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EXTENDED ABSTRACT

Title: ***Characterising the eco-hotel industry with locational factors: an urban analysis in the city of Barcelona***

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Abstract:

Characterising the eco-hotel industry with locational factors: an urban analysis in the city of Barcelona

This study identifies the determinant factors in the existence of Eco-Hotels. We highlight external local environment characteristics and the existence of significant spatial concentration areas of eco-companies in the hotel industry. The examination of these external elements is practically inexistent in current literature. Nevertheless, over the last years, the hotel sector is more conscious about the possibility of differentiating their services through environmental care practices. This has caused that hotels adapt their productive systems to eco-efficient services when productive resources and energy is used (García-Pozo et al. 2015). This transformation in their productive systems causes that hotels receive eco-certifications with a positive effect- from a commercial perspective- on the final customers which are more aware about the environment preservation. Despite this advantage, the number of eco-hotels is scarce-approximately a 7% according with the Eco-Labelling from TripAdvisor[1]-. Previous researchers state that this is explained by the existence of different barriers when firms try to readjust

[1] www.tripadvisor.es

their productive processes to eco-friendly practices. In this sense, they find high transformation costs and traditional management structures with scarce disposition to changes. The examination about the balanced between pros and cons effects of undertaking eco-practices in hotels has appealed to the growing interest of these studies which seen environment care as a relevant topic with economic and social implications. Given the relevance of this topic, in this paper we aim to deem into the identification of factors which impact on the working of Eco-Hotels with special attention to external elements and spatial colocalization pattern where the literature is practically inexistent (Bohdanowicz, 2006; Alonso-Almeida et al., 2017).

2. Background

External pressure from clients and investors has caused that hotels have developed initiatives to environment protection with the aim of satisfying these external agents demanding a green product whatever are the increasing in the final prices (Rodríguez-Anton et al., 2012). According with Martínez-Perez et al. (2015), eco-innovation practices has gained presence in hotel organizations as a new business model. Nevertheless, the literature is still scarce without a precise definition about the concept of eco-innovation practices. This is often defined as firms' investments in new products and processes which reduce the negative environmental effects (Rennings, 2000). Apart from this characteristic, literature also highlights the need for these processes of being assimilated by the companies (Oltra and Saint Jean, 2009). In the particular case of the hotel industry, Menezes and da Cunha (2016) indicate that eco-practices are applied to reduce the use of natural resources such as water (with specific procedures such a dual flush valves or reuse of water for irrigation), energy (as the application of solar panels or low temperature systems in the laundry), waste (waste management, recycling of paper, conversion of applied oil in food and beverage, applying a system to drop food wastage). These practices are applied to attract clients and investors improving hotels' image. However, investment on eco-innovation practices also face some limitations related to innovation barriers such as larger costs. According with these pros and cons, different researchers have analysed the impact of eco-innovation practices on different firms' dimensions. In this sense, García-Pozo et al. (2015, 2016) studies the impact of eco-innovation on the labour productivity on a sample of hotels in Spain with positive and significant results. Alonso-Almeida et al. (2016) indicate the crucial role of eco-

innovation procedures strengthening creative changes in management processes when tourism organisations are examined (e.g., hotels, restaurants, cruises, leisure, travel). But previous studies do not consider characterising elements of Eco-Hotels. In order to fill this gap in the literature we examine the internal and external elements determining the probability of a hotel becomes Eco-Certified. As external factors, we study spatial co-localised effects and environment characteristics.

Methodology and database

3.1 Spatial autocorrelation tests for qualitative data: The Joint-Count tests

In order to test co-localized spatial patterns in eco-hotels, we apply the Joint-Count tests (Cliff and Ord, 1981 p.36). In particular, the examined variable is categorized in two cases: Eco-hotel (E) versus Non-Eco Hotel (NE)[2]. From this classification, we distinguish three networks when the sample is analyzed: EE, NENE and ENE. EE and NENE indicate those geographically close hotels with the same category whereas ENE represents the number of connected hotels which are in different categories. In order to establish a connection between hotels, we apply a binary weight matrix W which is defined in function of the connectivity criterion. In particular, $w_{ij}\ (i, j = 1, \ldots, n)$ values 1 if hotels i and j are connected, and 0 if otherwise. $w_{ii} = 0$ by definition. The connectivity criterion is based on the k closest neighbors. Once the connectivity criterion is defined, *Join-Count* statistics (J_{EE}, J_{ENE}, J_{NENE}) are specified as follows (1)-(2):

$$J_{EE} = \frac{1}{2}\sum_{i=1}^{n}\sum_{i=1}^{m} w_{ij} EE_{ij} \qquad (1)$$

$$J_{ENE} = \frac{1}{2}\sum_{i=1}^{n}\sum_{i=1}^{m} w_{ij} ENE_{ij} \qquad (2)$$

w_{ij} represent the elements of W; EE_{ij}=1 if hotels i and j both are in the category "E", and $NENE_{ij}$=0 if otherwise; ENE_{ij}=1 if the hotels i and j are in different categories and ENE_{ij}=0 in otherwise. n represents the number of observations.

