The pressure of tourism on the Mediterranean coastline and beaches

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Highlights

Sandy beaches are the essential productive factor of Mediterranean tourism.

The demand for complementary amenities and services means that destinations are densely built-up areas.

A small beach can only support a small, specialized resort.

The view of the sea exerts an irresistible attraction for the tourist.

Abstract

Mediterranean tourism is usually defined as "3S tourism" – the three S's standing for sea, sand, and sun. The term highlights the central importance of these three physical factors in the attraction exerted by the shores of Mare Nostrum. In this paper we set out to quantify the impact of the first two of the S's – sea and sand. In our analysis, sandy beaches emerge as the basic production factor sustaining the tourism business, followed by the coast and the view of the sea. So great is the importance of the sea and the sand as specialized production factors that they actually dictate the spatial morphology of the tourist destinations. The coastline has become an indispensable prerequisite for attracting tourists, and proximity to it determines the quality and price of the various kinds of tourist accommodation.

We also show that Mediterranean tourism is essentially an urban phenomenon. Most tourists expect a wide diversity of complementary amenities close to their accommodation; this means that the resorts must be large, dense urbanized areas.

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1.   Introduction

"Like other economic and social activities, tourism does not occur evenly or randomly in space. A first and basic concern of the geographer is an examination of the areal occurrence of tourism at various scales: global, national, regional, or local." (Pearce, 1979, p. 249)

However, the motives of tourists range widely. People travel to tourist destinations to attend social or family events, to see new places or to take a break from daily duties and occupations. It is the last of these motives – getting away from it all – that drives the inhabitants of northern Europe towards the southern coasts:

"Mediterranean beach resorts appear as appropriate places for doing nothing in particular – without a bad conscience" (Jacobsen et al 2014; Pons, 2009).

So we find an array of types of tourism, determined by the geographical scale on the one hand and by the motivations of the tourists on the other. In this article we examine sun, sand and sea tourism at the local level, using a purely spatial approach. We aim to identify the key geographic variables that characterize this tourism model and its patterns of occupation of the coastline areas. We assess the extent of the appropriation of coastlines and beaches by the tourism industry, and then, in turn, the extent of the industry's dependence on these physical assets. As our target population, we will use just over a hundred resorts located in the Balearic Islands, one of the Mediterranean's leading tourism destinations.

A tourist resort is a complex geographical entity which offers a diverse mix of products and services under a single name (Leiper, 1995)); an amalgam of individual products and services (Gibson 2009). These amenities and services are provided in the

same place as they are produced; the offer may be monopolized by a single company, in which case it takes the form of a tourist enclave, or, as in the case of in the Balearic Islands, it may be managed by dozens or hundreds of companies. In a tourist destination of this kind, the territory is home to a multitude of companies offering very similar products in a limited physical space characterized by horizontal (Dicken & Malmberg, 2001) and diagonal competitive relationships between firms working in symbiosis and offering complementary products (Michael, 2003).

In the destinations we will look at we do not find the typical vertical hierarchical relations of production schemes dominated by phase subcontracting (Becattini, 2004; Brusco, 1982). These vertical supplier-customer relationships are an intrinsic part of the Balearic tourism model of the industrial district in the island and archipelago (Cirer, 2014; Rivas, 2012), but they do not exist at local level: the suppliers of the hotels, restaurants, and shops are located in industrial estates inland, not in the tourist areas.

In this paper we will focus on this local level, on the tourist resorts. Our analysis will be sequential. First, we physically define the areas of interest to us, quantifying the space they occupy and determining their impact on the island coastlines. We will explore a number of questions: "What proportion of the island's coastal areas is effectively urbanized? Is tourism a major contributor to the urban development, or are there other economic factors to consider? What features characterize the areas humanized by tourism, and what is their relationship with the sea and the beach?

Second, we classify the 117 resorts of interest and consider their function in the tourism industry and their dimensions. We find that the offer of holiday tourism in the Balearic Islands is much more varied than it might seem at first glance, and that its spatial distribution presents very specific patterns.

Third, we focus our attention on the largest tourism cluster in the Balearics, the south of the Bay of Palma. We assess the spatial distribution of different types of businesses within a specific resort, and analyse how this distribution is affected by distance from the beach and the coastline.

With this information at hand, we will be able to address the main aim of this paper: an assessment of the importance of the beach and the coastline to Mediterranean mass tourism, and of its effect on the occupation of land by tourist urban development.

2. Data acquisition and processing

For this study we used a very wide range of geographical, demographic and commercial data. The main instrument for acquiring geographical data was the *Google Earth* program, which we used to display the entire coastline of the Balearic Islands and all the developed areas located next to the sea. As a result of this search nearly 150 areas were identified, of which 117 (the ones occupying an area of more than ten hectares) were eventually included in the study. After locating the areas of interest, photographs of the areas were obtained using the *Google Satellite Maps Downloader*. With the height of the virtual eye at 975 m, these photographs generated an approximate scale of 1: 7,700, accurate enough to detect all the buildings, roads, parking lots, and so on. The photographs were treated to enhance the colour of the most important elements such as the swimming pools, using the *Irfanview* program. The nautical charts of the Balearic coast were a second source of mapping data. We used the analogical maps of the Spanish Navy's Hydrographical Institute and the digital ones produced by *Nautical Publications GmbH*. The geographic data were managed using the *OziExplorer* program and for the statistical analysis the *Addinsoft Xlstat* program was used.

After obtaining each photograph we defined the space occupied by buildings, gardens, streets, and so on, starting from the coastline in all cases. We only included urbanized areas directly connected with the coastline and omitted buildings which, although situated near the sea, were used for agricultural or industrial purposes and did not have direct access to the coastal area. In general, the purpose of the types of buildings was clear, but in case of doubt the *Street View* function in *Google Maps* was used to take a closer look and to classify each building accurately. Empty areas and unfinished buildings were omitted, but the roads, streets, squares and beaches with amenities such as sunbeds, parasols, and so on were included. We were thus able to determine the amount of occupied, developed areas throughout the Balearic coastline, and we defined the physical space occupied by each of the 117 areas considered, its surface area and perimeter, and the maximum distance from the coast of the different buildings. The methodology is very similar to the one used to analyse the impact of tourism on land in the Greek Islands (Tzanopoulosa and Vogiatzakis, 2011; Coccossis and Constantoglou, 2005) and on the Adriatic coast in Italy (Romano and Zullo, 2014).

