malaga, respectively. Both LISA cluster maps show a clear centre–periphery pattern for the agglomeration on tourism phenomenon as noted in previous studies of Barcelona [30,37] and Malaga [36]; the mapping developed is therefore focused on the HH clusters which are concentrated in the city centre and surroundings. Thus, census tracts with a high ratio and surrounded by other ones with a high value as well are in red with a focus on the old town, but the spatial penetration of the tourism facilities extends more

broadly in Barcelona than Malaga. Focusing on type HH for the Airbnb (I4) and tourism accommodation (I5) indicators with a high Global Moran’s Indexes (see Table 8), high-high clusters spread over 147 and 203 census sections in Barcelona (see Figure 4), respectively, but only in 103 and 66 in the case of Malaga (see Figure 5). It reveals that Airbnb accommodation for Malaga is not only in direct competition with traditional accommodation, but there are also emerging Airbnb clusters far away the old town along the eastern coastline. Taking Airbnb listings in 2019 at census section level but in absolute terms, HH clusters are more distributed over 236 census tracts in Barcelona, compared to Malaga with 70 [36]. However, the number of census tracts for Airbnb HH types counting the sum of beds per hectare is higher with 258, but taking 2015 as the analysis date before PEUAT legislation [30]. This difference between data measured by several units at census section level suggests that the data should not only be disaggregated as accurately as possible if available (e.g., bed capacity), but also considering how to standardise the dataset to make territorial units of analyses with different surface areas comparable (e.g., population).

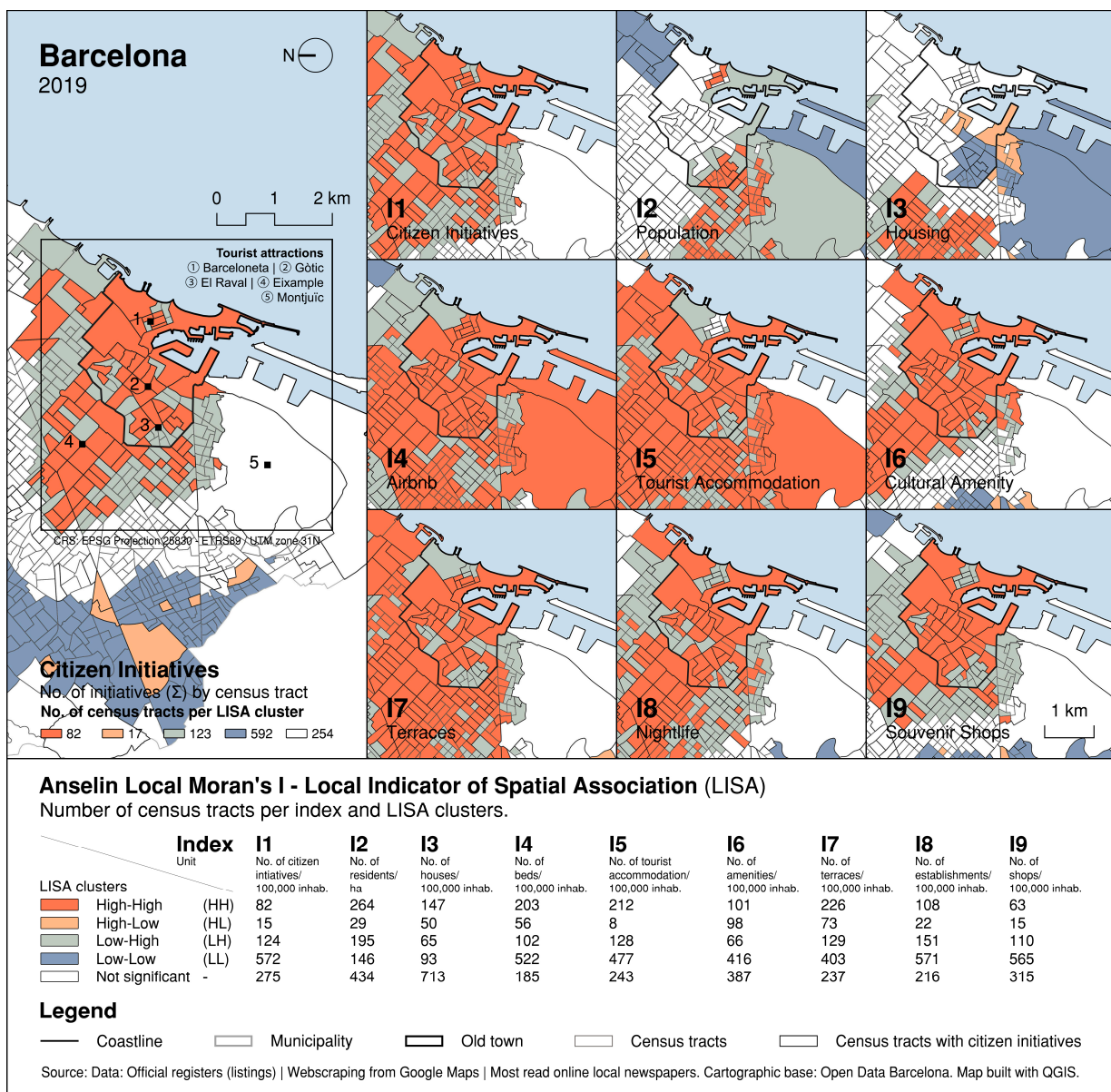


Figure 4. LISA cluster map for tourism intensification indicators and related socio-demographic variables in Barcelona.

