The current issue and full text archive of this journal is available on Emerald Insight at:
https://www.emerald.com/insight/2444-8494.htm

Location factors and agglomeration economies in the hotel industry: the case of Spain

Andrea Valenzuela-Ortiz
Faculty of Economics and Business Administration, University of Granada, Granada, Spain and
University of Guayaquil, Guayaquil, Ecuador, and
Jorge Chica-Olmo and José-Alberto Castañeda
Faculty of Economics and Business Administration, University of Granada, Granada, Spain

Received 8 October 2021
Revised 9 March 2022
6 July 2022
Accepted 1 August 2022

Abstract

Purpose – This research investigates the effect of accessibility to points of tourist interest (buffer) and direct and indirect spatial spillover effects of agglomeration economies on tourism industry revenues in Spain.
Design/methodology/approach – Data were collected from the Bureau van Dijk's (BvD) Orbis global database. The data were analysed using a spatial econometric model and the Cobb–Douglas production function.
Findings – This study reveals that hotels located inside the buffer zone of points of tourist interest achieve better economic outcomes than hotels located outside the buffer. Furthermore, the results show that there is a direct and indirect spatial spillover effect in the hotel industry.
Practical implications – The results provide valuable information for identifying areas where the agglomeration of hotels will produce a spillover effect on hotel revenue and the area of influence of location characteristics. This information is relevant for hotels already established in a destination or when seeking a location for a new hotel.
Social implications – The results of this study can help city planners in influencing the distribution of hotels to fit desired patterns and improve an area's spatial beauty.
Originality/value – The paper provides insights into how investment, structural characteristics, reputation and location affect hotel revenue.

Keywords Hotel industry, Spillover effects, Hotel revenue, Spatial policy diffusion, Clustering, Spatial accessibility

Paper type Research paper

1. Introduction

The hotel industry is one of the most important industries fuelling global socioeconomic development, especially in countries like Spain. However, traditional hotels currently face challenges to preserve and improve industry efficiency (Zhang *et al.*, 2020). Since 2020, the COVID-19 crisis has affected the accommodation industry (Nicola *et al.*, 2020). Moreover, the rise of nonstandard accommodation (e.g. Airbnb) has hit the industry (Zhang *et al.*, 2020). To identify hotels with a greater capacity to withstand periods of crisis in the tourism industry, we investigate a relevant competitive advantage of hotels: location (Cheng, 2013).

Funding: This research was funded by Junta de Andalucía and FEDER funds (No: B-SEJ-381-UGR18) and the Spanish State Research Agency (No: PID2019-110941RB-I00).

European Journal of Management and Business Economics
Emerald Publishing Limited
e-ISSN: 2444-8494
p-ISSN: 2444-8451
DOI 10.1108/EJMBE-10-2021-0273

The literature classifies variables related to hotel location factors into three groups: (1) hotel accessibility, which includes the main points of access such as bus/train stations and airports (Kim *et al.*, 2020; Lado-Sestayo *et al.*, 2020); (2) proximity to tourist attractions, including heritage sites and the coastline (Valentin and O'Neill, 2019); and (3) spillover effects caused by economic agglomeration and policy diffusion observed in the hotel industry (Zhou *et al.*, 2019). However, few studies have analysed the relationship between these location factors and spatial spillover effects (Lado-Sestayo *et al.*, 2020) and even less so the area of influence (buffer) of points of tourist interest or the relation between spatial spillover effects and mechanisms of policy diffusion in the hotel industry.

Policy diffusion refers to the fact that the policies of one entity are influenced by the policies of other entities. The bulk of the literature on policy diffusion examines policy spread by state and local policymakers (Gilardi and Wasserfallen, 2019). The diffusion literature considers four mechanisms of diffusion: coercion, competition, imitation and learning (Shipan and Volden, 2008). Three mechanisms may lead to the presence of spatial spillover effect, namely competition, imitation and learning (Chica-Olmo *et al.*, 2021). Spatial spillover refers to the fact that one company's activities usually impact on other nearby companies (Tallman *et al.*, 2004). In this line, Barros (2005) indicated that hotels can obtain positive spillover effects from neighbouring hotels. This effect is accounted for in the models through the presence of spatial autocorrelation.

The aim of this study is to explain the effect of accessibility to certain points of tourist interest (heritage sites, airports and the coast) and the spatial spillover effect of the hospitality industry on revenue. Also, to eliminate specification problems, we included other relevant predictor variables as controls, which are divided into three groups: structure (size and number of stars), investment (workforce and capital investment) and reputation (customer ratings). Lastly, spatial econometric models were used. The findings of this study provide useful information for selecting the best location for new hotels in a given destination and detecting the effect of policy diffusion on hotel revenue.

2. Literature review

Agglomeration economies are defined as positive (or negative) externalities resulting from the geographic clustering of firms (Myles Shaver and Flyer, 2000). These economies are linked to the geographical proximity between companies in regions with location advantages, thus giving rise to competitive advantages (Porter, 1998). Three main positive externalities are related to firm location: (1) knowledge spillovers; (2) pool of specialised labour; and (3) specialised input provided (Myles Shaver and Flyer, 2000). The literature on agglomeration economies suggests that geographic clusters improve firm performance due to better production and/or demand, which in turn causes industries, such as technology, hospitality, food and retail, to choose to cluster (Canina *et al.*, 2005).

Agglomeration of tourism businesses can improve their revenues via location-specific externalities (Tallman *et al.*, 2004). In tourism, agglomeration economies are significant due to the marked localisation of services, which are considered inseparable in time and space (Kim *et al.*, 2021). Tourism markets are spatially concentrated in a specific place, known as spatial clusters. Hotels located in spatial clusters have advantages in terms of both supply (access to suppliers and services) and demand (lower costs for consumers) (Canina *et al.*, 2005). In turn, agglomeration economies are linked to policy diffusion, leading hotels to form spatial clusters (Ferreira Neto, 2021).

Different spatial interactions such as the domino effect or the entry and exit of competitors cause spatial spillover effects that motivate companies to cluster geographically, thus leading to higher revenues (Tallman *et al.*, 2004). Hotel revenues depend on agglomeration economies due to the benefits that companies obtain from being close to others (Cruz and Teixeira, 2010).

This study uses four types of explanatory variables to determine the factors that impact hotel revenue: investment, structural characteristics, reputation and location. The literature has linked these factors to room rates, but few authors have analysed how they affect hotel revenue (Öğüt and Onur-Taş, 2012).

Investment: The Cobb–Douglas production function is probably the most widely used function to explain industrial production and has been employed in the hotel industry (Barros, 2004) and agglomeration economies (Viladecans-Marsal, 2004) where the main factors of production are workforce and capital investment.

Structural characteristics: One of the structural features considered in some studies is hotel size measured by number of rooms, which is directly related to hotel revenue (i.e. revenue per available room) (Kim *et al.*, 2013; Öğüt and Onur-Taş, 2012). Another structural feature that could be related to revenue is star rating. Star rating includes aspects such as physical characteristics like room size and facilities (Pawlicz and Napierala, 2017). The number of stars depends on factors like room size, air conditioning and other amenities. In general, hotels with higher star ratings generate more revenue (Martin-Fuentes, 2016).

Reputation: Another factor that has received considerable attention as an explanatory variable for hotel revenue is customer ratings. Studies have linked customer ratings to hotel prices and revenue (Blal and Sturman, 2014). Öğüt and Onur-Taş (2012) examined how an increase in customer ratings increases hotel industry revenue in some European destinations, such as Paris and London. Elias-Almeida *et al.* (2016) found that only customer delight generates more favourable results for hotels by increasing sales, customer loyalty, word-of-mouth communication and repurchase intentions.

In short, a large body of literature has linked hotel industry revenue with variables relating to these three types of factors. However, location factors have been little studied.

2.1 Spatial analysis of hotel location

Spatial analysis is used to identify the location patterns of hotels in different localities and their causes (Luo and Yang, 2016). The findings of spatial analyses are useful for predicting hotel industry behaviour and determining the importance of other factors such as resources and culture (Roehl and Van-Doren, 1990). The academic literature has sought diverse ways to explain these patterns at the national, regional and inter- and intra-regional scales (Yang *et al.*, 2014). In this regard, various techniques have been used, amongst them choropleth maps (Roehl and Van-Doren, 1990), spatial statistics (Luo and Yang, 2013), the monocentric model (Yang *et al.*, 2012) and agglomeration models (Kalnins and Chung, 2004).

Spatial patterns amongst hotels can be understood through the perceived agglomeration effects of their geographical concentration. The agglomeration model explains these patterns according to the relative location of entry hotels with respect to incumbent hotels (Yang *et al.*, 2014). Several studies have shown that entry hotels tend to be close to other competitors (Baum and Haveman, 1997) and a higher density of hotels increases the probability that entry hotels will choose that location (Kalnins and Chung, 2004).

Additionally, agglomeration models consider differences between entry hotels and incumbent hotels in terms of hotel ratings (Kalnins and Chung, 2004), hotel size (Yang *et al.*, 2012) or hotel brand (Kalnis and Chung, 2004).

For the empirical estimation of spatial agglomeration, spatial models have been developed, e.g. the spatial autoregressive (SAR) model and the spatial error model (SEM). The SAR model focusses on the interaction between dependent variables, while the SEM estimates the effect of spatial interaction between perturbances (Wang *et al.*, 2019). SAR models have been used in the hotel industry to determine the effects of agglomeration on hotel and restaurant demand (Skrede and Tveteraas, 2019), hotel location choices (Kalnins and Chung, 2004), hotel prices (Balaguer and Pernías, 2013) and labour productivity (Kim, 2020).

