Comparative analysis of short-term rental homes and traditional accommodation in Andalusian tourist cities: intensity, density, and potential expansion areas

ABSTRACT

Accommodation is one of the main sectors affected by the emergence of platform economies. This issue has been addressed by many researchers, but they have mainly focussed on Airbnb and large cities. Thus, there is a need for research on medium-sized cities and how they have been affected by the growth of short-term rental (STR) homes. Using official data, we analysed the spatial distribution of holiday rental homes in four Andalusian cities: Cordova, Granada, Malaga, and Seville. Using tourist density and intensity indicators, we created maps showing the concentration of STRs in historic centres, which matches the spatial distribution pattern of traditional tourist accommodation (TA). The analysis also identified areas in each city into which STRs may expand in the future. The results of this study may help policymakers and institutions responsible for territorial and tourism planning to better understand how the emergence of platform economies is impacting tourist destinations. They should also assist policymakers in making informed decisions on regulating this phenomenon.

Keywords: platform economy; STRs, tourist accommodation; tourist intensity; tourist density; spatial analysis.

Introduction

In recent years, tourism and tourist behaviour have been affected by the emergence and growth of digital platforms (Boros et al., 2018; Dolnicar, 2020; Gyódi, 2019; Heo, 2016) and the so-called "platform economy" (PE) (del Romero, 2018; Ferreri & Sanyal, 2018; Ortuño & Jiménez, 2019). Among the factors that account for the popularity of these digital platforms are the development of Information Technologies (IT) and the democratization of access to the Internet, thus facilitating a better match between tourism demand and supply (Werthner & Klein, 1999). Digital platforms have led to a deep transformative change in working conditions, urban mobility, leisure, tourism, and culture (del Romero, 2018).

Accommodation is the main sector affected by the emergence of the PE (Stors & Kagermeier, 2018), as shown by Eurobarometer data (Commission, 2018). The rapid growth of STR presents challenges for policy makers in tourist destinations (Bakker & Twining-Ward, 2018). The impact on the sector has led many researchers to investigate this issue (Heo, 2016).

According to data from Price Waterhouse Coopers (2016), it is estimated that by 2025 the PE will command a market worth more than €300 billion, with technology as one of the triggers and main drivers underlying the development of housing as tourist accommodation (Melián & Bulchand, 2019). Currently, Airbnb (2020) has more than 7 million tourist houses for rental in more than 220 countries, while another giant in the sector, Homeaway (2020), reported that it had 2 million STR properties in more than 190 countries.

Different disciplines have investigated the STR phenomenon. For example, the spatial distribution of holiday rental houses has been studied in cities (Adamiak, 2018; Boros et

al., 2018; Gyódi, 2019; Ioannides et al., 2019; Martínez et al., 2020; Wachsmuth & Weisler, 2018) and, to a lesser extent, in regional areas or areas outside cities (Morales et al., 2020). The price determinants of STR and the importance of distance in its market has been object of study too (Benítez-Aurioles, 2017; Wang & Nicolau, 2017). The evolution of PE in the hospitality sector was contextualised by Oskam & Boswijk (2016) and recently, Buslgaski (2020) has investigated the dynamic of Airbnb in European cities between 2014-2020. Ongoing research is investigating its impact on the residential rental market (Yrigoy, 2017), its effects on the hotel sector (Benítez-Aurioles, 2019; Blal, Singal & Templin, 2018; Choi et al., 2015; Zervas et al., 2016), the legal and fiscal aspects of the Airbnb phenomenon (Morales et al., 2020), and its relationship with tourist safety (Wu & Cheng, 2019).

According to Del Romero (2018), most research on digital platforms and other new social phenomena tends to focus on large cities such as London, Paris, New York, or Shanghai. This approach has created a large knowledge gap regarding the impact of tourist house accommodation in medium-size cities, especially in south European cities, where digital platforms play an important role (Adamiak et al., 2019). Moreover, most research has only addressed one platform (i.e. Airbnb), but there are no robust comparative studies on how Airbnb networks have developed in different cities (Gyódi, 2019).

It is relevant to investigate STRs in medium-sized cities because they can be deeply affected by the growth and distribution of STRs. As expected, tourist rental is greater in cities where tourism plays a predominant role in their economy (del Romero 2018, Martinez et al., 2020). Malaga, Seville, Cordova and Granada are a case in point. Data from the Andalusian Tourism Registry show that between 2016 and 2020 the number of STRs tripled in these cities. The foregoing aspects and the availability of reliable and

updated official data make Andalusia (Spain) an ideal setting for the analysis of tourist accommodation.

The main objective of this study was to conduct a spatial analysis of STRs in Cordova, Granada, Malaga, and Seville, which were selected according to their differences in size (medium or large) and location (inland or coastal). These four cities have the greatest urban and tourist complexity and the greatest growth of STRs in Andalusia. This study had four specific aims: to determine if the distribution patterns are similar to those of traditional regulated accommodation; to identify differences in spatial distribution between inland urban destinations (Seville, Cordova, and Granada) and a coastal urban destination (Malaga); to compare the spatial distribution of STRs in these four cities and that of other cities analysed in the literature; and to identify the potential expansion areas for STRs in these Andalusian cities.

The rest of the article is structured as follows: firstly, a literature review is provided in which we define STRs, describe their emergence within the tourism sector, and identify which aspects have been addressed, particularly in terms of spatial distribution in cities. The methodology section presents the indicators and tools used to determine the intensity and density levels of STRs and traditional housing. It also includes an exploratory scenario showing the potential expansion areas of STRs in the four cities. The results section provides data that may help public policy makers to make decisions on the distribution and control of the flow of visitors to cities in the light of observed conflicts regarding the use of urban space and their impact on residents' daily lives (Navarro, et al., 2019; Romero et al., 2019). Finally, the discussion section contextualises the results in relation to those of other studies and provides suggestions on future lines of research.

Literature review

Short-term rental homes in a platform economy setting

The development of digital platforms operating at a global scale has led to the exponential expansion of STRs in major cities. These platforms are considered to be an evolutionary social development (Stors & Kagermeier, 2018) rather than a paradigm shift.