Another important geographical feature in our study is the length of coastline and beach actually occupied by built-up areas. To calculate the length of the coast, we

projected the perpendicular of the area occupied by the coastal zone on the coastline obtained from the photographs mentioned above. In general, the method functioned well, because the buildings tend to be located on the seafront. As regards the beaches, we used the Spanish Ministry of Agriculture's Guide to Beaches, which provides data on the location, length, depth and quality of a total of 330 beaches, coves and inlets in the Balearics. Beaches located inside the fraction of the coast occupied by an area were assigned to that area.

Population data were obtained from the Census of the Spanish National Institute of Statistics which divides the Balearic Islands in 596 districts, most of which coincided with the areas defined in this paper. In the few cases where they did not coincide – above all, in big cities – we estimated the population of each area by sampling the number of residential buildings.

In addition to the strictly geographical data, we were also interested in data referring to tourist accommodation establishments located in each area. We found these establishments using Internet search engines such as *Booking, Atrápalo, Opodo*, and so on. Listings of the main island tourism business associations and employers, Chambers of Commerce, and the Tourism Development Office were also consulted. With the help of these instruments we completed the list of data corresponding to 1,744 establishments, including the type (*hostal*, apartment, hotel or aparthotel), category from one to five stars, size measured by number of rooms, the coordinates of the geographical position and location (on the seafront/not on the seafront). Furthermore, on the basis of the photographs, we calculated the surface area occupied by these establishments, including gardens, parks, sports facilities, and so on. The name of the tourist area where the establishment was located was recorded according to information provided on its website; this information was also used to define the boundaries between adjacent tourist areas. These establishments included 186,581 rooms, that is, more than 95% of those recorded in the official statistics in 2012.

We also listed the berths for vessels in the marinas on the Balearic coast using data from the Balearic government, the Ministry of Public Works and the private websites *Fondear.com* and *Buscoamarre.com*. Sixty-six marinas with capacity for almost 19,000 boats were located.

Data on hotel prices were obtained from www.booking.com, the Internet operator offering the highest number of prices for the Balearic Islands. Data were collected in June 2013 and took as the objective the rent of a double room in the second

week of September 2013 (the mid-season). We used a single price supplier to ensure a degree of uniformity in the data, since within the same category and type there are different kinds of accommodation arrangements, a variety of rooms (suites, rooms with sea or pool view, self-catering) and a vast array of discounts for families, groups, couples, and so on. (Cirer, 2013a).

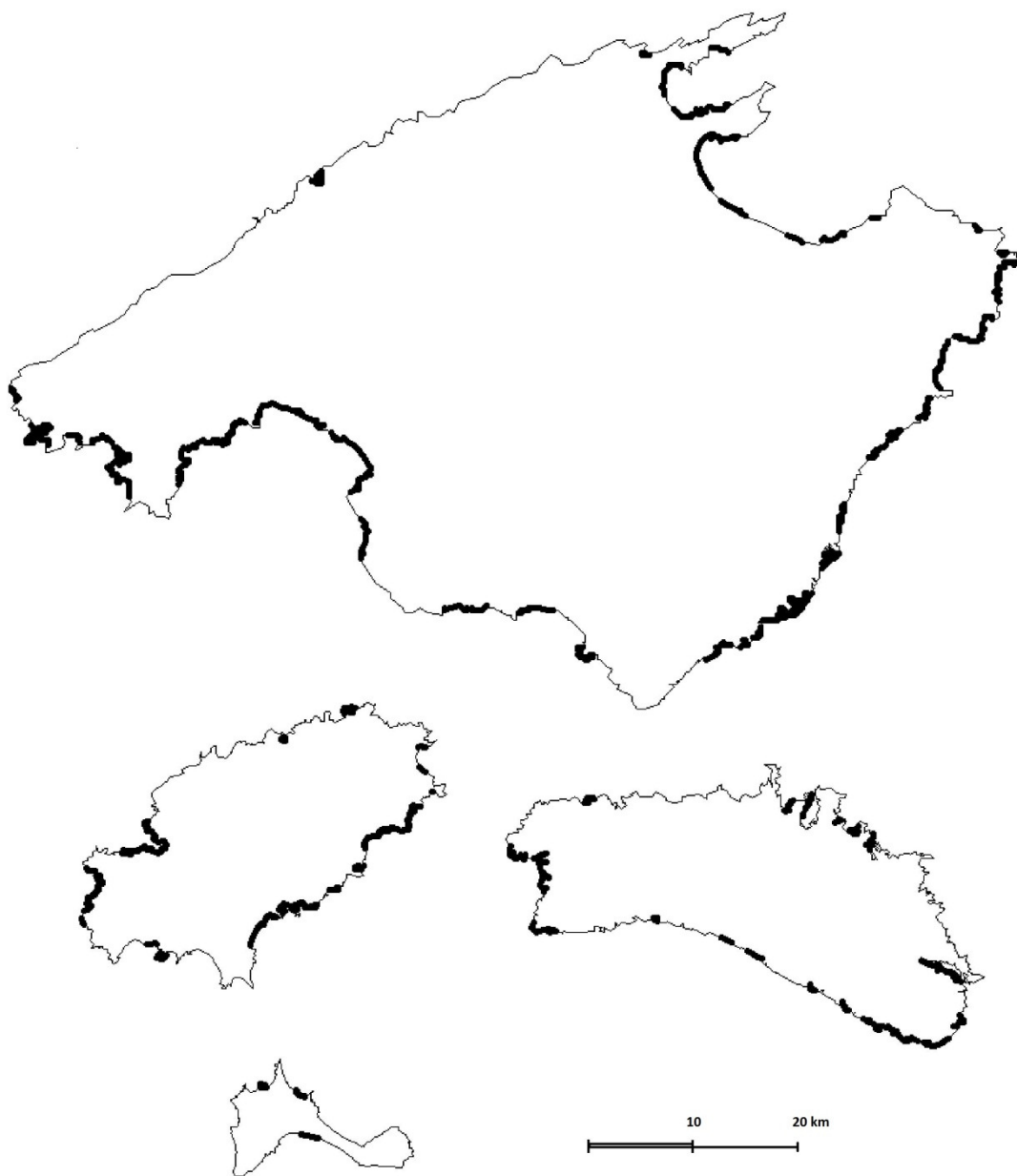## 3. Built-up spaces on the island's coastline

Fig. 1. Occupation of the Balearic coastline by the built-up areas discussed in the study.