However, these models have not been used in the literature to examine the effects of agglomeration on hotel performance in terms of profitability (e.g. Marco-Lajara *et al.*, 2014) and the evidence is mixed (Lado-Sestayo *et al.*, 2017). There is positive empirical evidence for the effect of agglomeration on hotel revenues (Chung and Kalnins, 2001). It has been shown that close competitors have access to resources (e.g. knowledge transfer, technology) that other competitors which are not close in space lack (Tallman *et al.*, 2004).

In addition, to take advantage of the externalities of stronger firms and improve revenues, weaker firms tend to locate close to stronger ones (Myles Shaver and Flyer, 2000). There is evidence in the literature of a negative relationship between agglomeration and profitability (Marco-Lajara *et al.*, 2014) due to the competition caused by proximity and diminishing marginal returns (Baum and Haveman, 1997). In the hotel industry, revenues are the most accessible variable given that data are published annually together with company accounts. In addition, this variable is related to the production function (Assaf, 2012).

2.2 Production function

Empirical studies on the tourism and hospitality industry have used the Cobb–Douglas function to measure the impact of operational strategies and policies on industry performance, particularly in terms of perceived costs and revenues (Arbelo *et al.*, 2018).

Studies using revenue as the dependent variable (Assaf and Magnini, 2012) have been conducted for tourism industries in European countries such as Portugal (Barros, 2004) and Spain (Pérez-Rodríguez and Acosta-González, 2007), as well as in non-European destinations such as Taiwan (Chen, 2007), the United States (Assaf and Magnini, 2012) and the Asia–Pacific region (Assaf, 2012). Similarly, in the literature on the economic effects of agglomeration, attempts have been made to explain other variables such as labour productivity (Anderson *et al.*, 1999). In this other field, the strategies used to estimate agglomeration effects are based mainly on the Cobb–Douglas functional form (Fernandes *et al.*, 2017).

An alternative functional form used in agglomeration studies is the translog function. Translog is considered an optimal function in some studies (e.g. Arbelo *et al.*, 2018; Martín-Rivero *et al.*, 2021) because it does not require strict assumptions such as “perfect” or “smooth” substitution between production factors or perfect competition on the production factors market (Pavelescu, 2011). However, the translog function is more difficult to manipulate mathematically (Martins *et al.*, 2012) and can lead to problems of collinearity (Fernandes *et al.*, 2017; Lionetti, 2009) or higher correlation (Vives and Jacob, 2020) due to the large number of parameters that must be estimated in each production factor (Pavelescu, 2011).

For this reason, other studies have argued that the Cobb–Douglas function is the most appropriate function (Assaf and Magnini, 2012; Deng *et al.*, 2019) as it satisfies properties such as explicit representability, parsimony, flexibility and uniformity (Bhanumurthy, 2002); it is easier to use for estimating and interpreting elasticities (Deng *et al.*, 2019), and largely approximates a production process (Reynes, 2017). Given these qualities, the Cobb–Douglas production function is used for the quantitative analysis performed in this study.

In line with other studies (Chiang and Cheng, 2014; Wannakrairoj and Velu, 2021), the Cobb–Douglas production function was estimated omitting records of hotels with no activity mainly to allow for the use of log-linear estimates. Alternatives for dealing with these cases have been proposed in the literature, such as the use of a dummy variable (Battese, 1997) or relative values (Chiang and Cheng, 2014). However, estimations obtained with transformed values could be extremely sensitive to the chosen transformation (Soloaga, 1999).

2.3 Location factors and buffer

Location choice is the most crucial decision for a new hotel (Yang *et al.*, 2012) and the hotel industry relies heavily on its strategies for choosing where to locate its establishments.

An effective location is linked to higher occupancy rate, profitability and revenue per room and will influence customer/tourist attraction and success/failure against competition (Latinopoulos, 2018; Luo and Yang, 2016). Hotels will choose to locate close to other hotels with similar characteristics to benefit from the external economies of all firms in the same environment; a behaviour that is referred to as "spatial agglomeration" (Adam and Mensah, 2014). Yang *et al.* (2014) argued that hotels are not randomly distributed but form spatial clusters due to these agglomeration economies. These spatial clusters of hotels are related to location factors.

The most frequently used measure of accessibility and proximity in these models is the distance between some points of origin and destination (Thrane, 2007). Most of the studies cited above suggest a monotonically decreasing relationship between distance to the destination's tourist attractions and hotel performance. However, the behaviour of tourists when selecting accommodation may not follow this pattern, and the effect may even disappear after a certain distance, thus giving rise to a buffer zone or area of influence around the point of interest. One methodological aspect our study aims to determine is whether it is better to specify accessibility by means of a buffer zone or to directly consider the distance between the hotel and the point of interest. Similar models have been developed to estimate the price of housing (Chica-Olmo *et al.*, 2019) and hotel accommodations (Blal and Sturman, 2014).

In accordance with Tobler's (1970) first law of geography that "everything is related to everything else, but near things are more related than distant things", hotel revenues are assumed to be spatially auto-correlated since nearby hotels are more likely to have the same (1) development goals and requirements; (2) attributes (Latinopoulos, 2018); (3) accessibility to transportation systems (Valentin and O'Neill, 2019); and (4) share complementary products offered by nearby businesses (e.g. restaurants, places of interest) (Rigall-I-Torrent and Fluvià, 2011).

Some studies have highlighted the importance of accessibility to airports, road and railroad networks for hotel guests (Lado-Sestayo *et al.*, 2020; Yang *et al.*, 2018). Given that tourists want to be well linked to the place they are visiting, transportation accessibility is an important driver of hotel location and guest satisfaction (Valentin and O'Neill, 2019; Yang *et al.*, 2012).

The distance between means of transport and accommodation has a negative effect on the number of visitors and hotel industry revenue (Montant, 2020). As the primary point of entrance in cities, airports play an essential role in accessibility (Valentin and O'Neill, 2019). Hotel guests perceive airport proximity as a benefit during their stay (Kim *et al.*, 2020) and hotel demand increases when points of tourism interest become more accessible (Yang *et al.*, 2018). Transportation to tourist destinations improves the utility and satisfaction of hotel guests, thus increasing the hotel's performance and revenue (Chou *et al.*, 2008).

In Spain, 82% of international tourists arrive by air (National Institute of Statistics [INE], 2020). The country's two main points of interest for tourism are its sun, sea, sand offering and cultural heritage (Huete-Alcocer *et al.*, 2019). Given that these are the most frequent types of tourism in Spain (Cisneros-Martínez and Fernández-Morales, 2015), we propose the following hypotheses:

H1. The spatial accessibility of a hotel to the nearest airport positively influences hotel revenue.

H2. The spatial accessibility of a hotel to a destination's main attractions (coastal and cultural) positively influences hotel revenue.

2.4 Policy diffusion mechanisms and spatial spillover effects

Hotel managers make decisions to improve performance influenced by diffusion mechanisms. Shipan and Volden (2008) considered four mechanisms of diffusion: coercion, competition, imitation and learning. The last three mechanisms are directly associated with the presence of spatial spillover effects although coercion may indirectly induce imitation.

Competition is a natural mechanism of the competitive market by which companies react in order not to lose business with respect to their closest competitors in the space.

The imitation mechanism occurs when the management of a hotel imitates the decision of the management of other neighbouring hotels, without considering whether this decision is effective. However, the learning mechanism occurs when a hotel adopts the decision of other hotels because it has learnt from their experience. Thus, similar and related companies in the same cluster create learning zones that enable knowledge spillovers and encourage learning and innovation, which in turn increases company and cluster productivity (Kim *et al.*, 2021).

According to Shaw and Williams (2009), it is easier to create human capital (as a result of observation and imitation) in geographically concentrated areas due to transparency and proximity. In the tourism industry, competitiveness, newly acquired knowledge and the imitation process can promote innovation at business level, thus improving the company's competitiveness and productivity (Weidenfeld *et al.*, 2010). In a learning environment like this, human capital and knowledge spillovers accumulated in the movement of experienced labour between cluster enterprises have an important impact on productivity (Kim *et al.*, 2021) or due to factors such as technology or knowledge transfer (Arbia *et al.*, 2010).

However, the effects of these mechanisms are not easy to separate, measure or quantify (Shipan and Volden, 2008), although they will have effects on the econometric model, giving rise to the presence of spatial spillover effects.

Policy diffusion gives rise to spatial clusters (Myles Shaver and Flyer, 2000), which are produced by two types of spatial spillover effects. The first effect is substantive spatial dependence (Anselin, 1988), which involves a spillover effect on the performance of geographically close hotels. Due to a spatial mechanism of diffusion, hotel managers might be expected to make decisions aimed at increasing revenues, such that hotels with high revenues will be located next to others with high revenues and vice versa, resulting in the presence of a spatial spillover effect of the dependent variable (substantive spatial dependence).