The proliferation of STRs, which has been barely addressed by current regulations, has placed conflicts over the use of residential space and unfair competition within international public debate (Dolnicar, 2020; González Jiménez, 2017; Oskam & Boswijk, 2016; Stors & Kagermeier, 2018; Zervas, Proserpio, & Byers, 2017).

The use of IT in the tourism sector has shortened distribution channels via direct sales between suppliers and users (disintermediation): however, it has also led to the emergence of new intermediaries with greater power in the market (hypermediation). The latter category includes new global players such as Booking.com, Airbnb, and Vrbo in the area of accommodation, Uber and Blablacar in transportation, or Viator and Civitatis in the sale of tourism experiences. Consumers have chosen these new services and intermediaries because of the advantages they offer. According to Eurobarometer (Commission, 2018), these advantages include cheaper or even free offers, a wider range of options to choose from than those offered by traditional channels, more convenient access to the services they offer, available user ratings and user opinions, and the possibility of direct contact with interesting people.

We positioned this study, on the one hand, by taking into account the definition of P2P accommodation proposed by authors such as Dolnicar (2019), who considered STRs to be a trade between a non-professional host and a guest on a digital platform for short-

term accommodation. However, the main players in this global business (Hajibaba & Dolnicar, 2018), Airbnb, Homeaway, and Booking.com, are used not only by non-professional hosts, but by thousands of host companies who are now engaged in tourist rentals due to the high returns on investment.

On the other hand, we also took into account the tourism legislation in force in Andalusia, which defines STRs (Spanish: viviendas de alquiler turístico) as "properties located on land for residential use that offer paid accommodation services on a regular basis and for tourism purposes in Andalusia. It is assumed that they are regular services and that they have a tourist purpose when the home is rented or promoted over tourism distribution channels. Travel agencies, companies that mediate or organize tourist services, and channels that include the possibility of booking accommodation shall be considered to be tourism distribution channels." (Junta de Andalucía, 2016).

The role played by the main agents involved in the global supply of STRs, their regulation in Spain, and the fact that most of them are actually customary for-profit businesses led us to position this study outside the scope of the collaborative economy and within the PE.

Short-term rental homes: spatial distribution and main conflicts in the destinations

Short-term rental homes are not a new phenomenon. They have formed part of tourism development in peripheral areas in places such as Brighton (UK) (Gormsen, 1997) and Menorca (Spain) (Yrigoy, 2017), but access to them was not as easy as it is today (Dolnicar, 2017). In Spain, STRs have been a traditional holiday choice since the 1960s. Fifteen years ago, holiday rentals were used by 19.4% of tourists and 28.3% of overnight stays were in STRs (EXCELTUR, 2015). In relation to coastal areas, digital platforms have simply become a more effective way of marketing accommodation that

already had tourist use, but in doing so the tourist offer has gained greater visibility (Romero et al., 2019), which has dramatically changed the urban landscape in relation to the aforementioned conflicts (Del Romero, 2018). The exponential increase in holiday housing has taken place so quickly that there has been insufficient time to update and adapt urban planning regulations or to conduct studies to assess in detail its effect on cities (Bakker and Twining-Ward, 2018).

The main effects of Airbnb on overtourism are associated with the uncontrolled spatial distribution of housing within destinations, uncontrolled growth, and unfair competition (Peeters et al., 2018). The effect of the increased intensity of economic activity on housing could lead to changes in real-estate markets (Dolnicar, 2020) and negative impacts on the well-being of residents (Macías, Del Espino, & Pérez, 2020; Oskam & Boswijk, 2016). Other studies have identified the emergence of the PE as a key element in the rise of overtourism (Del Romero, 2018), because it has a critical impact on housing, liveability, and the workplace (Exceltur, 2015; Gravari & Jacquot, 2016; Martín & Fernández, 2018; Milano, 2018; Romero et al., 2019). Faced with negative externalities, such as noise or the perceived risk of strangers accessing their residential buildings, neighbourhood movements have tried to stop the growth of tourism and STRs in Lisbon, Mallorca, Marta, Venice, Amsterdam, Barcelona, Berlin, New York, and Paris, whose local governments have strengthened their regulations on digital platforms (Cocola-Gant et al., 2020; Frenken & Schor, 2017). These facts and the need to explore the effects that tourism has on cities to understand the growing community opposition to tourism, appear to explain the growing interest in identifying city areas that have undergone greater tourist pressure, increased "touristification", and its negative repercussions on the city and its residents (Boros et al., 2018; Cocola-Gant et al., 2020; Rescalvo, 2019).

The relationship between tourist safety and Airbnb has recently captured the attention of media and researchers, generating a wide-ranging debate on whether Airbnb has become a risk factor for tourists (Xu, Kim, & Pennington-Gray, 2017). In fact, some researchers have compared Airbnb and traditional accommodation in relation to the perceived safety of tourists (Wu & Cheng, 2019).

As Frenken & Schor (2017) suggested, for theoretical and empirical reasons, the impact of the digital platform revolution in cities will not be clearly mapped for a long time. A key factor in assessing its impact would be to obtain access to data owned by digital platforms, which are restrictive and selective regarding access to researchers. Similarly, Martínez, Murray, & Blázquez (2020) have suggested that any such analysis depends on the information provided by the companies, which monopolise and control the data, and that this lack of information hinders the implementation of regulations and the assessment of public policies. This fact is also problematic because it concerns the measure of consumption of STRs and it may contain a bias as Airbnb does not disclose information on the length of stays nor the number of visitors (Benítez-Aurioles, 2017).

A recent study on the spatial distribution of Airbnb in Spain (Adamiak et al., 2019) suggested that STRs follow the general population distribution and hotel supply patterns, which does not contribute to reducing the concentration of local-scale tourist activity in urban areas. In fact, in high tourist demand areas, STRs may contribute to a greater concentration of tourist accommodation due to their high profitability to investors. This aspect has been demonstrated in Madrid, Barcelona (Benítez-Aurioles, 2017), Valencia (Spain), where the returns to tourist rental can be up to 500% higher than residential rentals in the real-estate market (Del Romero, 2018) and in New York, (Wachsmuth & Weisler, 2018).