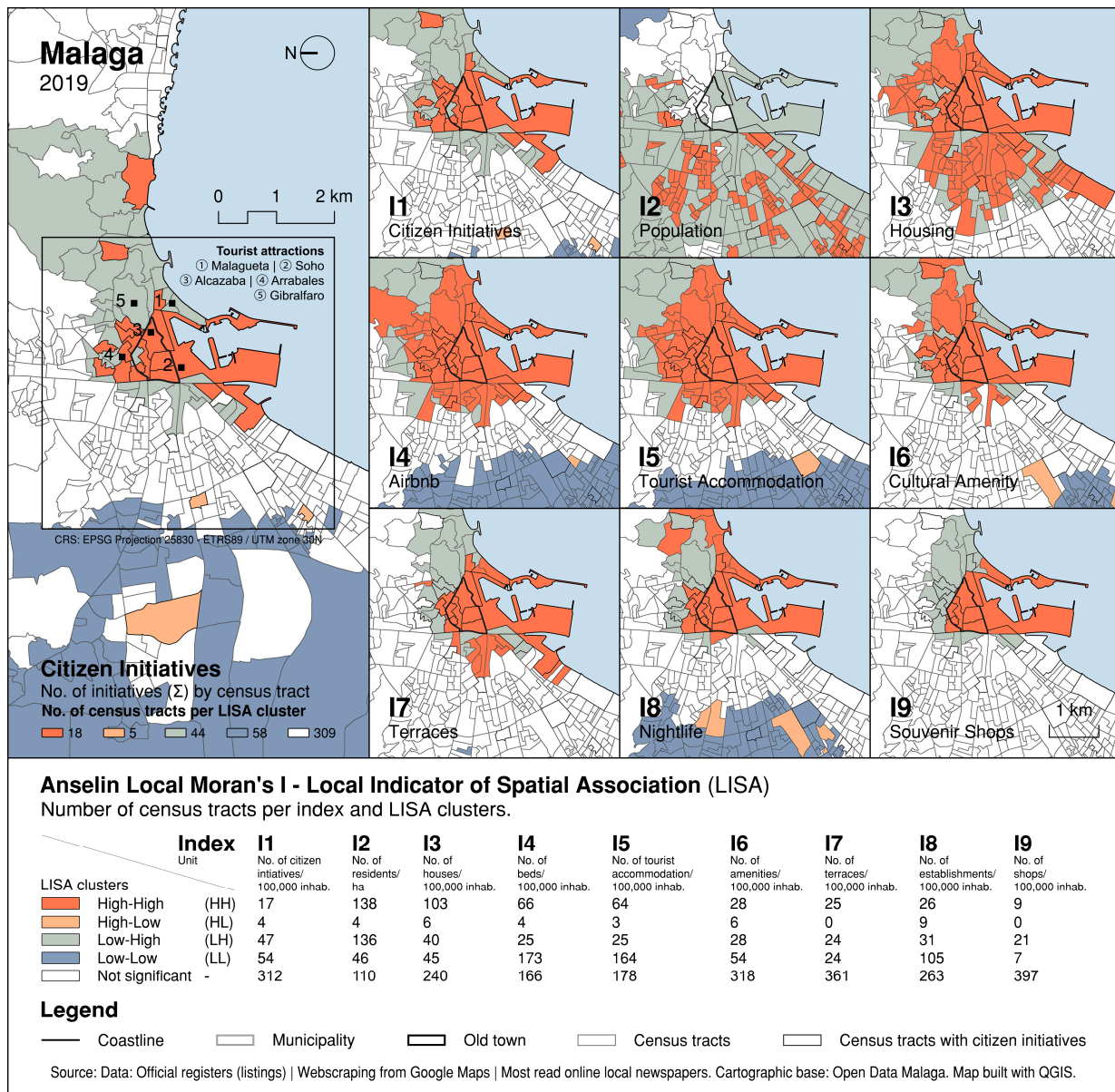


Figure 5. LISA cluster map for tourism intensification indicators and related socio-demographic variables in Malaga.