The second effect is indirect (LeSage and Pace, 2009). This is the spatial spillover effect of explanatory variables and occurs when factors that explain the revenue of some hotels affect the revenue of their neighbours. In this case, hotel managers' decisions with respect to some explanatory variables affect the revenues of neighbouring hotels. For example, if a hotel manager decides to increase the number of employees, this will benefit other nearby hotels, as it will be relatively easy to find trained staff. Few studies have considered the effects of spatial spillover on hotel revenue (Lee and Jang, 2012) and even fewer or none have examined the relation between spatial spillover and diffusion policies.

Therefore, two additional hypotheses regarding the location of hotels are proposed:

H3. Mechanisms of diffusion lead to the presence of substantive spillover in the hotel industry.

H4. Through mechanisms of diffusion, the explanatory factors of a hotel's revenue will affect the revenue of neighbouring hotels, thus leading to indirect effects.

3. Methodology

Ordinary least squares (OLS) is probably the most widely used method to study accommodation performance (White and Mulligan, 2002). The spatial relationship between the values of a spatially distributed variable determines spatial dependence, which is measured by spatial autocorrelation (Anselin, 1988). In the presence of spatial autocorrelation, OLS ignores spatial dependence and provides biased standard errors and inefficient estimations (Anselin, 1988). This justifies the use of more sophisticated spatial methodologies such as the spatial econometric models recently used in studies on the lodging industry (Eugenio-Martin *et al.*, 2019).

Although there are several types of spatial econometric models (Anselin, 1988; Elhorst, 2014), only two are commonly used:

(1) Spatial autoregressive model (SAR):

$$y = \rho Wy + X\beta + \varepsilon \tag{1}$$

(2) Spatial error model (SEM):

$$\begin{aligned} y &= X\beta + u \\ u &= \lambda Wu + \varepsilon \end{aligned} \tag{2}$$

where y is a vector of the values of the dependent variable; X is a matrix with explanatory variables; β is a vector of the parameters; W is a row-standardised spatial weights matrix whose elements are w_{ij}; Wy is a vector representing the spatial lag of the dependent variable; ρ is the spatial autoregressive parameter and represents the endogenous or substantive spatial spillover effects; Wu is a vector representing the spatial lag perturbations with λ as its associated parameter; and ε denotes normal vector perturbations.

In our study, a SAR model has been preferred (see section 6) and the specification is:

$$\text{ln\_Revenue} = \beta_1 i + \beta_2 I + \beta_3 S + \beta_4 R + \beta_5 L + \rho W_1 \,\text{ln\_Revenue} + \varepsilon \tag{3}$$

where ln_Revenue is a vector with log of hotel revenue; i is a vector of ones; I, S, R and L are matrices with investment, structural, reputational and locational variables; W_1 is the spatial weights matrix whose elements are $w_{\text{ij}} = 1/d_{\text{ij}}$, where d_{ij} represents the distance between two hotels; and β_j and ρ are the associated parameters.

3.1 Study area and data description

This study is geographically based on hotels located in Spain using financial metrics revenues per hotel. With 82.6 million international tourists in 2018 (UNWTO, 2019b), Spain occupies a prominent position within the international hotel industry (Lado-Sestayo *et al.*, 2020); one of the main generators of employment in the country. Over 2.5 million people were employed in the tourism industry in 2018, 3.7% more than in the previous year (UNWTO, 2019b). In addition, 13.5% of total employment in Spain is linked to tourism-related activities (UNWTO, 2019a). Bujosa *et al.* (2015) projected that tourism will continue to grow and develop driven by the sun, sea and sand product, which is currently the largest tourism segment in the world.

However, it is not the only tourism product that attracts international arrivals, as cultural tourism has experienced rapid growth worldwide (Huete-Alcocer *et al.*, 2019). Spain was chosen for this study as it has been the second tourist destination worldwide for several years (UNWTO, 2019a). With its 8,000 km of coastline, Spain has a wide sun, sea and sand tourism offering (IGN, 2020), as well as an important cultural tourism offering due to its 48 sites registered on the World Heritage List (UNESCO, 2020).

We obtained the data from Bureau van Dijk's (BvD) Orbis global database in 2018.

This database has been used in several studies (Kalemli-Ozcan *et al.*, 2015) as it contains data on the most important companies in each country and verifies the accuracy of the information. Although a total of 14,742 hotels were in operation in Spain in 2018 (INE, 2020), the Orbis database has information for only 2,047. Moreover, due to the lack of data for the individual analysis of some of the hotels, the study sample was reduced to 1,537 establishments. As in Chiang and Cheng (2014) and Wannakrairoj and Velu (2021), the sample was restricted to the positive values of the dependent and independent variables to enable the use of log-linear estimates and better interpret the elasticities. Thus, non-operating hotels in 2018 were eliminated from the analysis and a final sample of 1,015 hotels was obtained. The study uses a larger data set than has been available in previous analyses (Balaguer and Pernías, 2013; Lado-Sestayo *et al.*, 2020).

Customer delight leads to greater customer loyalty and commitment and generates favourable guest behaviour such as positive word-of-mouth and repeat bookings (Torres and Kline, 2006). Consequently, potential guests will take this delight factor into account when consulting customer ratings to book accommodation. However, the delight factor may be different for each consumer and the scale used by different websites may differ (TripAdvisor's scale ranges from 1–5, while Booking.com's scale is 2.5–10). Jiménez *et al.* (2016) found more than half of hotels (52.56%) had a rating of 4–5 in TripAdvisor, while Mellinas *et al.* (2015) determined 8 is the average rating for Spanish hotels in Booking.com.

The definitions of variables used in this study are shown in Table 1 and the classification of variables and study hypotheses are shown in Figure 1.

Variable	Category of variable	Name of levels	Description	Source
Revenue	Dependent	–	Hotel revenue	Orbis Global Database
Capital	Independent	–	Fixed assets as a proxy of capital (Barros and Santos, 2006)	
Workforce	Independent	–	Number of workers	
Company size	Independent	Small_size Medium_size Large_size	Dummy for each size. The criterion for company size used by Orbis takes into account operating revenue, total assets and number of employees	
Number of hotel star	Independent	3_stars 4_5_stars	In line with Andersson (2010) we included a dummy variable for 4- or 5-star hotels under the assumption that this category is based on superior quality compared to 3-star hotels. 1 or 2-star hotels is the reference category	Booking.com
Consumer rating	Independent	Booking	Dummy variable. 1 represents a rating equal to or greater than 8 and zero otherwise (Mellina *et al.*, 2015)	Booking.com
Location	Independent	Dist_coast (km) Dist_heritage (km) Dist_airport (km)	The Euclidean distance in kilometres. The Spanish airports (managed by AENA) and the sites on the United Nations Educational, Scientific and Cultural Organisation (UNESCO) World Heritage List (National Geographic Institute) were geo-referenced using a GIS	Georeferenced data of hotel location from Orbis Global Database

Table 1.
Definition and source of variables

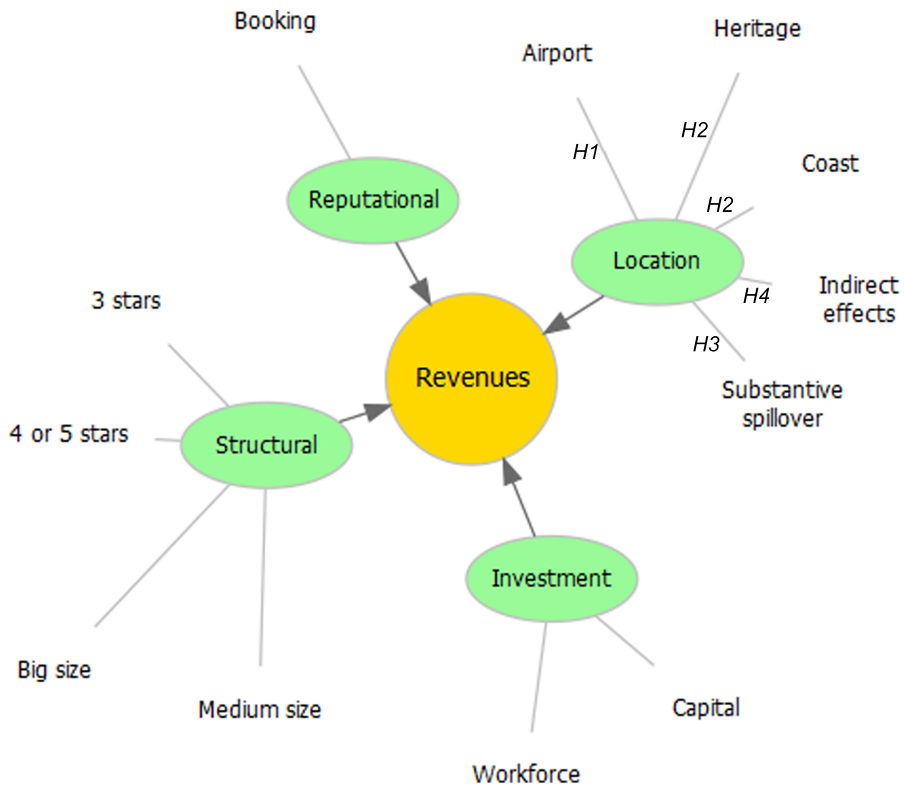

Figure 1.
Classification of variables and study hypotheses

3.2 Methods of analysis

Table 2 shows the descriptive statistics of the variables considered in this study. Even though the average annual revenue of the hotels in the sample is around two million euros, to understand how hotel revenue is related to hotels' accessibility characteristics, we considered, for example, hotels with maximum and minimum revenue.