Other authors (Gutiérrez et al., 2017; Gyódi, 2019; Quaglieri-Domínguez & Sans, 2016; Schäfer & Braun, 2016) have reported that Airbnb accommodation in cities such as Barcelona, Berlin, Warsaw, and Paris shows a centre-periphery distribution pattern and is concentrated in areas with high hotel densities, which may contribute to increasing the intensity of tourist pressure in urban centres. Martínez-Caldentey et al. (2020) analysed the distribution of Airbnb STRs in Madrid using Moran's I analysis and Optimized Hot Spot Analysis to identify significant hot spots. They confirmed that there was a strongly concentrated distribution of clusters in which the main touristic sights were located in areas with an infrastructure that offered quick access to such points of interest. Other studies have reported similar findings in other cities, such as Seville (Macías et al., 2020), Menorca (Yrigoy, 2017), Hamburg (Brauckmann, 2017), Budapest (Boros et al., 2018), Valencia (del Romero, 2018) and Utrecht (Ioannides et al., 2019). Thus, associations have been found between accommodation location and places visited by tourists (Gutiérrez et al., 2017) and between the location of tourist activities and tourist rental housing (Macías et al., 2020). Distance to historic city centres has been found to be a negative determinant of demand (Gunter & Önder, 2018) and it has been empirically proved in the cities of Barcelona and Madrid by Benítez-Aurioles (2017).

According to Postma & Schmuecker (2017), the agglomeration of tourists and tourist activity in space and time has been identified as one of the two core reasons for local populations to reject tourists. However, they pointed out that there is a lack of indicators and comparable metrics to systematically analyse this area of conflict. Given the foregoing aspects, the scarcity of studies on STRs in cities other than major cities, and the predominance of research on Airbnb, the present article attempts to fill this

knowledge gap by providing an in-depth analysis of the spatial distribution of STRs in several Andalusian cities using official data from the Andalusian regional government.

Methodology

In 2019, the four cities together received more than 7 million travellers (Spanish National Institute of Statistics, 2019). Table 1 illustrates the importance of tourism in the region of Andalusia, which produced a 12.6% in terms of gross domestic product (Consejería de Turismo, Regeneración, Justicia y Administración Local, 2018).

International tourism is higher in Malaga and Seville (the capital of Andalusia), where international airports are located. France and Italy are the main source markets for Cordova, Granada and Seville, while United Kingdom is for Malaga. China and the USA are the most relevant long-haul markets for Seville, Cordova and Granada.

The four cities were chosen because of their international relevance as cultural destinations. Malaga was also chosen on the basis of its being coastal tourism destination. Cultural is the predominant form of tourism but this vary among cities. While Cordova, Granada and Seville count with World Heritage Sites which are their most important tourist attractions since the last century, Malaga has become a cultural destination in the recent decades, based on the opening of more than 30 museums and urban renewal policies.

Table 1. Characteristics of analysed cities.

	CORDOVA	**GRANADA**	**MALAGA**	**SEVILLE**
Area (km^2)	**1253.9**	88.1	394.9	141.6
Population (2019)	325701	232462	574654	**688592**

Population density (persons/km2)	259.75	2638.62	1455.19	**4862.94**
Total number of homes (Spanish Cadastre 2019)	147096	136187	246896	**317673**
Visitors (2019)	970986	2001461	1413227	**2811352**
Foreign visitors (2019)	46.3%	55%	**61.8%**	58%
TA overnight stays (2019)	1627798	3596952	2785309	**5839752**
TA occupancy rate per bed (2019)	61.8%	64%	65%	**69.1%**
Average stay (2019)	1.69	1.8	1.97	**2.1**
No. of workers (annual average)	931	1754	1600	**3718**

Source: Own work based on data from INE (2019).

It should be noted that in the past these cities have not experienced high social conflict due to tourist activity. However, Seville and Malaga are beginning to experience neighbourhood protests and some social tension in areas of high tourist concentration (Macías et al., 2020; Romero et al., 2019). The main focus of tension is due to massive existence of STRs in residential areas.

This study was conducted in four stages:

Stage 1: data collection

Unlike most studies on this topic, the present study used official data on holiday rental homes rather than data from digital platforms. In Andalusia, all companies and individuals owning STRs have to register themselves in the Andalusian Tourism Registry. This registry is public and can be consulted by any citizen. Consequently, the data are not limited to a specific digital platform. This enriches the analysis because it reduces data bias due to the predominance of a given tourist profile depending on the platform. For example, foreign tourists seeking urban destinations often use Airbnb (Adamiak et al., 2019), whereas domestic Spanish tourists or other segments may use other platforms, such as HomeAway, Rentalia, Spain-Holiday.com, and Niumba. The use of data from official sources also avoids the bias derived from the use of secondary sources, such as AirDNA, Arbnb Inside, Datahippo, or data collection using scraping techniques. The latter approach may underestimate the number of tourist homes by omitting them (Adamiak et al., 2019) or by duplicating them if there is more than one on the platform for the same home or it is marketed by more than one platform. In summary, the use of official data ensures that there is no duplicated data, each datum is real and updated, and its geolocation is accurate.

The Andalusian Tourism Registry was used to obtain data on the global volume of tourist accommodation (i.e. STRs, hotels, etc), the number of bed-places, and the Universal Transverse Mercator coordinates for georeference). The Spanish Cadastre, the Andalusian Institute of Statistics and Cartography, and the Spanish National Institute of Statistics were also accessed to obtain official information on census sections, such as the number of houses, surface area and resident population in each census tract. A census tract is defined as a geographic region smaller than the municipality and is used

in the present study for statistical purposes as the basic unit of spatial analysis. All data refer to 2019, except for the population data, which refer to 2018.

Stage 2: creation of indicators

In line with the proposals of McKinsey & WTTC (2017), Yrigoy (2017), Adamiak (2018) and Ioannides et al., (2019), the information collected was used to create density and intensity indicators for each census tract.