The statistic J_{EE} can be computed from (1) and (2) as

[2] Traditionally the letters B (Black) and W (White) are used to denote the two possible categories.

$$I_{NENE} = \frac{1}{2}\sum_{i=1}^{n}\sum_{i=1}^{n} w_{ij} NENE_{ij} \quad (3)$$

Positive *Join-Count* tests indicate the existence of a significant spatial pattern conformed by spatial agglomeration of hotels in the same category (E or NE). A negative test reveals spatial co-localized hotels in different categories.

3.2 Spatial probit model

Spatial autocorrelation structures in models with limited dependent variables provide inconsistent and inefficient estimations (McMillen, 1992). In order to overcome this limitation, we propose the spatial-probit model (LeSage, 2009). This model assumes spatial interdependences in the latent-variable (4),

$$y^s = \begin{cases} 1 & if \quad y \geq 0 \\ 0 & if \quad y < 0 \end{cases} \quad (4)$$

$$y^* = \rho W y^* + X\beta + \varepsilon_i \quad \varepsilon \sim N(0, I_n) \quad (5)$$

where y is the observed value of the limited-dependent variable, y^* is the unobserved latent dependent variable, and X is a matrix of explanatory variables; W is spatial weight matrix; ρ is the spatial autoregressive coefficient, if ρ=0 then, the spatial probit model is the standard binary probit model, otherwise, if ρ≠0, then the corresponding term evaluates interdependence in the existence of eco hotels. Finally, ε is the disturbance term. In order to solve this model, we apply the recently developed conditional maximum Likelihood approach (Martinetti and Geniaux, 2017).

Database

To develop this study, we apply SABI (Sistema Annual de Balances Ibericos) database which provides accounting and financial information for Spanish companies from their accounting registers. Based on this information, we chose those companies in the accommodation subsector (55NACE code) and with local hotel branches[3] in the city Barcelona. Thus, we identify a sample of 380 hotels with information available for

[3] We drop those multinational companies with local headquarters in Barcelona.

2015–2018. This sample represented a 92% coverage rate in 2018 (INE[4], 2018). After this, we apply web scraping techniques to merge this accounting and financial information with information from TripAdvisor webpage. From this sample we get that a 10% of selected hotels have eco-label certifications. Apart from this information, we get qualitative information the hotels in the sample (number of rooms, Wi-Fi, number of beds, geographical location). In order to provide additional robustness to our analysis, we build a paired sample composed from the same proportion of Eco and Non-Eco hotels. We use some general hotels' characteristic such as the size and the age of the hotel to undertake the pairing.

Variables

The dependent variable is the probability of being an Eco-Hotel applying the information of Eco-Label certifications from TripAdvisor. The explanatory variables are classified into two categories. A) *Environmental variables characterising hotels surroundings. Into this category we include the variable* density (*Dens*) which evaluates the number of hotels surrounding each hotel in the sample. According to previous studies, the highly concentrated areas cause more competence and therefore, it is expected a high percentage of Eco-Hotels in order to face this competitive situation through differentiation. In addition, we evaluate hotels' surroundings analysing available facilities in the environment related to natural resources such as number of trees and water resources surrounding each hotel. In order to consider these hotels' environments, we consider the buffer generated from each hotel when one kilometre of distance is examined. In addition, other facilities such as proximity to restaurants and transport accessibilities are evaluated (B) Control variables: Into this category we include general hotels' characteristics such as the *size*, age and hotels' characteristics.

Results

With previous information, the first part of the results shows spatially co-localised patterns in Eco-Hotels which highlight the need of examining hotels' environments in order to identify key factors which could increase the probability of finding an Eco-Hotel. The posterior analysis provides significant results for the environment variables

[4] National Institute of Statistics

related to natural resources highlighting the need of an adequate urban planning including this kind of resources to promote Eco-Certifications in the city of Barcelona.

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