Variables	Mean	SD	Min	Max
Revenue (€)	2,034,223	3,567,001	77,603	39,771,121
Capital (€1000)	3490.507	10177.390	0.946	144665.600
Workforce (no.)	22.936	35.090	1	453
Medium_Size (binary)	0.522	–	0	1
Large_size (binary)	0.046	–	0	1
Booking (binary)	0.796	–	0	1
3_stars (binary)	0.379	–	0	1
4_5_stars (binary)	0.282	–	0	1
Dist_coast (km)	76.032	119.562	0.001	457.794
Dist_heritage (km)	67.694	49.932	0.156	289.939
Dist_airport (km)	50.452	41.829	0.887	194.515

Table 2.
Descriptive statistics

The maximum revenue (approximately 40 million euros) corresponds to a large 5-star hotel with one of the highest capital investments (136 million euros), a medium to high number of employees (344 employees) and good ratings in Booking.com (9.4). The hotel is located 500 m from the coast in the municipality of Marbella (Malaga). Although it is close to the airport of Torremolinos, it is quite far from the nearest UNESCO monument, the Alhambra in Granada. This particular hotel is surrounded by another 32 hotels (within a radius of 7 km), of which five are large 4-star hotels with mean revenue of 17 million euros. The hotel with the lowest revenue (77,603 euros) is a small 2-star hotel with a capital investment of only 67,000 euros, two employees and good ratings in Booking.com (8.7). This hotel is quite far from the coast but close to the airport and the Pyrenees-Monte-Perdido (UNESCO tourist attraction) and surrounded by another 12 hotels (within a radius of 7 km), of which only two others are small with mean revenue of 327,000 euros.

There are 11 small hotels in the sample which have a very low capital investment of less than 10,000 euros. It should be noted the average number of employees (22.9) is well above the average of most Spanish companies, which is 2 (Barrón, 2016). In our sample, medium-sized hotels abound, accounting for 52% of the total number. Nearly 80% of the hotels have good ratings given that the average rating in Booking.com is 8. It is interesting to note that more than 50% of the hotels are within 12 km from the coast, which confirms Spain's abundant sun, sea and sand hotel offering.

Following the literature review, a Cobb–Douglas model was used in which the response variable hotel revenue and the explanatory variables Workforce and Capital are all in natural logarithms. The coefficients of these variables represent elasticities. For the rest of the continuous variables, the coefficient multiplied by 100 represents the impact on revenue in percentages. However, when the variable is binary, this impact is $100(exp(\beta) - 1)$ (Halvorsen and Palmquist, 1980) where β is the coefficient of the binary variable.

4. Findings

As indicated in the literature review, the spatial accessibility of hotels to points of interest such as the nearest coast, heritage sites and airports might explain differences in hotel revenue. To quantify accessibility, the proximity between locations was measured using the Euclidean distance between hotel location and the nearest point of interest. However, as indicated in the literature review, the effect of distance does not always have to have a monotonically decreasing effect across the plane. In fact, the effect may even disappear after a certain distance, giving rise to a buffer zone or area of influence around the point of interest. In this study, two models were estimated using OLS to explain hotel revenue and determine whether it is better to consider distance or a buffer zone (see Table 4, Mod1.OLS and Mod2.OLS).

4.1 Buffer accessibility variables

In Mod1.OLS (Table 4) accessibility was measured as the Euclidean distance to the points of interest (Dist_coast, Dist_airport and Dist_heritage). All variables in the model are significant at 95% except distance to the coast and to the nearest heritage site. However, Mod2 OLS was estimated considering a buffer zone for each point of interest.

To determine the radius of the buffer zone, the following procedure was used: the first model (Mod1.OLS) was estimated replacing the variables Dist_coast, Dist_airport and Dist_heritage with binary variables that take the value of 1 for a certain distance h (buffer radius). Figure 2 shows the R-squared of the model with the buffer radius, h, from 1 km to 50 km, which increases kilometre by kilometre. The R-squared is maximised for a distance of 40 km to heritage sites, 12 km for the distance to the coast and 23 km for the distance to airports. Figure 3 shows the location of the coast, heritage sites and airports, as well as the buffer zone associated with each of the three points of interest.

4.2 Global spatial dependence

Before analysing the presence of a spatial spillover effect in revenues, it is convenient to analyse the presence of global spatial autocorrelation (dependence) without considering the

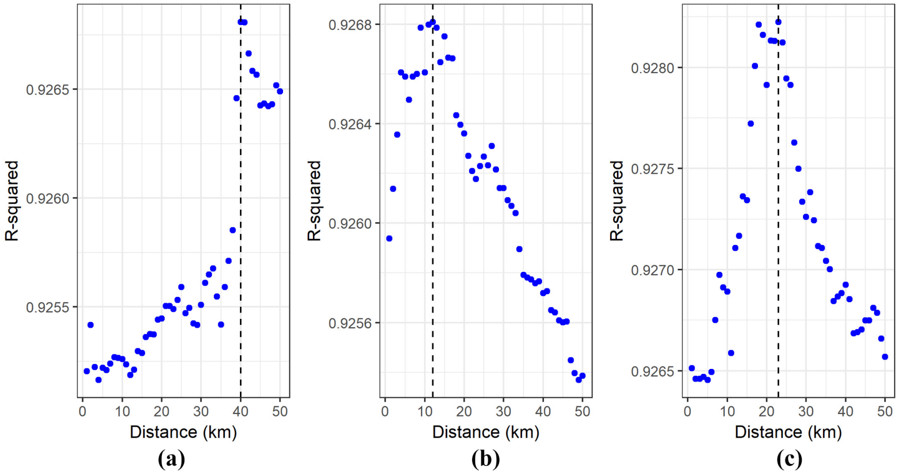

Figure 2.
R-squared for the different distances between each hotel and the point of interest. (a) distance to the nearest heritage site, (b) distance to the coast and (c) distance to the nearest airport

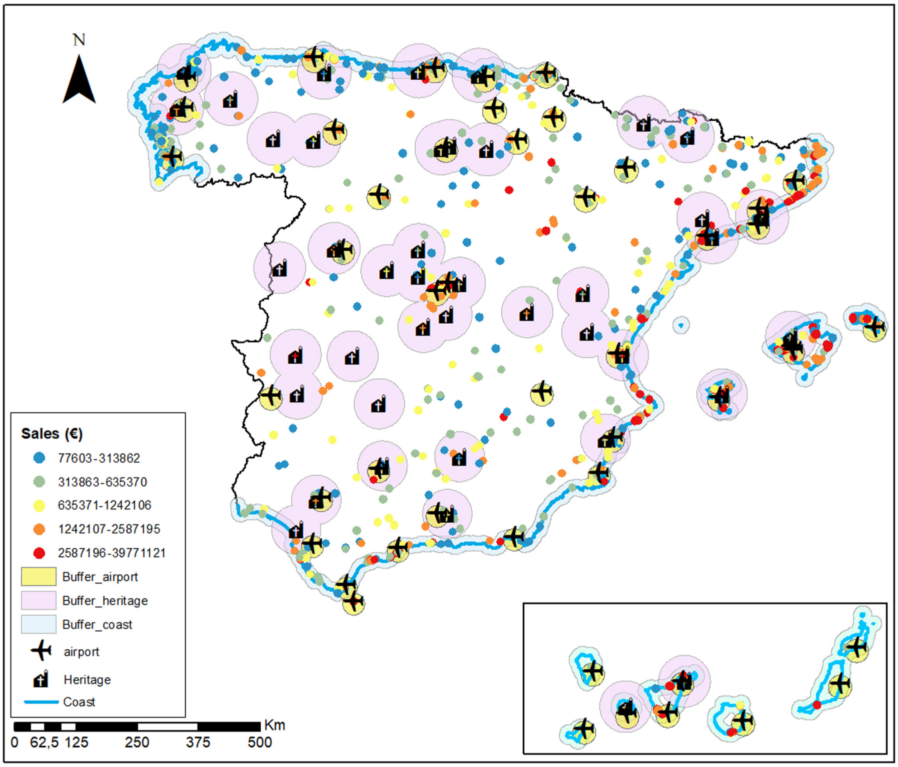

Figure 3.
Location of hotels and hotel revenue in quintiles. Location of airports and UNESCO heritage sites, their buffer zones and coastal buffer zones

possible effect of other explanatory variables. To quantify this global spatial dependence, Moran's I statistic was used (Moran, 1950):

$$I = \frac{n}{\sum_{i-1}^{n}\sum_{j-1}^{n} w_{ij}} \frac{\sum_{i-1}^{n}\sum_{j-1}^{n} w_{ij}(y_{i-}\bar{y})(y_j - \bar{y})}{\sum_{i-1}^{n}(y_{i-}\bar{y})^2} \tag{4}$$

where y_i is the revenue of the i-th hotel, $\bar{y}$ is its mean and w_{ij} are the spatial weights corresponding to hotels i and j. These weights represent the type of neighbourhood and intensity between hotels i and j.