Indicator 1. TA density (without including STR) = Number of bed-places in TA ÷ Surface Area (ha).

Indicator 2. STR density = Number of bed-places in STR ÷ Surface area (ha).

Indicator 3. TA intensity = Number of bed-places in TA ÷ Population (ha) · 100 inhabitants.

Indicator 4. STR Intensity = Number of bed-places in STR ÷ Population · 100 inhabitants.

Indicator 5. STR percentage = (Number of STRs ÷ Total number of homes) · 100.

Tourist density was calculated by dividing the number of bed-places available in the area by the surface area of each census tract. Tourism intensity was defined as the pressure on the resident population and was calculated by dividing the number of bed-places available in the area by the number of residents in each census tract. The prevalence of STRs was measured according to the registered proportion of STRs in the total number of homes in each census tract.

Stage 3: creation of maps

The indicators were then entered into a geographic information system (GIS) using information layers. Thematic choropleth maps were created in ArcGIS 10.3 to visually represent the spatial distribution of tourist density and intensity in the four cities. A GIS was chosen because these systems provide a set of techniques and technologies that can be applied to tourism planning and management (Bahaire & Elliott-White, 1999). A GIS can be used to explore conflicts, the spatial visualization of tourism resources, and the measurement and assessment of actual and potential tourism impacts through the creation of different scenarios (Farsari & Prastacos, 2004).

Stage 4: scenario creation

The objective of stage 4 was to create a scenario showing future STR expansion areas. The maps show the potential for growth in different areas based on the concentration of houses that could be converted into STRs. The territorial unit was the census tract and the scenario was based on the two following criteria:

- Criterion 1: Proximity to sightseeing and attractive spots (i.e., historic centres and/or beaches), defined as areas within a walking distance of less than 20 minutes from the city centre and less than 10 minutes to the beach in the coastal cities (isochrones were calculated from an average pedestrian speed of 4 km/h). The areas of influence were calculated via network analysis (using the Service Area tool in ArcGIS 10.3), a geographical analysis technique that can be used to measure area accessibility, like in the case of Wolff (2021), or to valuate evacuation facilities and areas in a city (Reuben & Lowry, 2016). These areas of influence were calculated taking into account different points in each area (from the historic centre and from the beach).

- Criterion 2: Concentration of residential homes likely to become STRs. This figure was calculated as the number of residential homes minus the number of STRs divided by the area of the census tract.

Results

Table 2 shows the global data for each city, and the highest values (in bold) for each indicator.

Table 2. Available tourist accommodation and maximum values of density and intensity in each city (2019).

	CORDOVA	**GRANADA**	**MALAGA**	**SEVILLE**
Total number of STRs	1369	1901	**5530**	4963
Total number of bed-places in STRs	6697	9541	**28258**	23623
Volume of bed-places in STRs in the city centre	12.1%	34.5%	16.4%	**57.7%**
Cumulative annual variation rate of bed-places in STRs (2016-2019)	46.5%	37.2%	**46.7%**	42%
Total number of TA establishments	138	281	333	**420**
Total number of bed-places in TA	8057	18155	17087	**28087**

Volume of bed-places in TA in the city centre	34.9%	28%	40.8%	**52.1%**
Cumulative annual variation rate of bed-places in TA (2016-2019)	-0.1%	2.3%	**2.6%**	1.4%
Volume of illegal STRs (2019)	22%	**35%**	25%	28%
TOURIST ACCOMODATION DENSITY AND INTENSITY INDICATORS (maximum global values by city)				
Indicator 1. TA density (ha)	58	**170**	141	128
Indicator 2. STR density (ha)	44	77	**327**	137
Indicator 3. Intensity of TA per 100 inhabitants	99	134	**217**	124
Indicator 4. Intensity of STRs per 100 inhabitants	37	64	**161**	74
Indicator 5. Percentage of tourist use in the total number of homes	(92/706) 13%	(124/586) 21%	**(321/859) 37%**	(123/558) 22%

Source: Own work

A skyrocketing growth over the last years (over 250%) can be observed in the SRTs supply in the four cities, being more intense in the cases of Malaga and Cordova. By contrast, the TA had a lesser evolution and even a decrease was registered in Cordova.

The volume of illegal STRs was calculated comparing the total number of bed-places (August 2019) from the tourism registry with scraped data of AirDNA. The results seem to indicate there could be a sizeable part, over 20% in most of cities and 30% in Granada, in the shadow economy.

Although the global data presented in Table 2 are indicative of the relevance of the study, the use of maps to spatially represent the indicators provides even greater insight into the data and facilitates a deeper analysis of the results. Malaga has the highest densities and intensities: STR density =327 STR/ha, TA intensity = 217 bed-places/100 inhab, and STR intensity = 161 bed-places /100 inhab. It also has the highest percentage of STRs in relation to total housing (37%).

Seville has the highest number of TA bed-places, followed by Granada, Malaga, and Cordova. Granada has the highest TA density outside the historic centre (in Camino de Ronda: 170 bed-places/ha), followed by Malaga and Seville (141 and 128 bed-places/ha outside the historic centre, respectively).

Map 1 shows that historic centres have the highest TA intensity (approximately one bed-place per inhabitant, except in Malaga, where the value is double). In any case, TA goes beyond the limits of the historic centre in the four cities and spreads toward areas with good road links, railway stations, the vicinity of airports, and industrial estates.