The 117 urban coastal areas cover a total area of 10,330.30 ha and the projection of the occupied territory on the adjacent coast stands at 313.5 km. (Figure 1) These data indicate that the built-up tourist areas extend an average of 330 m inland from the coast, although of course this is a theoretical value that masks an extraordinarily high dispersion. In some areas in the Bay of Palma, like Cala Major or Portals Nous, tourist developments spread further than 1.5 km inland, while in many others the occupation is limited to a single row of buildings next to the sea.

These 117 areas cover 32% of the Balearic coast, that is to say, one third of the coastline of the Balearic Islands is densely urbanized. As we will see below, tourism is the almost exclusive cause of this high level of occupancy. In addition to the 117 areas, there are hundreds of small clusters of chalets which do not qualify as built-up areas but represent a certain degree of land occupation. If we add them to the well-defined urbanized areas, then in fact only half of the Balearic coast can be considered relatively unaltered by tourism.

Concentrating on the beaches, the use of the land for tourist purposes rises notably. Fifty-eight per cent of the length described as sandy beach and 66% of the area of sandy coast have been developed. The beaches that are made up of gravel, stones, and rocks rather than sand have a much lower degree of occupation, at only 18% – offering clear evidence of the importance of sand as a magnet for beach tourism.

The occupation of the Balearic coast is by no means uniform; in fact, it shows large geographical differences. To calculate them we have divided the Majorcan coastline into four districts in addition to the three smaller islands. The occupation of the coastline is shown in Table 1.

In this table we see that in the first Majorcan district – Calvià-Bay of Palma, from Peguera to Cap Blanc – all existing beaches and three-quarters of the total coastline are built-up. This is, without doubt, the largest urban concentration in the islands. Next in intensity of occupation come the south-east of Majorca, from Punta Regana to Cala Rajada, and the eastern part of the island, from Cala Mesquida to Formentor. In the south-east the occupation of the coast is high although a number of sandy beaches remain unexploited, while in the eastern part, the occupation of the coast is lower, but almost all sandy beaches have been developed. The case of the northern coastline of Majorca is very interesting; with the imposing Serra de Tramontana and the rough terrain, it has high cliffs and few beaches, but its beaches nevertheless present a very

high degree of occupation. The three built-up areas, Sant Vicenç, Sóller and Sant Elm, contain almost all of the sandy beaches in the north of the island.

Table 1
Percentages of built-up coastline and beaches in each of the four areas in the island of Majorca, and in the rest of the Balearics.

	% Total coastline developed	% Length of sandy beach developed	% Surface area of sandy beach developed
Calvià-Bay of Palma	74	100	100
South and south-east coast	49	40	51
East coast	36	79	83
North coast	14	84	76
Total island of Majorca	40	71	79
Ibiza	29	72	76
Menorca	23	46	52
Formentera	8	18	18
TOTAL BALEARICS	32	58	66

On the smaller islands the coast is less developed than in Majorca. The beaches of Ibiza have a high degree of occupation, but Formentera presents a model of development that is clearly different from the one that predominates in the other islands. Another interesting result is the geographical location of the hotels. After defining our 117 areas and identifying the 1,744 hotels, we find that 1,658 of them, which include 94% of the rooms officially recorded, are located inside these areas. The tourist accommodation establishments in the Balearic Islands are concentrated exclusively in coastal urban areas; hardly any are located inland or in isolated coastal sites. So tourism in the Balearic Islands is a strictly coastal phenomenon, with little direct impact on inland areas, and is also primarily urban, since the hotels are grouped in dense concentrations. Leaving aside the island of Formentera, there are very few examples of isolated hotels located at some distance from other similar establishments.

Similarly, all the marinas in the Balearic Islands are located off the coast of one of these 117 areas. Golf courses, on the other hand, are rarely near the coast in the Balearic Islands, which is why they are not included in our study.

4. Statistical analysis of the data

4.1. Cluster analysis

The first analysis consisted of the creation of several linear regression models in which the number of hotel rooms/apartments in the area was the explained variable and the explanatory variables were the length of coastline and beach occupancy, the surface area, and so on. Almost all models created were of poor quality, with low R^2 values and non-significant parameters according to t contrasts. The geographical distribution of the Balearic tourism phenomenon is too complex to summarize in a few equations, and so we used a multivariate analysis technique (*cluster analysis*) to classify the 117 areas defined. The variables were:

1) Resident population.

2) Surface area measured in hectares.

3) Perimeter area measured in km.

4) Coastline occupied as a function of the area, measured in km.

5) Number of moorings for boats.

6) Area occupied by hotels in the area (hectares).

7) Length of beaches in the area (in metres).

8) Area occupied by beaches in the area (hectares).

9) Total number of tourist accommodation establishments.

10) Rooms/apartments included in the above establishments.

11) Percentage of *hostals* and apartments.

12) Percentage of hotels and serviced apartments.

13) Percentage of 1- and 2-star establishments.

14) Percentage of 3-star establishments.

15) Percentage of 4- and 5-star establishments.

16) Average size of establishments (measured by nº of rooms).

17) Percentage of establishments on the seafront.

18) Percentage of sandy beaches in the area.

19) Percentage of beaches with a promenade.

All the data were standardized to present a range between 0 and 100 to allow the use of Euclidean distances in the statistical algorithm. The Ward agglomerative method was used.

The results suggested a classification in three groups: core areas (16 elements), secondary areas (70) and other areas (31). The third group is residual; it includes the areas that do not have beaches and have only a low density of hotels, though among them are the coastal tourism developments and the islands' major cities. To distinguish between these two types of urban areas an additional criterion was introduced: the number of swimming-pools, an excellent indicator of the prevalence of tourism in an area. Strictly urban areas, coastal cities, have fewer than one swimming-pool per hectare (mean 0.4) while areas developed for tourism have almost three swimming-pools per hectare (mean 2.9).

Table 2 and Figures 2 and 3 show the main features that distinguish between these four types of areas. The first salient finding is that the third and fourth groups of areas are characterized by an absence of sandy beaches, and accordingly represent a very small part of the Balearic tourism industry.

Table 2
Main characteristics of the four types of coastal areas. Sums of the values of all the areas of the same type.

	Total tourism accommodation establishments	Total hotel rooms and apartments	Total population living in each type of area	Mooring sites for leisure boats in the area
Core	734	95,882	92,662	3,552
Secondary	716	72,545	135,924	8,379
Residential	41	5,000	26,537	2,193
Coastal cities	167	10,197	384,45	4,787
Rest of islands	933	12,498	472,10	
TOTAL BALEARICS	2,591	196,122	1,111,674	18,911

4.2.   Core and secondary areas

Sum total of the values in all the areas of each type				
Total surface area (Ha)	Built-up coastline (km)	Length of sandy beaches (km)	Surface area of sandy beaches (Ha)	Type of area
2,770	63	26.6	142.1	Core
4,627	177	27.4	110.7	Secondary
1,324	57	0.2	0.3	Residential Develop.
1,609	16	0.2	0.2	Cities

Fig. 2. Total geographical data. Distribution of the total surface area and length of coastline occupied by all the areas of each of the four types – Columns 1 and 2. Size of the set of all the beaches in each of the four types of area –Columns 3 and 4.