It is important to determine the most suitable specification for the weights w_{ij} (Anselin, 1988). In line with the first law of geography (Tobler, 1970), we have considered the distance between hotels as a measure of proximity between them. Additionally, we have considered three different specifications for the weights w_{ij}: (1) inverse distance, the weight should decrease as the distance between hotels increases; (2) binary, two hotels are considered to be neighbours if they are within an area of influence defined by a radius or threshold and (3) inverse distance with threshold:

$$W_1\text{. Inverse distance : } w_{ij} = \frac{1}{d_{ij}}$$

$$W_2\text{. Binary with threshlod : } w_{ij} = \begin{cases} 1 \text{ if } d_{ij} \leq 118.5km \\ 0 \text{ if } d_{ij} > 118.5km \end{cases} \tag{5}$$

$$W_3\text{. Inverse distance with threshold : } w_{ij} = \begin{cases} \frac{1}{d_{ij}} \text{ if } d_{ij} \leq 118.5km \\ 0 \quad \text{if } d_{ij} > 118.5km \end{cases}$$

where d_{ij} is the distance between hotels i and j, and 118.5 km is the threshold. The threshold represents the minimum distance required to avoid excluding hotels.

Table 3 shows the results of Moran's I statistic considering the three specifications for the weights w_{ij}. In all three cases, significant spatial autocorrelation was detected. The degree of persistence in the spatial autocorrelation is a robust indicator that hotel revenue is not randomly distributed across the plane. In contrast, hotels close to other hotels have similar revenue. This leads us to think about the possibility of the presence of the spatial spillover effect.

In this study, three specifications of w_{ij} are significant. In order to select the best one, we need to consider the value of Moran's I statistic (Chi and Zhu, 2008) together with the value of the z-score. In this case, W_1 is the specification that presents the highest value in both Moran's I and the associated z-score. As a result, it was the specification chosen for the study.

Table 3.
Moran's I statistical for revenue with different neighbourhood specifications among hotels

	W_1	W_2	W_3
Moran's I	0.2587	0.1290	0.1945
z-score	10.1070	3.5489	10.6750
p-value	<0.0000	0.0001	<0.0000

Table 4 shows the estimates for the four models considered. Mod1.OLS and Mod2.OLS have been previously discussed. Mod2.SAR and Mod2.SEM represent, respectively, explanatory variables of Mod2, but also consider the substantive spatial spillover effect (SAR model) and spatial autocorrelation in the perturbations or nuisance (SEM model) (Anselin, 1988).

4.3 Models

In line with the Anderson–Darling test (Anderson and Darling, 1954), in Mod1.OLS (AD = 0.6069, p = 0.1145) and Mod2. OLS (AD = 0.3679, p = 0.4297), the null hypothesis of normality of disturbances is not rejected. Neither of the two models presents problems of multicollinearity given that the variance inflation factor (VIF) does not exceed the value of 5 in any of the cases (2.6678). However, the Moran's I error, LM-error, Robust-LM-error, LM-lag and Robust-LM-lag tests reveal the presence of spatial autocorrelation. It should be noted that the value of the LM-lag and Robust-LM-lag statistics are somewhat higher than the LM-error and Robust-LM-error. This indicates the SAR specification is preferred to SEM (Anselin, 1988).

Dependent variable ln_Revenue	Mod1.OLS	Mod2.OLS	Mod2.SAR	Mod2.SEM
const	11.1592 (0.000)	10.9529 (0.000)	9.9316 (0.000)	10.9839 (0.000)
Investment variables				
ln_Workforce	0.7845 (0.000)	0.7830 (0.000)	0.7743 (0.000)	0.7791 (0.000)
ln_Capital	0.0505 (0.000)	0.0500 (0.000)	0.0515 (0.000)	0.0485 (0.000)
Structural variables				
Medium_size	0.3745 (0.000)	0.3584 (0.000)	0.3478 (0.000)	0.3457 (0.000)
Large_size	0.8554 (0.000)	0.8081 (0.000)	0.7644 (0.000)	0.7844 (0.000)
3_stars	0.0690 (0.010)	0.0736 (0.005)	0.0710 (0.005)	0.0795 (0.001)
4_5_stars	0.1752 (0.000)	0.1725 (0.000)	0.1639 (0.000)	0.1786 (0.000)
Reputational				
Booking		0.0665 (0.009)	0.0692 (0.007)	0.0552 (0.030)
Locational variables				
Dist_coast	0.0471 (0.6535)	–	–	–
Dist_heritage	−0.0004 (0.0673)	–	–	–
Dist_airport	−0.0013 (0.000)	–	–	–
Coast_12 km	–	0.1154 (0.000)	0.0833 (0.000)	0.1232 (0.000)
Heritage_40 km	–	0.0769 (0.001)	0.0730 (0.002)	0.0713 (0.010)
Airport_23 km	–	0.1229 (0.000)	0.0934 (0.000)	0.1255 (0.000)
*W*ln_Revenue	–	–	0.0777 (0.000)	–
Wu	–	–	–	0.2101 (0.000)
Goodness of fit				
R-squared	0.9242	0.9282	0.9306	0.9306
AIC	658.183	602.896	572.66	572.97
Spatial autocorrelation				
Moran's *I*	0.1819 (0.000)	0.1548 (0.000)	–	–
LM-error	48.25 (0.000)	34.932 (0.000)	–	–
Robust-LM-error	21.252 (0.000)	16.158 (0.000)	–	–
LM-lag	52.561 (0.000)	35.319 (0.000)	–	–
Robust-LM-lag	25.563 (0.000)	16.546 (0.000)	–	–

Note(s): Dependent variable natural logarithm of revenue. N = 1015. p-values in brackets. The R-squared of Mod2.SAR and Mod2.SEM is the Nagelkerke pseudo R-squared

Table 4. Models

The model with the lowest AIC statistic value is Mod2.SAR. Considering this result and the LM and Robust-LM statistics, Mod2.SAR would seem to be the most suitable model for explaining differences in revenue, including the substantive spatial spillover effects.

The significance and signs of the coefficients obtained for Mod2.SAR show that investment (ln_Workforce, ln_Capital), structural (Stars and Size) and reputational (Booking) factors have a significant and positive influence on hotel revenue. Spatial accessibility factors condition revenue through buffer zones that determine the area of influence. Thus, the area of influence of airports is 23 km, the area of influence of UNESCO World Heritage sites is 40 km, and the area of influence to the coast is 12 km. This result empirically supports H1 and H2 and corroborates that the buffer-based ratio better explains hotel revenue than a monotonic distance.

In turn, the coefficient of the variable *W*ln_Revenue is positive and significant. This supports H3, which states that diffusion mechanisms lead to the presence of substantive spillover in the hotel industry.

4.4 Direct, indirect and total spatial spillover effects

According to LeSage and Pace (2009), the so-called direct, indirect and total effects in a SAR model can be obtained by means of the following expression:

$$y = (I - \rho W)^{-1}(X\beta) + \varepsilon$$

$$\begin{bmatrix} \dfrac{\partial E(y_1)}{\partial x_{1k}} & \cdots & \dfrac{\partial E(y_1)}{\partial x_{Nk}} \\ \cdot & \cdots & \cdot \\ \dfrac{\partial E(y_N)}{\partial x_{1k}} & \cdots & \dfrac{\partial E(y_N)}{\partial x_{Nk}} \end{bmatrix} = (I - \rho W)^{-1} \begin{bmatrix} \beta_k & 0 & \cdots & 0 \\ 0 & \beta_k & \cdots & 0 \\ \cdot & \cdot & \cdots & \cdot \\ 0 & 0 & \cdots & \beta_k \end{bmatrix} \tag{6}$$

where the direct effects are every diagonal element of the partial derivate matrix, and the indirect effects are every off-diagonal element of the matrix. The direct effect represents the impact on revenue of hotel i if a certain unit varies in a particular explanatory variable of that hotel.

The indirect effect represents the impact of this explanatory variable on the revenue of neighbouring hotels and is the spatial spillover effect of the explanatory variables (Gong *et al.*, 2014). The total effect is the sum of the direct and indirect effects. Due to feedback effects, the direct effect in the SAR model differs from the OLS coefficient because the impact will spread to neighbouring hotels before returning to the origin (Gong *et al.*, 2014).

The coefficients of models Mod1.OLS, Mod2.OLS and Mod2.SEM for the variables ln_Capital and ln_Workforce represent elasticities, while the other coefficients represent semi-elasticities. Given that the coefficients of Mod2.SAR cannot be directly interpreted, the direct, indirect and total effects were obtained. Table 5 shows the effects of the explanatory variables.

All have the expected signs and are significant at 95%. The variable ln_Workforce can be used as an example to interpret the results in the table. The direct effect of this variable can be understood as follows: if Workforce increases by 1%, then the revenue of hotel i will increase by approximately 0.78%. This will lead to an increase of approximately 0.06% in the revenue of its neighbouring hotels (indirect effect). This means that if the hotels (j) near hotel i invest in Workforce, the revenue of hotel i will improve given that it would probably create a market for trained personnel in the proximity of that hotel. Logically, in all cases the direct effect of each predictor is much greater than the indirect effect. The total impact is the sum of both.