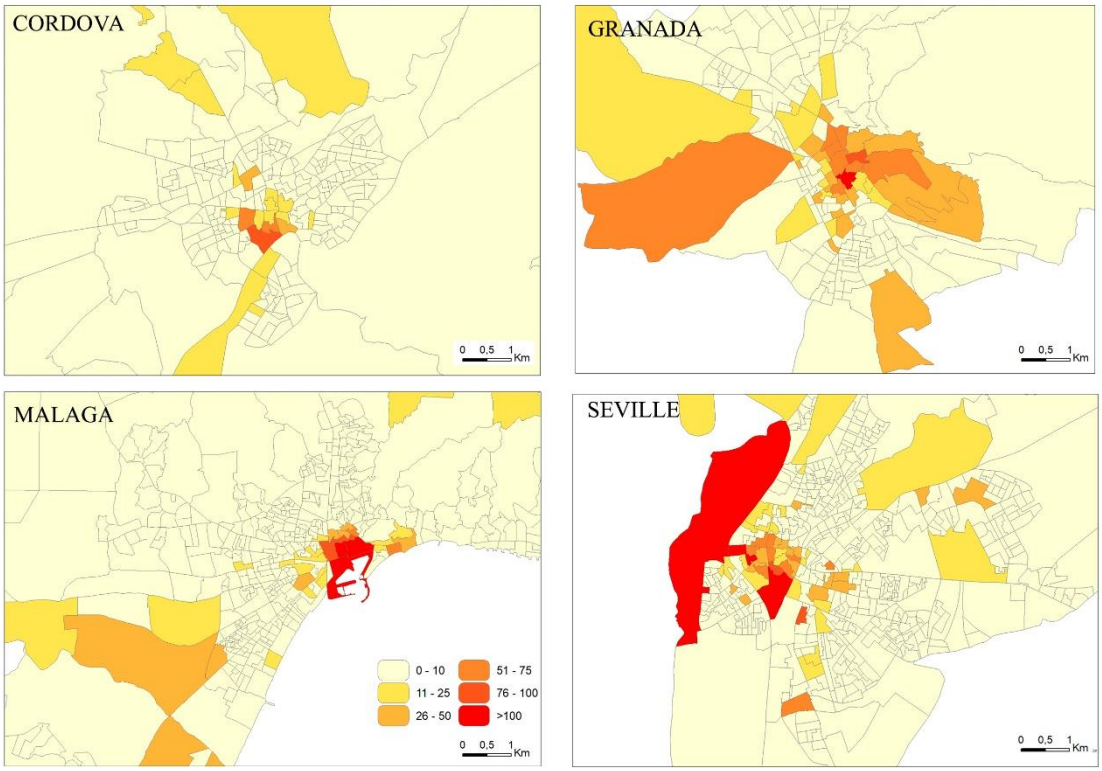
Map 2 presents the intensity levels of STRs. In six areas of Malaga's historic centre, the number of STR bed-places exceeds the number of residents, and this could be a source

of conflict. Malaga is followed in STR intensity by the area of Santa Cruz in the historic centre of Seville (74 STR bed-places/100 inhabitants) and Albaycín in Granada (64 STR bed-places/100 inhabitants). It should be noted that these values are much lower than those of Malaga. The historic centre of Seville has over 10400 STR bed-places, representing 57.7% of the total STR bed-places in the city. This percentage reaches 34.5% in Granada, 12.1% in Cordova, and 16.4% in Malaga.

Map 3 shows the percentage of STRs in relation to the total number of homes in each area. In the El Ejido and Plaza Merced neighbourhoods in Malaga, 37% of the total number of homes are STRs, which is almost double the values reported for the other three cities. Similar to the pattern of STR intensity, the greatest percentage of STR homes in relation to total homes are found in historic centres and surrounding areas.

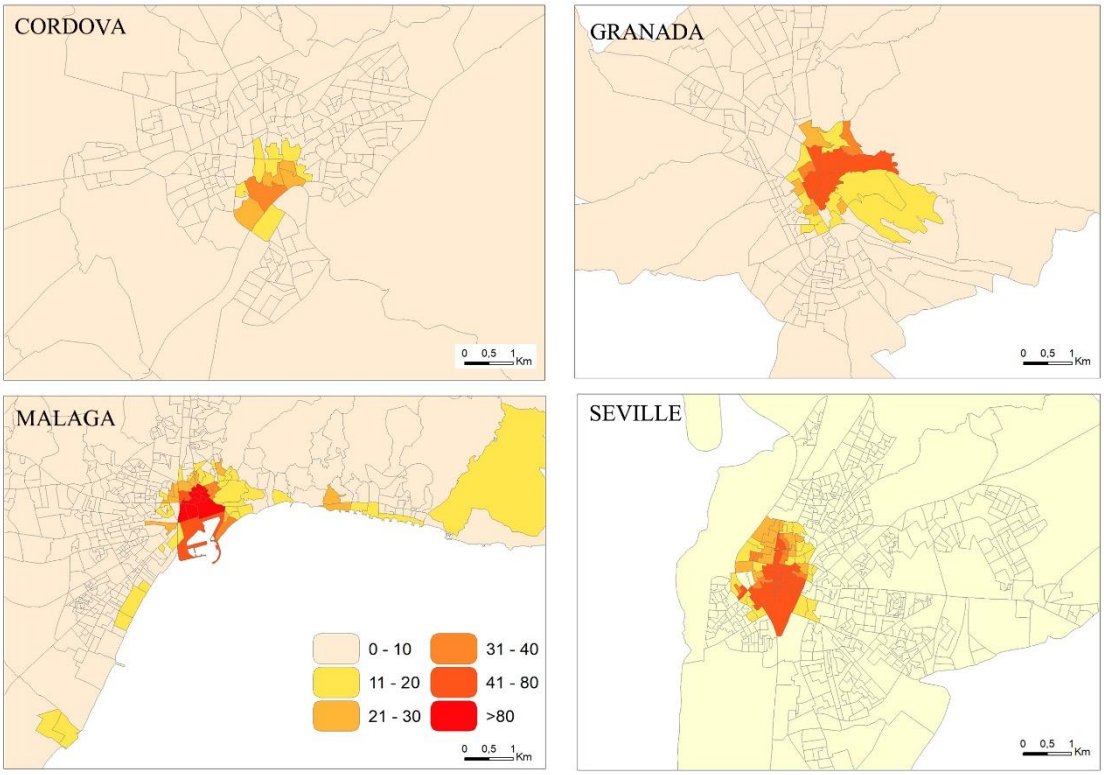
Maps 1, 2, and 3 not only show the increase in tourist accommodation in the historic centres, but also indicate the scarcity of residential populations in these areas (i.e., less than 1% in Córdoba, Malaga, and Granada, and 8.4% in Seville). In fact, since the 1990s, the number of residents in the historic centre of Malaga has decreased by more than 28% (Marín et al., 2017). These results are in line with reports about the slow process of depopulation in European historic centres as a whole (Escudero, Ruiz-Apilánez, & Solís 2019).