Mean values of each area classified according to type				
Total surface area (Ha)	Built-up coastline (km)	Length of sandy beaches (km)	Surface area of sandy beaches (Ha)	Type of area
173	4.0	1,658	88,838	Core
66	2.5	391	15,809	Secondary
58	2.5	7	140	Residential Develop.
201	2.0	21	255	Cities

Fig. 3. Mean geographical data. Surface area, length of built-up coastline, length and surface area of sandy beaches.

Size. Mean values of each area classified according to type				
Total number of hotel rooms and apartments in each area	Mean category of the establishments (stars)	Dimension of the establishments (rooms)	% of rooms in hotels and serviced apartments	Type of area
5,993	3.15	131	85	Core
1,036	3.00	101	79	Secondary
217	3.40	122	90	Residential Develop.
1,275	2.73	61	72	Cities

Fig. 4. Size. Mean size of each area, measured as a function of the number of hotel rooms and tourist apartments and the main characteristics of the hotels situated in each of the four types of area.

Density. Number of hotel rooms and tourist apartments in each type of tourist area divided by				
Total surface area (Ha)	Built-up coastline (km)	Length of sandy beaches (km)	Surface area of sandy beaches (Ha)	Type of area
35	1.511	3.6	675	Core
16	410	2.7	656	Secondary
4	88	30.5	15,581	Residential Develop.
6	625	60.0	49,985	Cities

Fig. 5. Tourism density. Number of hotel rooms and tourist apartments in each tourist area divided by the surface area and coastline it occupies; length and the surface area of the sandy beaches in the area.

The core areas are the nucleus of Balearic tourism. These 16 areas host half of the existing hotel rooms and apartments in the islands, and a significant part of the resident population (8.3% of the total). They contain one-fifth of the urbanized coast, but half of the sandy beaches. Figures 4 and 5 show that the core areas are characterized by combining large individual size and high urban density. Some of the secondary areas are relatively large and others quite dense, but none of them present both features simultaneously.

In the core areas there are four times more hotel rooms per kilometre of coastline and twice as many rooms per hectare of total area occupied. A second feature of this high density is the ratio of the space occupied by hotels, which reaches 20% of the total area in the core areas and 13% in the secondary areas. In the secondary areas, second homes have a greater relative presence.

This combination of large size and high density might suggest that the hotel industry in these large core areas seeks to maximize economies of scale in order to offer lower-priced products aimed at tourists with less purchasing power. However, the data clearly reject this possibility. In the core areas, only 15% of the offer is in the form of *hostals* and apartments which provide more economical accommodation, while in other areas this business accounts for over 20%. The average category of the establishments in the core areas is 3.15 stars, which is slightly above the average, and we also see that establishments in the core areas are a third larger than those in the secondary areas. In both cases the means are different with a probability of error of less than 1% according to the t-test and z-test. The conclusion is clear, though it may seem surprising: the large tourism clusters in the Balearics are home to above average hotels in terms of both category and size, despite being densely packed within the physical space.

From a commercial perspective, Figure 6 shows that the sixteen core areas tend towards homogeneity, with a strong concentration in the 3-star category (57% of the rooms and apartments come under this classification) and a low number of *hostals* and apartments. Secondary areas, in contrast, are much more dispersed. Almost all of them specialize in specific market segments depending on their category. In some areas the offer is limited to 4- and 5-star hotels and serviced apartments (Cala Vinyes, Cala Mandia, Punta Prima) while others aim at a less affluent public (Sóller, Es Viver-Figueretes, Cala en Blanes) where *hostals* and apartments are in the majority and the mean category is below 2.5 stars.

The core areas are usually very large (in general, around twice the average size) but it is the beach factor in which the differences are most apparent. Beaches in the core areas are four times larger (in terms of both length and surface area) than those in secondary areas. The availability of a large expanse of sand is an essential prerequisite for the development of the core areas, and in fact secondary areas cannot exist without a beach either (albeit a smaller one). Of the seventy secondary zones, 69 have at least one sandy beach; the only one that does not have one (Alcanada, in Majorca) has a 700 metre beach which alternates stones and sand.
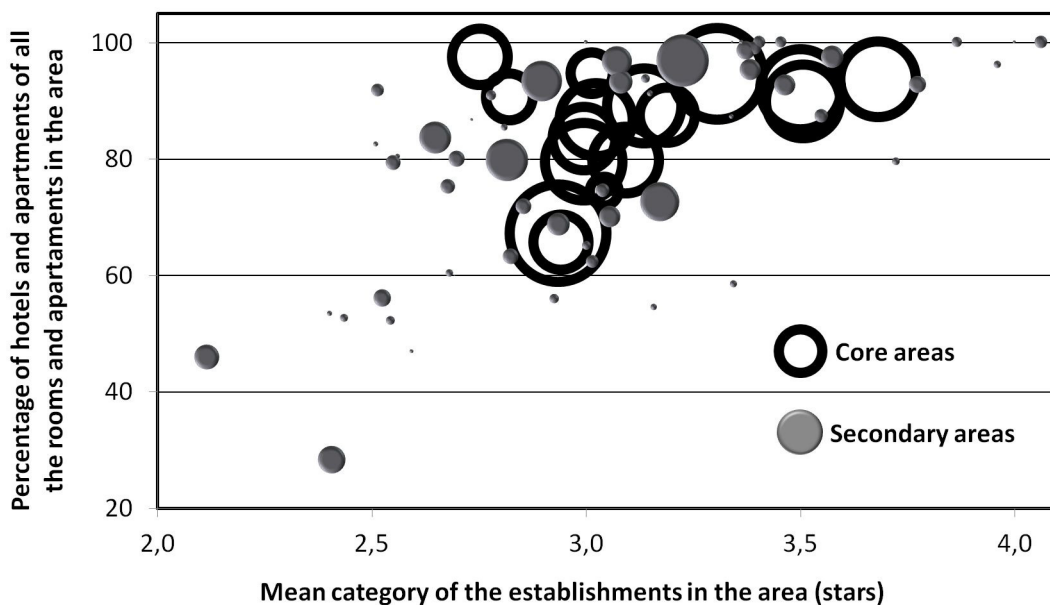
Fig. 6. Two-dimensional distribution of the core and secondary sites by category (horizontal axis) and the type of tourist accommodation establishments in each area. The diameter of the circles is proportional to the number of rooms or apartments available in each area. Note the concentration of the offer in the core areas in three-star hotels and the relative homogeneity of the size. Secondary areas, however, show a wide dispersion in terms of size, mean category, and presence of *hostals* and apartments.