Variable	Direct effect	Indirect effect	Total effect
ln_Workforce	0.7759 (0.000)	0.0637 (0.000)	0.8396 (0.000)
ln_Capital	0.0516 (0.000)	0.0042 (0.000)	0.0558 (0.000)
Medium_Size	0.3485 (0.000)	0.0286 (0.000)	0.3771 (0.000)
Large_size	0.7660 (0.000)	0.0629 (0.000)	0.8288 (0.000)
3_stars	0.0712 (0.001)	0.0058 (0.005)	0.0770 (0.001)
4_5_stars	0.1643 (0.000)	0.0135 (0.000)	0.1777 (0.000)
Booking	0.0694 (0.010)	0.0057 (0.027)	0.0751 (0.011)
Coast_12 km	0.0835 (0.000)	0.0069 (0.000)	0.0904 (0.000)
Heritage_40 km	0.0731 (0.005)	0.0060 (0.008)	0.0791 (0.004)
Airport_23 km	0.0936 (0.000)	0.0077 (0.001)	0.1013 (0.000)

Note(s): *p*-values in brackets

Table 5.
Direct, indirect, and total effects

The interpretation of a dichotomous variable such as 4_5_stars would be as follows: if hotel *i* has 4 or 5 stars, its revenue will increase by approximately 17.86% ((exp (0.1643)−1)*100) (direct effect) with respect to a 1- or 2-star hotel and this will indirectly influence the revenue of neighbouring hotels by 1.36% ((exp (0.0135)–1)*100) (indirect effect), thus resulting in a total effect of 19.22%. Hence, in a SAR model it is possible to interpret the indirect effects as the effects of diffusion mechanisms caused by the decisions of neighbouring hotel managers in relation to the explanatory variables. That is, if the manager of a neighbouring hotel (*j*) decides to increase investment in the workforce, this decision will have an indirect effect on the revenues of the hotel (*i*), either by imitating the manager's decision, or learning that this decision can improve revenue or because of competition.

The results obtained from the indirect effects enable us to test hypothesis H4 and indicate that the explanatory factors of a hotel's revenue will affect the revenue of its neighbours likely due to diffusion mechanisms.

5. Conclusion and implications

Similar to previous studies, we have shown that agglomeration externalities influence hotel location decisions (e.g. Canina *et al.*, 2005; Cruz and Teixeira, 2010). Thus, the choice of hotel location constitutes an important factor in hotel performance (Chung and Kalnins, 2001; Tallman *et al.*, 2004). Specifically, our results show that agglomeration economies and policy diffusion play a significant role in hotel industry revenue. While agglomeration economies are related to several factors linked to spatial accessibility, mechanisms of policy diffusion are related to spatial spillover effects. This study showed it is better to use specifications by buffer zones than a monotonically decreasing relationship of distance to the main points of interest to quantify spatial accessibility. This brings the theoretical model closer to the market reality, and these factors should be taken into account in the immediate surroundings when considering the location for a new hotel.

It should be noted that the explanatory variables of proximity to points of interest such as the coast, heritage sites, and airports have a significant positive effect on hotel revenue owing to the area of influence. More specifically, the radius for the area of influence for the coast is 12 km, for UNESCO heritage sites it is 40 km and for airports it is 23 km. In addition, if a hotel is located in an area where there are hotels with high revenue, high investments in productive factors, good structure indicators (size and stars) and good customer ratings, the hotel's revenue will increase.

This study shows accessibility variables produce agglomeration economies because hotels tend to be located closer to each other to obtain benefits from these variables and the hotel's performance increases due to a spillover effect caused by its neighbours (Barros, 2005). Hotels that take advantage of high agglomeration economies tend to have higher survival rates in times of crisis than hotels located in areas with low agglomeration economies (Luo and Yang, 2013). Moreover, two types of spatial spillover possibly caused by diffusion mechanisms have been observed: endogenous or substantive spillover and indirect effects.

Regarding the structural variables, hotel size and star rating both have the expected signs (Kim *et al.*, 2013). Reputational factors, like customer ratings, have a positive effect on revenue (Öğüt and Onur Taş, 2012). For the investment category, the variables Capital and Workforce have a positive impact on hotel revenue, which is consistent with the literature (Barros, 2004). In addition to having direct effects, investment, structural, and reputational factors have indirect spillover effects on hotel revenue. Consequently, improvements made by a hotel not only have a positive effect on the revenue of that specific hotel, but such investments have a marginal effect on nearby hotels. For example, an improvement in customer ratings of neighbouring hotels will attract more tourists to an area, thus benefiting all the hotels in that area.

The results of this study confirm the four hypotheses proposed and show that location factors have significant effects on hotel revenue in Spain. It has been determined that hotel revenue is affected by both (H1) proximity to means of transport such as airports, and (H2) the classic sun, sea and sand offering, as well as cultural tourist attractions, the two hypotheses related to the presence of agglomeration economies. The study detected substantive spillover where hotel revenue is influenced by the revenue of neighbouring hotels (H3) and indirect effects where hotels benefit from the explanatory variables of the revenue of neighbouring hotels (H4), both of which are caused by mechanisms of diffusion.

We performed a validity test taking into account the direct impact of the COVID-19 health crisis on the tourism industry. Overnight stays were obtained for the second half of 2020 (period in which the lockdown restrictions in Spain were lifted) and 2018 (year of our data) for both domestic and international tourists (INE, 2020). The objective is to compare whether there were significant changes in the visiting preferences of domestic and international tourists in this period, regardless of the absolute number of tourists.

A total of 102 main tourist spots in Spain (municipalities) that account for 76% of hotel rooms in the country were considered and the correlation coefficients were calculated for overnight stays in 2020 and 2018. Comparing both periods, the calculated correlation is 0.92 for domestic tourism and 0.93 for international tourism. This suggests that although tourism indexes have been affected, tourist preferences regarding places to visit remained the same in 2020. Therefore, we assume the results obtained in this research can be extrapolated to the current situation of the industry.

Our findings have implications for the hotel industry, governments and academia. Firstly, they provide relevant information for the hotel industry and shareholders who wish to invest in a new hotel since both the direct and indirect effects of spatial spillover on hotel revenues are quantified. Secondly, the area of influence of factors related to accessibility and hotel revenue have been identified, which can help in making decisions on where to locate new hotels.

The influence of points of interest (areas with high investment in productive factors and infrastructure) on the level of hotel revenue underlines the importance of public and private investment in creating agglomeration economies that generate positive externalities (Chung and Kalnins, 2001; Tallman *et al.*, 2004), the design of urban planning models that fit the desired patterns and enhance the spatial attractiveness of an area (Marco-Lajara *et al.*, 2014), and policies aimed at tourism development (Yang *et al.*, 2014). In addition, this study provides a novel result regarding the fact that diffusion policies create a spillover effect between nearby hotels in terms of revenue (substantive spillover effect) and predictors of revenue (indirect effect).

Moreover, given that the hotel environment is considered natural capital and contributes to hotel resilience, a convenient location will be beneficial for the recovery of the industry after the impacts of COVID-19 (Duarte Alonso *et al.*, 2020). Additionally, the spatial distribution of hotels and their proximity to airports and tourist attractions should be considered in the development of tourism policies to maximise their effectiveness.

Finally, our study supports the theoretical arguments of agglomeration theories which argue that the benefits associated with a higher concentration of competitors improve a firm's revenue. These findings support the positive externalities obtained from the geographic clustering of hotels (Adam and Mensah, 2014; Yang *et al.*, 2014) and is contradictory with the literature that suggests a negative relationship between agglomeration and profitability (Baum and Haveman, 1997; Marco-Lajara *et al.*, 2014). This demonstrates the relevance of working with spatial econometric models to explain hotel industry performance and agglomeration effects in other geographical locations, as well as to clarify the mixed evidence regarding the effects of agglomeration on hotel profitability (Lado-Sestayo *et al.*, 2017).

Despite the importance of our findings and their contributions to the literature, this study has some limitations for future research. Firstly, our theoretical and practical results are of a more general nature, and it would be of interest to conduct research on other geographical areas presenting specific features.

Secondly, although the overall rating of each hotel was used as an indicator of hotel service quality (Nicolau *et al.*, 2020), it does not paint a complete picture of customer satisfaction since all customers do not post their ratings on the website and they cannot be quantified. Therefore, to effectively quantify customer perceptions of hotel service quality, results of ad-hoc measures could be compared to the results obtained using the measure proposed in this research.

Finally, it would be of interest to consider additional variables such as environmental variables (air pollution, noise), policy diffusion mechanisms (learning, financial, or fiscal variables); structural variables (hotel age or refurbishments) and other variables that would justify locating hotels in a specific territory.

References

Adam, I. and Mensah, E. (2014), "Perceived spatial agglomeration effects and hotel location choice", *Anatolia*, Vol. 25 No. 1, pp. 49-60.

Anderson, T. and Darling, D. (1954), "A test of goodness of fit", *Journal of the American Statistical Association*, Vol. 49 No. 268, pp. 765-769.

Anderson, R., Fish, M., Xia, Y. and Michello, F. (1999), "Measuring efficiency in the hotel industry: a stochastic Frontier approach", *International Journal of Hospitality Management*, Vol. 18 No. 1, pp. 45-57.

Andersson, D.E. (2010), "Hotel attributes and hedonic prices: an analysis of internet-based transactions in Singapore's market for hotel rooms", *The Annals of Regional Science*, Vol. 44 No. 2, pp. 229-240.

Anselin, L. (1988), *Spatial Econometrics: Methods and Models*, Kluwer Academic Publishers, Dordrecht.

Arbelo, A., Arbelo-Pérez, M. and Pérez-Gómez, P. (2018), "Estimation of profit efficiency in the hotel industry using a Bayesian stochastic Frontier model", *Cornell Hospitality Quarterly*, Vol. 59 No. 4, pp. 364-375.

Arbia, G., Battisti, M. and Di Vaio, G. (2010), "Institutions and geography: empirical test of spatial growth models for European regions", *Economic Modelling*, Vol. 27 No. 1, pp. 12-21.