The emergence of LH clusters can be seen around the HH ones in both cities, but their spatial dimension is due to the tourism agglomeration phenomenon spreading close to the territorial units of analysis at LAU level, where the tourism intensification is located, which is known as geographic spillover effects [102]. For example, in the northern neighbourhoods beyond the old town in Malaga, known as Arrabales, there are no extremely high values for tourism intensification indicators (I4–9; see Figure 5). However, low–high clustering trends are detected due to the accessibility of the urban areas to tourist facilities, which indicates where the tourist attractions will be spread once the more touristy neighbourhoods are saturated. Regarding the citizen initiatives (I1), HH clusters are located in 82 and 17 census sections in Barcelona and Malaga, respectively, but relatively no difference in absolute terms with 82 and 18 census blocks. This is because the spatial distribution of citizen initiatives is located and concentrated in a few census tracts of the sample—around 10% of the sample in both cities—and a significant number of spatial units have zero value. Moreover, it should be noted that the emergence of citizen initiatives in both cities occurs in those locations around tourist facilities, as shown by the bivariate Global Moran’s I statistics (see

Table 9). Thus, there is a strong positive correlation (bivariate Moran's > 0 , p -value < 0.001) between the Citizen Initiative (I1) index with each tourism intensification indicator (I4–9). However, the high z-score values in the case of Malaga indicate a stronger intensity of clustering rather than Barcelona, which shows the greater dependence on tourism in the city centre of Malaga where protest and resistance movements emerge rather than other locations of the city.

Table 9. Bivariate Global Moran's I statistics.

City No. of Census Tracts (N)	Statistic	Citizen Initiative (I1) vs. Tourism Intensification (I4–9)					
		I1–I4	I1–I5	I1–I6	I1–I7	I1–I8	I1–I9
Barcelona 1068	Global Moran's Index	0.194	0.18	0.17	0.205	0.263	0.228
	z-score	15.485	14.123	13.152	15.85	19.958	18.215
	p-value	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Malaga 434	Global Moran's Index	0.499	0.48	0.368	0.451	0.455	0.384
	z-score	20.369	19.814	16.097	19.29	20.103	16.397
	p-value	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001

Note: Randomisation with 999 permutations.

5. Conclusions

The emergence of social movements, organisations, entities and citizen platforms actively arguing for degrowth in tourism together with all the stakeholders involved in the conflicts of interest in urban tourism have been barely listed, geolocated and measured. This study seeks to close this gap with the definition of an indicator—Citizen Initiatives (I1)—to measure their presence among geographical areas and to define the determinants of their appearance according to the tourism intensification and socio-demographic descriptors. Therefore, an indicator system has been defined and tested in Barcelona and Malaga, the two main cultural tourism port cities on the Spanish Mediterranean coast, as case studies.

Each indicator has been measured at census section level as the territorial unit of analysis to which all data could be disaggregated. Its normalisation has enabled the spatial relationship among census tracts to be defined and compared in each and both cities. Relationships have been established between citizen initiatives, population, housing, Airbnb and traditional accommodation, cultural and recreational facilities, the outdoor food sector and purveyors of souvenirs. Data mapping and statistical analysis show different outputs that explain the spatial distribution of protest and social movements tackling overtourism on the city. Density maps show a common pattern: tourism specialisation is mainly dependent on the old town and nearby neighbourhoods where citizenry is collectivised. Pearson correlations are mainly significant in both samples, but the stronger the coefficients are, the greater the tourism specialisation in the city centre as an overall tourist attraction. The tourism intensification drivers of the spatial distribution of citizen initiatives show a high explanatory capacity in the multiple regression model only in the case of Malaga due to the touristification phenomenon being mainly confined to the city centre. Cluster maps show that tourism intensification is spreading in a clear 'core-periphery' pattern with a strong positive autocorrelation in both cities, but the larger coefficient values are for Airbnb and traditional accommodation. However, both listings tend to be concentrated over the old town according to high-high values, but in a wider area in the case of Barcelona rather than Malaga. Spatial autocorrelation analysis shows that the distribution of citizen initiatives HH clusters is much more localised in a few census tracts in Malaga than in Barcelona. Moreover, the emergence of social movements struggling with touristification occurs in tourism specialisation areas with a high concentration of tourism facilities.

The indicator system presented has been estimated by combining different analyses in seven steps. The spatial analysis of the emerging citizen initiatives linked with each descriptor shows the relevance of the social implications due to tourism specialisation. This new indicator is based on a qualitative source such as the most-read local newspapers, but finally quantified to measure the presence of social movements and their relationship to the tourism offer. This mixed model provides a holistic approach to the touristification phenomenon and serves as a new tool for local administrations to elaborate urban policies to address overtourism particularly by urban areas. It serves not only to measure the spread of touristification in the city, but also to identify areas at risk of being touristified. This urban diagnosis could be monitored over time in order to promote specific legislation for certain urban areas to tackle gentrification and safeguard the original residential use living together with tourist demands. However, the contributions of this research in relation to the proposed Citizen Initiatives index should be assessed in the light of several limitations: (1) this indicator is based on the most-read local newspapers as a way of universalising the methodology, but this source could not capture the full range of stakeholders or even the complexity of the issues related to overtourism, and (2) the recorded effects may be weaker or stronger in other cultural frames, especially when considering individualistic and/or atomistic societies with lower degrees of socialisation. Moreover, the family set of descriptors could be complemented in future research in several ways, such as (1) redefining the selected variables or even considering new ones, (2) testing the indicators in further cases to find common urban patterns among tourist destinations, (3) disaggregating the data into a smaller non-administrative territorial units of analysis such as regular grids to focus on tourist saturated areas, and (4) checking not only open-access official dataset with fieldwork, but also stakeholder listing through semi-structured explorative interviews or focus groups for a snowball sampling.

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