4.3. Built-up areas and cities on the coast

The geographical dimension of the built-up areas is very similar to that of the secondary areas, with an average surface area of 58 ha of coastline occupied and an average length of 2.5 km. The variable that differs significantly is hotel size; only six of the 23 areas of this kind have more than one tourist accommodation establishment, nine have one, and the rest have none. Clearly, the cause of these differences is the absence

of sandy beaches in the built-up areas; only three have sandy beaches, all of them very small.

Most of the buildings are isolated chalets of one or two storeys with a garden and pool for personal use; therefore, in terms of consumption of the island's limited resources such as water, this model is extremely costly (Kent et al. 2002).

A notable feature of these areas is their branch-like appearance, with a very long perimeter with respect to the surface area actually occupied, as shown in Figure 7 for Port d'Andratx. This layout is caused by the fact that the tourist resorts are located in the highlands on hills and cliffs overlooking the sea, which leaves the lower valleys and slopes facing the interior of the island empty. This characteristic disposition confirms the special attraction of the view of the sea (Caletrío, 2009, 2011; Nasar and Li, 2004), and the lack of interest in the island's interior landscapes.

In five of these built-up areas the population in the census amounts to over a thousand people, a figure that suggests the presence of both residents and tourists. The remaining 18 have little or no resident population, and are intensively used for tourism purposes.

Finally, we have the coastal cities, including the capitals of the three major islands and other urban areas where tourism is always present but is clearly secondary. Each of the cities has a number of hotels, but they tend to be small and cater for business travellers rather than tourists; they do not have access to the beach and their morphology is distinctly urban, with a preponderance of buildings over two storeys and a high building density.
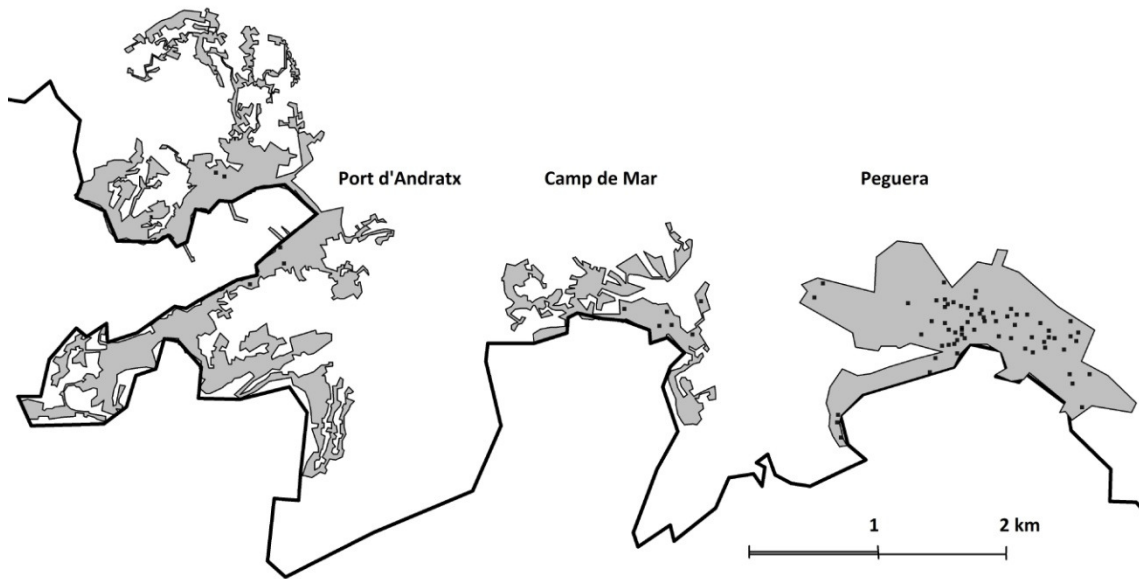
Fig. 7. Section of coastline in the west coast of Majorca, which includes three urban areas of different types. On the far right (East) is the core area of Peguera which occupies 165 Ha. and 2.59 km of coastline. There are 66 tourist accommodation establishments (the black dots) which together offer more than 6,000 rooms or apartments. The secondary area of Camp de Mar includes six hotels offering 1,065 rooms and Port d'Andratx – a residential development – has only 321 rooms in five hotels. Note the compact nature of the core areas, contrasting with the highly irregular perimeters of the residential development.

5.   Analysis of the major tourist concentration of the Balearic Islands: Can Pastilla Platja de Palma-El Arenal.

The Bay of Palma is dominated by the tourist cluster south of the capital, which includes four of our sixteen core areas stretching along the seafront: Can Pastilla, Palma Beach North and South, and El Arenal. This cluster contains 21,417 hotel rooms and apartments – almost 11% of the official total in the archipelago – along 9.6 km of coastline, including 5 km of sandy beach. It is the largest cluster in the islands, and due to its size our database of hotels and firms offering complementary services provides statistically significant information. The aim of this analysis is to determine the influence of the beach on the morphology of the tourist destination using hotels and apartment blocks as primary indicators, as well as restaurants and entertainment venues. "Restaurants are arguably one of the most prominent and important examples of a city's nontradable consumer goods", (Schiff, 2014).

This conurbation houses 165 accommodation establishments, of which 33 are located on the seafront and offer 4,306 rooms or 20.1% of the total. Using this ratio we have divided the study area into five quintiles: five strips of land each one of which includes 20% of the hotel rooms and apartments in the area studied. The first strip is the seafront, the second strip starts immediately behind it, some 50 metres from the beach – and stretches back 200 metres, and so on (see Table 3).

Table 3.
Distribution of tourist accommodation in Platja de Palma in five strips progressively further away from the beach, each including a similar number of hotel rooms or apartments (quintiles).