Assaf, A.G. (2012), "Benchmarking the Asia Pacific tourism industry: a Bayesian combination of DEA and stochastic Frontier", *Tourism Management*, Vol. 33 No. 5, pp. 1122-1127.

Assaf, A. and Magnini, V. (2012), "Accounting for customer satisfaction in measuring hotel efficiency: evidence from the US hotel industry", *International Journal of Hospitality Management*, Vol. 31 No. 3, pp. 642-647.

Balaguer, J. and Pernías, J. (2013), "Relationship between spatial agglomeration and hotel prices. Evidence from business and tourism consumers", *Tourism Management*, Vol. 36, pp. 391-400.

Barrón, I.D. (2016), "El 94,6% de las empresas españolas tiene de media dos empleados", available at: https://elpais.com/economia/2016/06/28/actualidad/1467111740_869558.html.

Barros, C. (2004), "A stochastic cost Frontier in the Portuguese hotel industry", *Tourism Economics*, Vol. 10 No. 2, pp. 177-192.

Barros, C. (2005), "Evaluating the efficiency of a small hotel chain with a Malmquist productivity index", *International Journal of Tourism Research*, Vol. 7 No. 3, pp. 173-184.

Barros, C.A.P. and Santos, C.A. (2006), "The measurement of efficiency in Portuguese hotels using data envelopment analysis", *Journal of Hospitality and Tourism Research*, Vol. 30 No. 3, pp. 378-400.

Battese, G. (1997), "A note on the estimation of Cobb-Douglas production functions when some explanatory variables have zero values", *Journal of Agricultural Economics*, Vol. 48 Nos 1-3, pp. 250-252.

Baum, J. and Haveman, H. (1997), "Love thy neighbor? Differentiation and agglomeration in the Manhattan hotel industry 1898-1990", *Administrative Science Quarterly*, Vol. 42 No. 2, pp. 304-338.

Bhanumurthy, K.V. (2002), "Arguing a case for the Cobb-Douglas production function", *Review Commerce Studies*, Delhi, India, Vol. 3, pp. 75-91.

Blal, I. and Sturman, M. (2014), "The differential effects of the quality and quantity of online reviews on hotel room sales", *Cornell Hospitality Quarterly*, Vol. 55 No. 4, pp. 365-375.

Bujosa, A., Riera, A. and Torres, C. (2015), "Valuing tourism demand attributes to guide climate change adaptation measures efficiently: the case of the Spanish domestic travel market", *Tourism Management*, Vol. 47, pp. 233-239.

Canina, L., Enz, C. and Harrison, J. (2005), "Agglomeration effects and strategic orientations: evidence from the US lodging industry", *Academy of Management Journal*, Vol. 48 No. 4, pp. 565-581.

Chen, C. (2007), "Applying the stochastic Frontier approach to measure hotel managerial efficiency in Taiwan", *Tourism Management*, Vol. 28 No. 3, pp. 696-702.

Cheng, D. (2013), "Analyze the hotel industry in porter five competitive forces", *Journal of Global Business Management*, Vol. 9 No. 3, p. 52.

Chi, G. and Zhu, J. (2008), "Spatial regression models for demographic analysis", *Population Research and Policy Review*, Vol. 27 No. 1, pp. 17-42.

Chiang, Y. and Cheng, E. (2014), "Estimating contractors' efficiency with panel data: comparison of the data envelopment analysis, Cobb-Douglas and translog production function methods", *Construction Innovation*, Vol. 14 No. 3, pp. 274-291.

Chica-Olmo, J., Cano-Guervós, R. and Tamaris-Turizo, I. (2019), "Determination of buffer zone for negative externalities: effect on housing prices", *The Geographical Journal*, Vol. 185 No. 2, pp. 222-236.

Chica-Olmo, J., Checa-Olivas, M. and Lopez-Castellano, F. (2021), "Regional characteristics of the gender employment gap: a spatio-temporal approach", *The Economic and Labour Relations Review*. doi: 10.1177/10353046211023242.

Chou, T.-Y., Hsu, C.-L. and Chen, M.-C. (2008), "A fuzzy multicriteria decision model for international tourist hotels location selection", *International Journal of Hospitality Management"*, Vol. 27, pp. 293-301.

Chung, W. and Kalnins, A. (2001), "Agglomeration effects and performance: a test of the Texas lodging industry", *Strategic Management Journal*, Vol. 22 No. 10, pp. 969-988.

Cisneros-Martínez, J. and Fernández-Morales, A. (2015), "Cultural tourism as a tourist segment for reducing seasonality in a coastal area: the case study of Andalusia", *Current Issues in Tourism*, Vol. 18 No. 8, pp. 765-784.

Cruz, S. and Teixeira, A. (2010), "The evolution of the cluster literature: shedding light on the regional studies–regional science debate", *Regional Studies*, Vol. 44 No. 9, pp. 1263-1288.

Deng, Y., Veiga, H. and Wiper, M. (2019), "Efficiency evaluation of hotel chains: a Spanish case study", *SERIEs*, Vol. 10 No. 2, pp. 115-139.

Duarte Alonso, A., Kok, S.K., Bressan, A., O'Shea, M., Sakellarios, N., Koresis, A., Buitrago Solis, M.A. and Santoni, L.J. (2020), "COVID-19, aftermath, impacts, and hospitality firms: an international perspective", *International Journal of Hospitality Management*, Vol. 91, 102654.

Elhorst, J. (2014), *Spatial Econometrics: From Cross-Sectional Data to Spatial Panels*, Vol. 479, Springer, Heidelberg, p. 480.

Elias-Almeida, A., Miranda, F. and Almeida, P. (2016), "Customer delight: perception of hotel spa consumers", *European Journal of Tourism, Hospitality and Recreation*, Vol. 7 No. 1, pp. 13-20.

Eugenio-Martin, J., Cazorla-Artiles, J. and González-Martel, C. (2019), "On the determinants of Airbnb location and its spatial distribution", *Tourism Economics*, Vol. 25 No. 8, pp. 1224-1244.

Fernandes, M., Santos, S. and Gouveia, A. (2017), "The empirics of agglomeration economies: the link with productivity", *Revue D'économie Industrielle*, Vol. 123 No. 3, pp. 87-109.

Ferreira Neto, A.B. (2021), "The diffusion of cultural district laws across US States", *The Annals of Regional Science*, Vol. 67 No. 1, pp. 189-210.

Gilardi, F. and Wasserfallen, F. (2019), "The politics of policy diffusion", *European Journal of Political Research*, Vol. 58 No. 4, pp. 1245-1256.

Gong, Y., Boelhouwer, P. and de Haan, J. (2014), "Spatial dependence in house prices: evidence from China interurban housing market", *Paper Presented at the ERSA Conference Papers*.

Halvorsen, R. and Palmquist, R. (1980), "The interpretation of dummy variables in semilogarithmic equations", *American Economic Review*, Vol. 70 No. 3, pp. 474-475.

Huete-Alcocer, N., López-Ruiz, V. and Grigorescu, A. (2019), "Measurement of satisfaction in sustainable tourism: a cultural heritage site in Spain", *Sustainability*, Vol. 11 No. 23, p. 6774.

IGN (2020), "Instituto Geográfico Nacional y Asociación Española de Geografía", available at: https://www.ign.es/recursos-educativos/relieve-costa/index.html

INE (2020), "Instituto Nacional de Estadística", available at: https://www.ine.es/

Jiménez, S., Morales, A., de Sandoval, J. and Stefaniak, A. (2016), "Hotel assessment through social media–TripAdvisor as a case study", *Tourism and Management Studies*, Vol. 12 No. 1, pp. 15-24.

Kalemli-Ozcan, S., Sorensen, B., Villegas-Sanchez, C., Volosovych, V. and Yesiltas, S. (2015), *How to Construct Nationally Representative Firm Level Data from the Orbis Global Database: New Facts and Aggregate Implications*, National Bureau of Economic Research, London.

Kalnins, A. and Chung, W. (2004), "Resource-seeking agglomeration: a study of market entry in the lodging industry", *Strategic Management Journal*, Vol. 25 No. 7, pp. 689-699.

Kim, Y. (2020), "The impact of spatial clustering on the labour productivity of the UK tourism and hospitality industry", Doctoral dissertation, University of Surrey, Guildford.

Kim, W., Cho, M. and Brymer, R. (2013), "Determinants affecting comprehensive property-level hotel performance: the moderating role of hotel type", *International Journal of Hospitality Management*, Vol. 34, pp. 404-412.

Kim, J., Jang, S., Kang, S. and Kim, S. (2020), "Why are hotel room prices different? Exploring spatially varying relationships between room price and hotel attributes", *Journal of Business Research*, Vol. 107, pp. 118-129.

Kim, Y., Williams, A., Park, S. and Chen, J. (2021), "Spatial spillovers of agglomeration economies and productivity in the tourism industry: the case of the UK", *Tourism Management*, Vol. 82, 104201.

Lado-Sestayo, R., Vivel-Búa, M. and Otero-González, L. (2017), "Determinants of TRevPAR: hotel, management and tourist destination", *International Journal of Contemporary Hospitality Management*, Vol. 29 No. 12, pp. 3138-3156.