***Map 1**. Traditional accommodation intensity (bed-places per 100 inhabitants).*



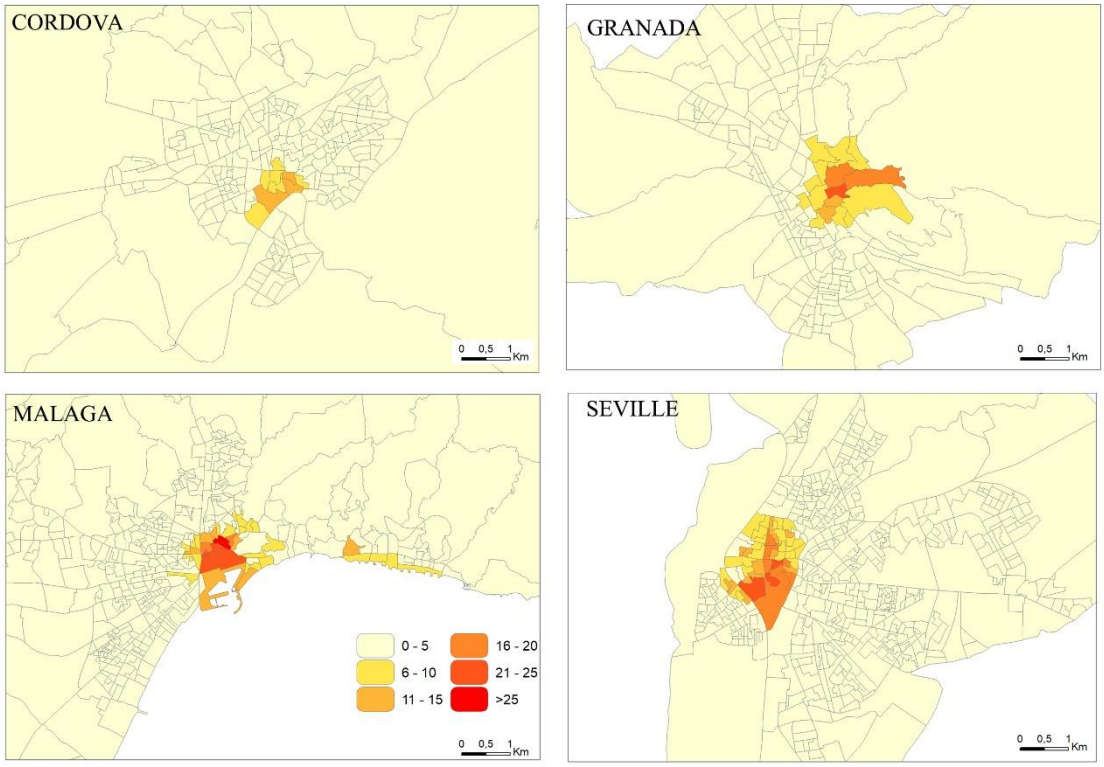
Source: Own work

Map 2. *Short-term rental intensity (bed-places per 100 inhabitants).*



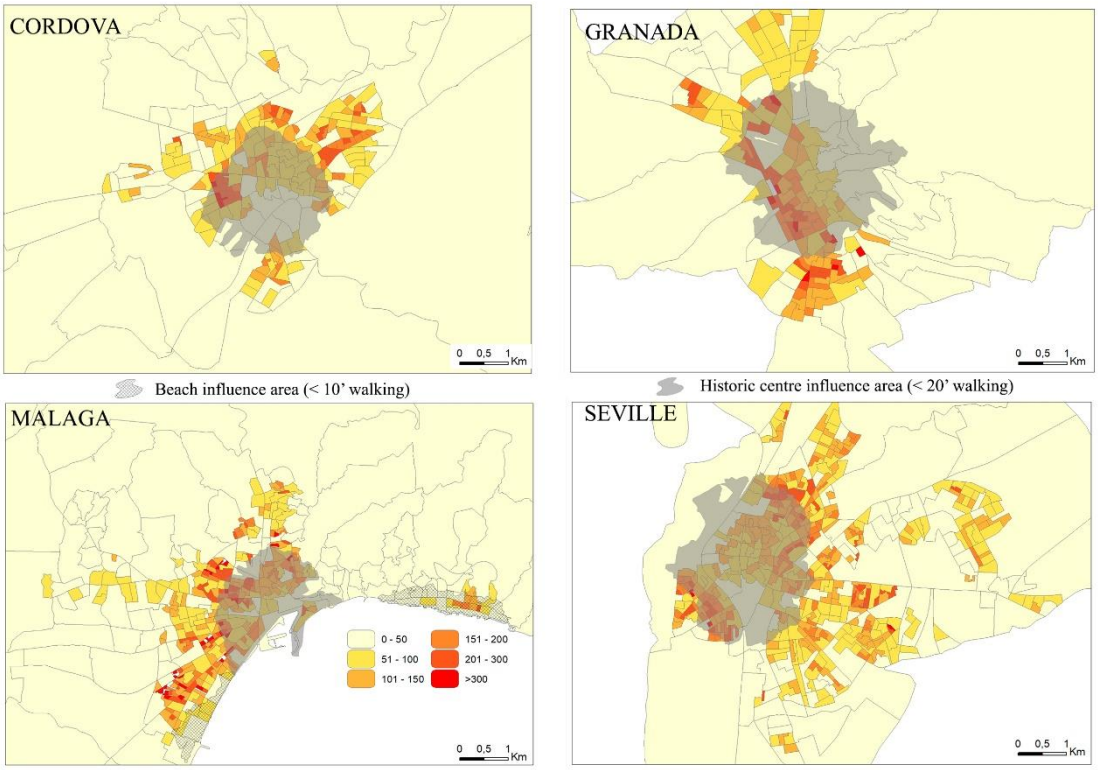
Source: Own work

Map 3. *Percentage of short-term rentals in total number of homes (%) by study unit areas (census tracts)*