Distance from beach (m.)	Number of hotels	Rooms Apartments	Mean category (stars)	Mean size of each hotel	Sq.m for each room apartment
0	33	4,306	3.4	130	33
50-199	39	4,198	2.8	108	26
200-288	30	4,338	2.9	145	27
289-425	31	4,277	3.0	138	23
426-737	32	4,298	3.0	134	27
TOTAL	165	21,417	3.0	130	27

With this division into quintiles, we have used the t-test and z-test to assess whether it is possible to differentiate the hotels located in each strip according to their category, the size of the buildings, and size of the rooms in square metres.

The analysis of these three variables among the five quintiles produced thirty pairs of contrasts which we evaluated with a risk of error of 1%. Of these, only four contrasts suggested that a population can be clearly distinguished from the others: the hotels located on the seafront were of a significantly higher category than the other four which are further from the beach. The remaining twenty-six contrasts rejected the possibility of distinguishing populations in terms of average category, building size and room size. These findings quantitatively confirm the result presented earlier in Figure 6: that is, that the tourist accommodation establishments in the large core areas are relatively homogeneous.

In short, in the core areas, the hotels located on the seafront differ significantly from the others in terms of their quality, but the establishments located between 50 and 737 metres from the beach turn out to be indistinguishable from each other. The increasing distance from the beach sand does not lead to the appearance of statistically

identifiable patterns; the hotels furthest from the beach are not larger, nor do they have larger areas for gardens, solariums or pools than those on the seafront. This result suggests that the tourists value the beach location highly, but if this location is beyond their purchasing power the distance from the beach is not an important issue. However, this assumption leaves out an important additional variable: the price.

Figure 8 shows prices of 17 two-, three- and four-star hotels offering room only (RO) based on the relative distance from the hotel to the beach. It also shows the average price of a three-star hotel in each of the four quintiles not on the seafront. Clearly, the price falls significantly as the distance grows between the hotel and the beach.
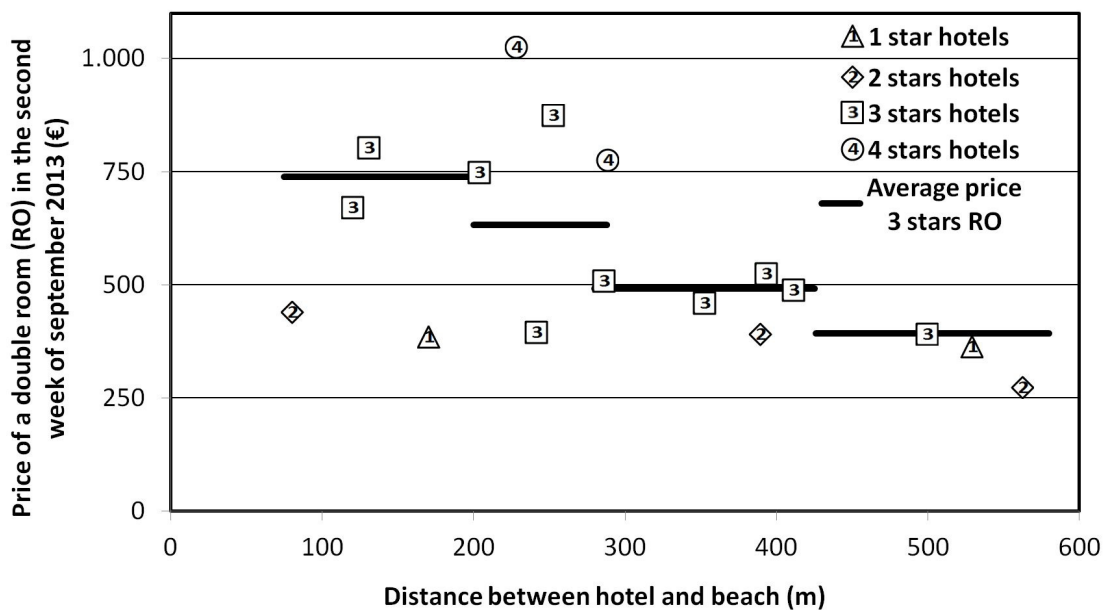

Fig. 8. Representation of the decreasing relationship between prices and distance from the establishment to the seafront.

To quantify this reduction we created a hedonic regression model (Cirer, 2013a) with the data from 44 hotels in one-, two-, three- and four-star hotels which are not located on the seafront. The results appear in table 4. Only data from establishments presenting the most common format are used, so neither apartments nor hotels offering less common formats (half board, full board and all inclusive) are included. The result is clear: the price of the room falls by 30 euro cents per metre away from the beach. A room in the same category may cost € 200 per week less in a hotel in the fifth quintile (furthest from the beach) than in one in the second quintile. As the hotels are relatively similar, the heterogeneity between them is the result of their relationship with a scarce resource: the beach (Maskell, 2001).

Table 4.
Regression results. Estimated value of the price of a week's stay in a double room hotel in the second week of September 2013, depending on the category of hotel and type of stay chosen – Room only or Bed and Breakfast. The intercept value is the price of a 1- or 2-star hotel located just behind the seafront.

Variable	Value (€)	Absolute value t-statistics
Intercept	444.075	8.694
Distance from beach (m)	− 0.302	2.171
Surface area occupied by hotel (sq. m)	0.020	2.821
3 stars Hotel. Room Only	165.430	2.815
3 stars Hotel. Bed & Breakfast	173.246	2.869
4 stars Hotel. Room Only	340.823	3.324
4 stars Hotel. Bed & Breakfast	679.300	5.955

All parameters are significant at the 5% level.
$R^2 = 0.754$ Adjusted $R^2 = 0.714$.   F-test $= 18.925$ Sample: 44 hotels

The bars, restaurants and entertainment venues are at the core of the complementary offer. To assess their importance inside this cluster we consulted business directories (the Yellow Pages), internet search engines, and the Street View application in Google Maps. Only pubs, discos and restaurants were incorporated into the database, as these types offer a high degree of homogeneity – unlike other categories such as bars or ice cream parlours, where the offer ranges very widely and is difficult to compute. Figures 9 and Table 5 display the results of this search and demonstrate the clear tendency for these establishments to be located next to the beach or on the coastal strip directly behind it. Four out of five of these establishments are located in the first or second quintile. There is a clear trend for traditional restaurants and pubs and discos to be located on the seafront, while cheaper restaurants (burger joints and pizzerias) tend to accumulate further inland, since these businesses cannot afford the cost of a location on the sandy beach.