Lado-Sestayo, R., Vivel-Búa, M. and Otero-González, L. (2020), "Connection between hotel location and profitability drivers: an analysis of location-specific effects", *Current Issues in Tourism*, Vol. 23 No. 4, pp. 452-469.

Latinopoulos, D. (2018), "Using a spatial hedonic analysis to evaluate the effect of sea view on hotel prices", *Tourism Management*, Vol. 65, pp. 87-99.

Lee, S. and Jang, S. (2012), "Premium or discount in hotel room rates? The dual effects of a central downtown location", *Cornell Hospitality Quarterly*, Vol. 53 No. 2, pp. 165-173.

LeSage, J.P. and Pace, R.K. (2009), *Introduction to Spatial Econometrics*, Taylor & Francis Group, Boca Raton.

Lionetti, S. (2009), "Tourism productivity: incentives and obstacles to fostering growth", *Tourism Analysis*, Vol. 14 No. 6, pp. 781-791.

Luo, H. and Yang, Y. (2013), "Spatial pattern of hotel distribution in China", *Tourism and Hospitality Research*, Vol. 13 No. 1, pp. 3-15.

Luo, H. and Yang, Y. (2016), "Intra-metropolitan location choice of star-rated and non-rated budget hotels: the role of agglomeration economies", *International Journal of Hospitality Management*, Vol. 59, pp. 72-83.

Marco-Lajara, B., Claver-Cortés, E. and Úbeda-García, M. (2014), "Business agglomeration in tourist districts and hotel performance", *International Journal of Contemporary Hospitality Management*, Vol. 26 No. 8, pp. 1312-1340.

Martin-Fuentes, E. (2016), "Are guests of the same opinion as the hotel star-rate classification system?", *Journal of Hospitality and Tourism Management*, Vol. 29, pp. 126-134.

Martín-Rivero, R., Ledesma-Rodríguez, F. and Lorenzo-Alegría, R. (2021), "Technical efficiency and agglomeration economies in the hotel industry: evidence from canary islands", *Applied Spatial Analysis and Policy*, Vol. 14 No. 4, pp. 777-793.

Martins, F., Silva, F., Rocha, C., Queiroz, M. and Araújo, C. (2012), "Analysis of efficiency of the regulated transportation coach operator by stochastic Frontier of Cobb-Douglas and translog functions: the case of the interstate passenger coach transportation in Brazil", *Journal of Transport Literature*, Vol. 6 No. 3, pp. 08-33.

Mellinas, J., Martínez, S. and Bernal, J. (2015), "Booking. com: the unexpected scoring system", *Tourism Management*, Vol. 49, pp. 72-74.

Montant, G. (2020), "The determinants of the hotel sector revenues: the case of French Polynesia", *Tourism Economics*, Vol. 26 No. 5, pp. 809-829.

Moran, P. (1950), "Notes on continuous stochastic phenomena", *Biometrika*, Vol. 37 Nos 1/2, pp. 17-23.

Myles Shaver, J. and Flyer, F. (2000), "Agglomeration economies, firm heterogeneity, and foreign direct investment in the United States", *Strategic Management Journal*, Vol. 21 No. 12, pp. 1175-1193.

Nicola, M., Alsafi, Z., Sohrabi, C., Kerwan, A., Al Jabir, A., Iosifidis, C. and Agha, R. (2020), "The socio-economic implications of the Coronavirus and COVID-19 pandemic: a Review", *International Journal of Surgery*, Vol. 78, pp. 185-193.

Nicolau, J., Mellinas, J. and Martín-Fuentes, E. (2020), "Satisfaction measures with monetary and non-monetary components: hotel's overall scores", *International Journal of Hospitality Management*, Vol. 87, 102497.

Öğüt, H. and Onur-Taş, B. (2012), "The influence of internet customer reviews on the online sales and prices in hotel industry", *The Service Industries Journal*, Vol. 32 No. 2, pp. 197-214.

Pavelescu, F. (2011), "Some aspects of the translog production function estimation", *Romanian Journal of Economics*, Vol. 32 No. 1, p. 41.

Pawlicz, A. and Napierala, T. (2017), "The determinants of hotel room rates: an analysis of the hotel industry in Warsaw, Poland", *International Journal of Contemporary Hospitality Management*, Vol. 29 No. 1, pp. 571-588.

Pérez-Rodríguez, J. and Acosta-González, E. (2007), "Cost efficiency of the lodging industry in the tourist destination of Gran Canaria (Spain)", *Tourism Management*, Vol. 28 No. 4, pp. 993-1005.

Porter, M. (1998), *Clusters and the New Economics of Competition*, Harvard Business Review, Boston, Vol. 76.

Reynes, F. (2017), *The Cobb-Douglas Function as a Flexible Function: Analysing the Sustitution Between Capital, Labor and Energy*, Sciences Po, No. 2017-12.

Rigall-I-Torrent, R. and Fluvià, M. (2011), "Managing tourism products and destinations embedding public good components: a hedonic approach", *Tourism Management*, Vol. 32 No. 2, pp. 244-255.

Roehl, W. and Van-Doren, C. (1990), "Locational characteristics of American resort hotels", *Journal of Cultural Geography*, Vol. 11 No. 1, pp. 71-83.

Shaw, G. and Williams, A. (2009), "Knowledge transfer and management in tourism organisations: an emerging research agenda", *Tourism Management*, Vol. 30 No. 3, pp. 325-335.

Shipan, C. and Volden, C. (2008), "The mechanisms of policy diffusion", *American Journal of Political Science*, Vol. 52 No. 4, pp. 840-857.

Skrede, O. and Tveteraas, S. (2019), "Cruise spillovers to hotels and restaurants", *Tourism Economics*, Vol. 25 No. 8, pp. 1286-1301.

Soloaga, I. (1999), "The treatment of non-essential inputs in a Cobb-Douglas technology: an application to Mexican rural household-level data", available at: SSRN 632569.

Tallman, S., Jenkins, M., Henry, N. and Pinch, S. (2004), "Knowledge, clusters, and competitive advantage", *Academy of Management Review*, Vol. 29 No. 2, pp. 258-271.

Thrane, C. (2007), "Examining the determinants of room rates for hotels in capital cities: the Oslo experience", *Journal of Revenue and Pricing Management*, Vol. 5 No. 4, pp. 315-323.

Tobler, W. (1970), "A computer movie simulating urban growth in the Detroit region", *Economic Geography*, Vol. 46, pp. 234-240.

Torres, E. and Kline, S. (2006), "From satisfaction to delight: a model for the hotel industry", *International Journal of Contemporary Hospitality Management*, Vol. 18 No. 4, pp. 290-301.

UNESCO (2020), "United Nations Educational, scientific and cultural Organization", available at: http://whc.unesco.org/en/statesparties/es/

UNWTO (2019a), "World Tourism Organization", *European Union Tourism Trends*, available at: https://www.e-unwto.org/doi/pdf/10.18111/9789284419470

UNWTO (2019b), "The World Tourism Organization", *Panorama del turismo internacional*, available at: https://www.e-unwto.org/doi/pdf/10.18111/9789284421237

Valentin, M. and O'Neill, J. (2019), "The value of location for urban hotels", *Cornell Hospitality Quarterly*, Vol. 60 No. 1, pp. 5-24.

Viladecans-Marsal, E. (2004), "Agglomeration economies and industrial location: city-level evidence", *Journal of Economic Geography*, Vol. 4 No. 5, pp. 565-582.

Vives, A. and Jacob, M. (2020), "Dynamic pricing for online hotel demand: the case of resort hotels in Majorca", *Journal of Vacation Marketing*, Vol. 26 No. 2, pp. 268-283.

Wang, S., Chen, Y., Huang, J., Chen, N. and Lu, Y. (2019), "Macrolevel traffic crash analysis: a spatial econometric model approach", *Mathematical Problems in Engineering*, Vol. 2019, pp. 1-10.

Wannakrairoj, W. and Velu, C. (2021), "Productivity growth and business model innovation", *Economics Letters*, Vol. 199, 109679.

Weidenfeld, A., Williams, A. and Butler, R. (2010), "Knowledge transfer and innovation among attractions", *Annals of Tourism Research*, Vol. 37 No. 3, pp. 604-626.

White, P. and Mulligan, G. (2002), "Hedonic estimates of lodging rates in the four corners region", *The Professional Geographer*, Vol. 54 No. 4, pp. 533-543.

Yang, Y., Wong, K. and Wang, T. (2012), "How do hotels choose their location? Evidence from hotels in Beijing", *International Journal of Hospitality Management*, Vol. 31, pp. 675-685.

Yang, Y., Luo, H. and Law, R. (2014), "Theoretical, empirical, and operational models in hotel location research", *International Journal of Hospitality Management*, Vol. 36, pp. 209-220.

Yang, Y., Mao, Z. and Tang, J. (2018), "Understanding guest satisfaction with urban hotel location", *Journal of Travel Research*, Vol. 57, pp. 243-259.

Zhang, G., Wang, R. and Cheng, M. (2020), "Peer-to-peer accommodation experience: a Chinese cultural perspective", *Tourism Management Perspectives*, Vol. 33, 100621.

Zhou, K., Liu, H. and Wang, Q. (2019), "The impact of economic agglomeration on water pollutant emissions from the perspective of spatial spillover effects", *Journal of Geographical Sciences*, Vol. 29 No. 12, pp. 2015-2030.

Corresponding author
José-Alberto Castañeda can be contacted at: jalberto@ugr.es