Source: Own work

Map 4. *Potential areas of short-term rental expansion: (total number of homes - number of short-term rentals)/surface area (ha).*



Source: own work

The most likely areas for the future expansion of STRs were estimated by taking into account the availability of housing with the potential to become STRs. Given that efficient tourism planning requires comprehensive knowledge of the areas and conditions, these scenarios may help to design policies that avoid the negative effects of STR concentrations. As a coastal city, there are two areas of influence in Malaga. The first one covers the historic centre (i.e. Perchel, Trinidad, Victoria, and Cruz de Humilladero) and the second one covers the western coastline area (i.e. Carretera de Cádiz) connected by subway to the centre. Although Granada, Cordova, and Seville have larger historic centres, the pattern is similar to that in Malaga. Future STRs are likely to grow in unoccupied plots within the historic centres and then spread toward

areas near the area of influence of the historic centres. In Cordova, the northeast area of the city (i.e. the neighbourhoods of Viñuela-Rescate, Valdeolleros, Santa Rosa, and Las Margaritas), and especially Ciudad Jardín in the western area of the city, were identified as future STR expansion areas. In Granada, the western area (i.e. neighbourhoods of Figares, Centro-Sagrario, and Plaza de Toros-Doctor de San Lázaro) would be a direct area of influence of the historic centre, and Zaidín-Vergeles, located in the southern part of the city, could also expand due to good transport links with the centre. Beyond the historic centre of Seville, it is predicted that there will be STR expansion in the south-western areas (i.e. the neighbourhoods of Los Remedios and Triana) and the north-eastern areas such as San Pablo and Nervión, due to the public transport connections to the urban centre and their new commercial and residential centrality.

Discussion

A period of undisrupted growth of STRs was observed in the four cities. Needless to say, this is not a local phenomenon and the scale of the development in the tourism economy have deeply affected European historic cities, in their majority capital cities supplemented by clusters of medium-sized cities located in Western Europe (Bugalski, 2020).

The estimations about illegal STRs suggested that a sizeable part of this phenomenon may be in the shadow economy. However, the same estimations where calculated in 2021 and the number of STRs listed in the official registry were higher than in AirDNA, so no shadow economy seem to be detected in the present. In this context, we assume the volume of STRs in the shadow economy is dynamic and very sensitive to economic, social changes and regulations what makes STRs varies over time.

Tourist occupation is at its highest in town centres and their areas of influence because these areas command the most tourist resources and activities and the best roads and transport links (Arbel & Pizzam, 1977, cited in Gutiérrez et al., 2017). Our results show that the highest intensity and density levels are located in the historic centres of Granada, Seville and Malaga. Malaga also has high intensity and density in the seafront areas. These results corroborate touristification in the centre of the four cities but stronger in Seville and Granada. All these areas have been subjected at the end of the 1990s and beginning of 2000s to urban renewals, a factor that has been demonstrated to accelerate the increase of the supply of STRs in Valencia (García-Amaya et al., 2021). Macías et al. (2020) and Cocola-Gant et al (2020) reported tourist concentrations in the historic centre of Seville too.

The spatial maps show that the TA intensity and density patterns differ from those of STRs, and that peripheral areas are more often spread into by hotels than by STRs. This could be explained according to Gutiérrez et al. (2017) because the prices of urban plots were lower than those in the centre and because of other factors, such as the presence of commercial areas and good transport and road links. This differential pattern of spatial distribution between TA and STRs has been reported in other European cities and it can be explained in Spain by its complex legal framework, conditioned by the existence of different entities with competences to regulate tourism, a cross-cutting activity with a significant impact an integrated with other sectors (del Busto et al., 2019).

TA businesses are subject to urban planning regulations that govern land use for tourism purposes according to a city strategy. Urban plans in Spain are usually valid for 8 years and its modification can take several years. Therefore, the provision of land for hotel use is not exclusively based on criteria of tourist interest and it can take into account the need to provide a public service. For instance, some hotel land allocations in the four

cities were established where accommodation needs had been foreseen in urban planning in connection with infrastructures such as hospitals, technology parks or transportation activities.

Compared to TA, STRs in the Andalusian cities are not covered by urban planning regulations and the tourism legislation in force enables a quick start-up for this type of accommodation. The difference in the growth of both types of accommodation observed in table 2, as García-Amaya et al. (2021) already noted, is due to the difficulty to regulate and control STRs, contrasting the rigidity of the regulations, the urban planning limitations and the slowness of the processes for obtaining construction permits for hotels. A consequence of this, there are higher densities, intensities, and percentages of STRs in historic centres than in other areas, an aspect that may entail a greater risk of conflict between the needs of tourism and those of residents.

In fiscal and legal terms, TA has to comply with many requirements regarding taxes and infrastructure requirements, whereas legislation on STRs is more lax and less well-defined (Bakker & Twining-Ward, 2018; Boros et al., 2018; Brauckmann, 2017; Stors & Kagermeier, 2018). This means that STRs have an unfair advantage over TA and partly accounts for the recent spontaneous growth of STRs. These conditions explain why STRs are much more concentrated in urban centres, whereas TA also spreads toward other city areas, such as those near transport links and industrial estates.

Economic and cultural factors also account for the concentration and rapid growth of STRs in historic city centres. For example, the returns to STRs are greater than returns to residential rentals (del Romero, 2018), which encourages the growth of STRs in existing hot spots in cities (Adamkiak et al., 2019). Likewise, there are marked differences between the start-up costs of STRs and TA: for example, the start-up costs of hotels are far higher than those of STRs. Cultural factors also contribute to the

collective belief that historic centres are the "essence" of cities: that is, they are urban heritage sites that are “staged” as cultural landscapes that every tourist should visit (Martínez-Caldentey et al., 2020).