A particularly significant finding is the very low offer of complementary services in the fifth quintile, the one furthest from the beach, even though it is home to 20% of all rooms and apartments. The clients of the most economical hotels seek out complementary services near the beach, in spite of the distance from their accommodation. Clearly, the sand exerts an almost irresistible attraction when tourists want to eat, go for a walk, or are looking for entertainment.
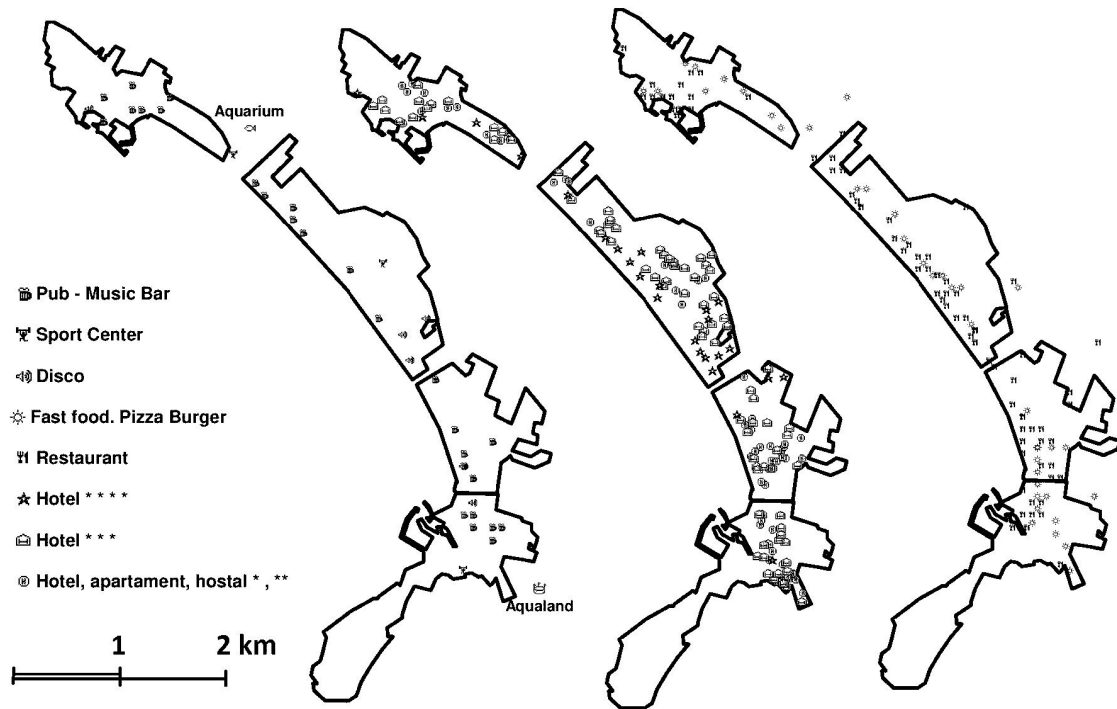
Fig. 9. Tourism cluster around the Bay of Palma which includes four core areas: Can Pastilla, Platja de Palma North, Platja de Palma South and s'Arenal. This is the largest tourism cluster in the Balearic Islands. This figure again shows the compact nature of the occupation of the territory in the core areas and the geographical distribution of different types of tourism businesses. We find that 4-star hotels tend to be located on the seafront, while lower category hotels are randomly distributed. The complementary offer, however, composed of pubs, clubs and restaurants, is clearly concentrated in the beach and in a strip stretching 200 metres inland.

Table 5.
Distribution of the complementary offer in the Platja de Palma in five strips progressively further away from the beach, each including a similar number of hotel rooms or apartments (quintiles). Pubs and discos are presented together, since many of these businesses are similar. Restaurants are divided into fast food and traditional.

Distance from beach (m.)	Pub + Disco	Fast food Burger-Pizza	Traditional restaurant	Total	% of quintile
0	10	0	26	36	25
50-199	16	27	35	78	54
200-288	1	4	7	12	8
288-425	4	6	2	12	8
426-737	1	2	3	6	4
TOTAL	32	39	73	144	100

6.   Results

Taking a historical perspective, in the 1930s tourism was distributed randomly around the coastlines of Majorca and Ibiza (Cirer, 2004, 2009; Marí, 2000). In almost all the sandy beaches connected to the hinterland small groups of hotels and restaurants were built by local entrepreneurs. In the 1950s and 1960s these tiny nuclei were quickly surrounded by a collection of new businesses which initially imitated the pioneers but soon began to specialize, offering a different product which, in turn, attracted new kinds of clientele ways and thus opened up the Balearic tourism business. The early stages of development were not planned in any way (Bardolet and Sheldon, 2008); the various government bodies merely applauded the acceleration of the process and did not intervene. At most, they showed some concern when the rhythm of the construction of buildings generated dysfunctions that threatened the continuity of the industry – for instance, when beaches were contaminated by discharges, or when the hotels had no water, and so on.

In the early 1970s, when the growth stopped abruptly, the spatial distribution of tourism in the Balearic Islands is very similar to what it is today. The few beaches that had not been exploited were left out of the process for good and most of them became legally protected areas (Bardolet and Sheldon, 2008; Royle, 2009). In the remaining cases – the majority – the success of each resort was closely linked to the size and quality of its beach; physical geography thus became the main factor explaining their development and their future prospects for expansion.

When the tourism business was reactivated in the 1980s, the biggest tourist clusters were sited in what are today the core areas. They intensified the occupation of the coastline and expanded the development inland, becoming large urbanized areas devoted strictly to tourism. The areas associated with a small beach or only a limited amount of space – areas boxed in between mountains and the coast, for example – became secondary areas. Secondary areas were obliged to specialize and focus on a particular type of customer: for example, families or young adults, people with low or high spending power, and so on.

Both core and secondary areas became more compact and densely built up. In this process, single-family holiday homes located by the sea were eliminated. With the growth of the tourism economy, land close to beaches increased in value and chalets

surrounded by gardens were gradually replaced by multi-storey buildings occupying all the available land. This process is far from unique to these islands, and has been detected in other mature tourist destinations both in the Mediterranean and as far away as the Gold Coast in Australia (Pigram, 1977; Smith, 1991).

Second homes have not disappeared in the core and secondary areas. In fact they are particularly numerous in most secondary areas, but now these homes are flats in multi-storey apartment blocks rather than in isolated houses with a terrace or garden. The sequence shows the extraordinary economic value acquired by the sandy beach in the Balearic tourism model, a feature that is also common in other parts of the Mediterranean (Ghermandi and Nunes, 2013).