Tourist destinations are unique spaces of great complexity that host a variety of settings and situations. Nevertheless, the results show that the four cities share some common features in the spatial distribution of homes for tourist use. The total volume of STRs is much higher in Malaga and Seville than in Cordova and Granada, with figures comparable to destinations such as Madrid, Barcelona, or Lisbon, where digital platforms for STRs have led to a new burst of tourist gentrification (Cocola-Gant et al., 2020; Yrigoy, 2017). The loss of local populations from some areas because of the rise of STRs has stimulated the emergence of citizen movements in Malaga and Seville that are protesting against the damage caused by touristification to their cities (Rescalvo, 2019; Romero et al., 2019). Although Cordova has yet to show symptoms of high tourist intensity or density that could lead to anti-tourism social movements, Granada is now showing worrying intensity and density indicators that in some cases even surpass those of Seville. Digital platforms take the line that STRs expand tourist activity into peripheral areas (Adamiak et al., 2019) and into areas with little TA. However, this pattern was completely absent in the cities analysed: in fact, we found that STRs are in competition with the traditional hospitality sector and that they increase tourist pressure in the historic area.

The location of STRs is similar in the four cities studied: there is a high concentration of STRs in the historic centres and they are expanding into neighbouring areas. Malaga has the added factor of many STRs being located in areas near the beach. This aspect has also been observed in other Spanish coastal cities, such as Marbella (Romero et al., 2019) and Menorca (Yrigoy, 2017), Valencia (Temes et al., 2016), Las Palmas de Gran

Canaria, Alicante and San Sebastián (EXCELTUR, 2015). In coastal cities, tourism in historical centres exists alongside sun and beach tourism, which leads to a dual distribution pattern of STRs.

The results obtained from the spatial analysis of STRs are very similar to those described in the literature, which suggests that the radius of action of tourist activity is mainly restricted to the boundaries of historic city centres. The urban city centres analysed have many cultural sights and high tourist specialization catered to by nightlife venues and commercial areas, which are where most of the STRs are located. In this sense, they follow the patterns reported in Madrid (Benítez-Aurioles, 2017; Martínez-Caldentey et al., 2020), Barcelona (Benítez-Aurioles, 2017; Sans and Quaglieri, 2016), Berlin (Schafer and Braun, 2016), Budapest (Boros et al.), Seville (Macías et al., 2020), Menorca (Yrigoy, 2017), Hamburg (Brauckmann, 2017), Valencia (García-Amaya et al., 2021; del Romero, 2018) and Utrecht (Ioannides et al., 2019). Previous comparative studies on other cities have reported similar results and have described STR distribution patterns that spread around historic centres (centre-periphery) and main tourist hot spots (Adamiak, 2019; Gyodi, 2019; Gutierrez et al., 2017). In light of the previous results, rather than contributing to reducing already overcrowded tourism in the four cities, STRs are in fact having the opposite effect and to some extend it could be explained by the fact that STRSs' prices fall per kilometre away from the city centre

Conclusions

The indicators used in this study show that the spatial distribution patterns of STRs and TA in Granada, Cordova, Seville, and Malaga are very similar to each other and to those of other European cities. Previous authors have reached similar conclusions using other

scales and different methods and data sources to study other cities. They have reported tourist concentrations in the historic centres, where tourism puts pressure on resources and leads to social conflict with residents. The growth is confirmed to be radial, starting from a hyper centre and moving throughout the territory.

This study provides an explanation for the differences between the spatial distribution of TA and STRs due to the aforementioned complex legal framework. It also corroborates differences between coastal and inland cities, in that Malaga also has greater STR intensity and density in areas near the beach.

This study also identifies possible areas in the four cities into which STRs could expand. The results obtained from the exploratory network analysis are compatible with the framework of reference, especially when the high flexibility of STRs allows for greater proximity to touristic attractions and there is evidence of the role of distance as a variable that condition the spatial distribution of the STRs within a city (Benítez-Auriolez, 2017).

The rapid adoption of the new European planning regulations due the effect of digital platforms on the growth of STRs is leading to an exponential changeover of residential homes into STRs. This is having unforeseen effects on the cities, their residents, and TA. Initially, STRs in Spain began to operate without complying with current regulations and without requiring an opening business license or authorization for a change of use. However, changing the use of residential housing to STRs has repercussions on other urban uses, such as the provision of services and equipment.

Although this study addressed some of the limitations of previous studies, it also has some limitations that should be taken into account in future lines of research. The exclusive use of official data means that illegal STRs were excluded and this could

mean that a part of the phenomenon would not be reflected in the findings. This tell us that PE transparency about operated properties and about visitors is essential to tackle this phenomenon with precision and prevent undesirable effects. While this occurs, researcher should focus on methods to obtain quality data without bias.

The analysis was restricted to specific dates, but given the rapid evolution of STRs, time series and longitudinal studies would be needed to capture the reality in greater depth. As in previous studies, the analysis was restricted to STR supply data. Thus, a future line of research would be to obtain and use reliable data on STR demand and occupancy in order to know their real use.

It is essential to continue investigating this phenomenon. Despite the COVID-19 health crisis, official data from the Andalusian Tourism Registry indicate that the number of STR bed-places continued to increase in 2020. This increase was particularly marked in Seville and Malaga, which are the cities with the highest volume of STRs in Andalusia (8.6% in Cordova, 11.1% in Granada, 13.1%, in Malaga, and 26.7% in Seville). In contrast, according to AirDNA data, the STR offer decreased in all four cities (i.e., -9.8% in Malaga, -10.1% in Seville, -15.5% in Cordova, and -17.7% in Granada). Data sources would need to be compared in order to know exactly how many STRs recorded in the official tourism registry are offered on digital platforms. It would also be useful to conduct an analysis to identify STR owners and the reasons that motivate them to offer these properties. Such an analysis could shed some light on the increase of STRs in the Andalusian tourism registry during the pandemia.

A new line of research would be to develop an explanatory model of future STRs expansion, based in multicriteria like prices, occupancy rates, distance, transport network and others aspects suggested by the theorized framework of reference.

Finally, one of the main hindrances to the study of "Airbnbification" is that most studies are principally quantitative or principally qualitative (Martínez-Caldentey et al., 2020). Thus, we suggest that future studies on STRs should use more eclectic approaches to gain further insights into the phenomenon.

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