However, most models of business clusters and industrial districts tend to ignore the natural environment (Beenstock and Felsenstein 2010; Suedekum 2006). In our case, the environment – specifically, the beach – is of fundamental importance; in fact it is the key to the spatial distribution of the tourist infrastructure along the coastlines of the Balearic Islands. In this context, the beach is a specialized factor of production whose heterogeneity explains the existence of an "optimum distribution of firms by size but not an optimum size of firms" (Friedman 2007).

And so this is how the current spatial hierarchy of Balearic resorts emerged, at the top of which we find the core areas with thousands of hotel rooms and rental apartments accompanied by hundreds or thousands of second homes. The presence of large numbers of tourists concentrated in a small space creates a reliable, effective demand that induces the firms offering complementary services to specialize.

> "The presence of a strong cluster environment, which reduces barriers to entry and growth and enhances regional comparative advantage, should be a central driver of entrepreneurial vitality. [...] More specifically, clusters facilitate new business formation and the growth of successful start-ups by lowering the costs of entry" (Delgado et al. 2010).

In these areas there are restaurants of all price ranges and ethnic specialities to cater for tourists wanting to try new things on holiday (Jacobsen, 2002; Schiff, 2014). There are water parks and children's entertainment centres for families with children, facilities for sports enthusiasts and nightlife aimed at specific nationalities and population segments – above all young people, but also middle-aged couples and gay

tourists as well. Shopping centres can increase and diversify their range of products far beyond the typical souvenirs and beach accessories, incorporating quality clothing, footwear and perfume businesses. The result is an exceptionally wide complementary offer catering for the tastes of tourists of all kinds which, in turn, generates high overall satisfaction with the destination (Cladera, 2009; Jacobsen, 2002) and allows hoteliers to maintain high occupancy rates.

Interestingly, the concentration of different types of tourists in accommodation and leisure establishments also allows apparently incompatible forms of entertainment to coexist without any great friction. For example, in the morning a beach may be occupied by families with children (who then spend the afternoons and evenings in their hotels enjoying the family entertainment); then, in the afternoon and evening, it may be taken over by groups of young people just getting up after a night on the town, creating an atmosphere with a strong sexual component.

These resorts need to ensure a large-scale influx of thousands of visitors every week. This is only possible by attracting customers of diverse economic potential. This is where the inner geography of the destination, its morphology, acts as a screening mechanism, without implying in any case that anyone is excluded. Tourists with higher spending power can stay in four-star hotels that monopolize the beach, but the destination is also accessible to less affluent customers who are able to afford quality hotels whose only drawback is the distance from the beach. The message shown in Figure 8 is clear: tourists can enjoy the beach and all the advantages of a large tourist area, at an affordable price, on the condition that they are willing to walk a few minutes before reaching the seafront and the amenities located on the beach and its immediate vicinity.

The core areas contain dozens of hotel firms and hundreds of ancillary businesses, all tightly linked to each other in a dense localized cluster (Cirer, 2011, 2013b; Dicken and Malmberg, 2001). As a result, cluster economies emerge (Chung and Kalnins, 2001) as well as a high degree of heterogeneity in the product, typical of the large concentrations of hotels (Freedman and Kosová, 2011). But we stress that these relations appear as a result of sharing a key production factor, an essential geographical prerequisite: the presence of the beach, without which a core destination (or even a secondary destination) cannot develop.

Second homes follow exactly the same pattern as hotels and apartments, in that: the beach is also the main factor in their geographical distribution. People wishing to

purchase a second home on the Balearic coast have two options: an apartment in one of the major tourist areas, or a chalet in an urbanized development. In the first case, the price varies widely because it depends directly on the distance from the beach; if the apartment is located in a building on the seafront with access to the sand and a view of the ocean it may cost as much as a large chalet with a garden and pool, but if it is a few hundred yards away from the coast it may be three or four times cheaper. Again, the distance from the beach is the key economic factor in an environment that supports a clientele with a wide range of purchasing power: the cost of renting a hotel room, having dinner in a restaurant or buying a second home are all far higher closer to the beach. The less affluent visitors must walk several minutes to access the beach, dine at fast-food restaurants that do not have an ocean view and, if they can buy a second home, must do so inland.

Those who are looking for the peace and quiet of a chalet in an urban development will have to make a high financial commitment, but in any case no second homes are available near the beach; all the beaches have been previously built up or are now protected. Numerous developments over the last thirty years have moved away slightly from the beaches, but have not spread further inland. If they do not have access to the beach, a sea view is the next best thing: these developments are always laid out to face the sea, and the land facing the interior or the valleys is left untouched.

7.   Conclusions

The beach is the essential element in Balearic tourist destinations, a prerequisite for the industry's development. A beach in a particular setting does not have to be especially beautiful: the important thing is its size, its capacity. If its length and surface area are sufficient, it can help create a core area equipped with an extensive range of tourist accommodation and a corresponding range of complementary amenities and services. Once established, the quantity and variety of the complementary offer become the main attraction of these areas: they all provide a range of services to meet the leisure expectations of any tourist, whatever their interests and their budget. The only requirement that the tourists must accept is the high occupancy rates, and the knowledge that, whatever activity they engage in, they will be surrounded by hundreds of other similar visitors. However, the likelihood of crowding is not perceived negatively. Quite

the opposite, in fact: tourism emerges as the purchase of a social experience that is affected very little by the congestion of the destination (Urry, 1990).

In contrast, secondary destinations do not provide this kind of diversity. Each one targets tourists seeking a specific, clearly defined option, be it nightlife, small areas to spend time with one's children, and so on. The large number of secondary areas means that each one offers a double specialization: first with regard to the type of tourism offered, and second depending on the purchasing power of the customer. So those who want to enjoy vast, virtually unspoilt beaches can go to Menorca and Formentera, where they can choose to stay in an area with small budget hotels or in another one equipped with five-star hotels. Those looking for an all-inclusive stay at a family hotel will find several places that cater to different budgets.

Finally, the decisions facing those who love the island enough to purchase a second home will also be greatly influenced by the beach. Wealthy potential buyers for whom proximity to the beach is important will acquire an expensive apartment on the seafront; otherwise, they can choose a chalet with private pool and garden in a coastal development. Those who have less purchasing power can acquire a timeshare apartment located a few hundred metres from the sand but integrated in a core area, and will be able to enjoy the extensive complementary services that it offers.

In any case, we have shown that the beach and the coastline are the essential elements in Balearic tourism and that its exploitation is the main explanatory factor of how tourism has occupied the coastal area. The availability of sandy beaches has dictated the morphology of the various hotel areas along the coast of the Balearic Islands. Away from the beach, a sea view – and therefore proximity to the coast – is the key magnet for prospective tourists.

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