INNOVATION AND PROFITABILITY IN THE HOTEL INDUSTRY: SPECIALIZATION AND CONCENTRATION EFFECTS

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ABSTRACT

In recent years, the hotel industry has brought in significant changes to adapt to the development and use of new technologies. The aim of this paper is to analyse the main sector characteristics that affect innovation in the hotel industry and the relationship between innovation, specialization, geographical concentration and profitability in Spanish hotels. We have considered the effect of spillovers and found that greater industrial specialization in the hotel industry leads to a higher innovation level, but that greater firm competition in a geographical area affects the innovation level negatively. A model of simultaneous recursive equations has been estimated in which the innovative activity and profitability of the hotel industry are explained jointly. Furthermore, we have found that innovative activity has a positive impact on firm profitability and as such, innovation appears to be a main target for firms.

1. INTRODUCTION

The capacity to innovate, that is, the potential to adopt and use new technologies in the productive and management process (Eatwell et al. (1987)), is increasingly seen as a factor in determining competitiveness. This capacity in the tourism sector is directly linked to information and communication technologies (ICT) and to human capital.

Despite this, however, there are very few studies which analyse innovative activity in the services sector, in general, and in the hotel industry in particular.

Concentrating on the hotel industry, there is little empirical evidence of innovative activity due to the lack of existing data since few surveys on innovation have been carried out. Nevertheless, given the hotel industry’s contribution to employment and production in the economies of OECD countries and the fact that it is an innovative industry, the scarcity of studies is not warranted. While the innovative activity of this industry generally consists of improving customer service, it is also an industry that invests in information and communication technologies.
Since the diffusion of innovation is very important for the growth of a region, and different models in which externalities play a fundamental role can explain the diffusion of innovations, the aim of this paper is to analyse which of the models is dominant in the hotel industry. For this reason, an analysis has been conducted on how innovation is affected by factors such as the concentration of hotels and the specialization of the hotel industry in a destination. Nevertheless, hotels are the last agents to decide whether to innovate, and as such, it is interesting to study how innovations affect hotel profitability.

Section 2 of this paper opens with a description of the theoretical framework which demonstrates the importance and implications of innovations in the hotel industry. Also taken into consideration are the factors related to the diffusion and adoption of innovations by firms to increase their profitability. Section 3 contains a description of the databases and the variables used. Section 4 provides a description and evaluation of the econometric model as well as an explanation of the results obtained. Finally, the main conclusions and their implications for economic policy are presented in Section 5.

2. THEORETICAL FRAMEWORK

In recent years there has been a growing interest in the importance of technological advances and innovation with respect to the growth of an economy. Similarly, the ICT affect the strategic behaviour of firms in the tourism sector (Pechlaner and Osti, 2001), such as mergers, concentrations, strategic alliances and virtual cooperation (Schertler, 1998; Govers et al., 2000). This line of analysis is aimed at relating the degree of concentration and specialization in a given geographic area to the externalities associated with information that may affect the cost function of firms and therefore their profitability. This analysis is very interesting since it contributes to our understanding of the rapid diffusion of knowledge that characterises the tourism sector (Sheldon, 1993), confirming whether such developments have been favoured by a greater or lesser concentration of hotel firms, or whether it has been the combination of hotel firms together with other more dynamic sectors which has been responsible for such technological developments.

Glaeser et al. (1992) mention the importance of technology diffusion in the growth of regions and the fundamental role that externalities play in the diffusion of innovations. This idea may also be applied to the tourism sector in particular, given that the strong links between the new technologies and the development of the tourism sector have been clearly demonstrated (Buhalis, 1996, O’Connor, P. And Frew A.J. 2001).

A distinction is made between dynamic externalities, which generate growth, and static externalities, which only generate concentration of the activity. Among the dynamic externalities they distinguish between the MAR models (Marshall (1923), Arrow (1962), Romer (1986)); Porter’s model (1990) and Jacobs’ model (1969). All of these externalities are related in one way or another to the competition of firms and to the specialization in a geographic area.

MAR model externalities, defined as intra-industrial, occur as a result of the distribution of knowledge among firms in the same sector, owing to the greater facility of assimilating innovations between similar firms. Therefore, the MAR approach is that the hotel industry should specialize geographically in order to absorb the diffusion of knowledge between firms, enabling them to learn from each other more quickly. The MAR theory also predicts that local monopoly is better for growth than local competition, because local monopoly restricts the flow of ideas to others and so allows externalities to be internalized by the innovator. Consequently, the MAR approach considers that the greater the level of innovation in the hotel industry, the lesser the concentration of firms in this industry.

Porter (1990), like MAR, argues that the specialization of a region in a specific activity boosts the diffusion of knowledge. However, he differs from the MAR approach with respect to the effect of
local competition. Porter’s approach implies that competition between hotels boosts greater innovation and consequently growth in the region. For Porter, a greater competition of hotels allows for more innovation, and in a competitive context it is “renew or die”. And the contrary also applies, if there is no competition between hotels there is no incentive to innovate.

Finally, Jacobs (1969), unlike MAR and Porter, considers that the less specialization there is in a tourism destination, the greater the diffusion of knowledge. He argues that the transmission of knowledge takes place for the most part between firms belonging to different industries since it is more likely that these firms have different information, which they end up sharing among themselves. With regard to the effect of the competition of hotels, Porter predicts that a greater competition of hotels boosts the degree of innovation in the hotel industry.

To summarize, the MAR and Porter theories predict that hotel industry specialization fosters greater innovation and growth since proximity encourages the diffusion of knowledge. For Jacobs, diversification of activities further the diffusion of knowledge between different industries, and therefore innovation and growth. Regarding competition, for Jacobs and Porter, the competition of firms boosts innovation in the sector, which is not the case in the MAR approach which considers that competition between firms discourages innovative activity.

Although the three types of externalities differ with respect to the effect of specialization and competition, none of them excludes the other. This article raises the question of which of them is dominant in the hotel industry, that is, how do specialization and concentration affect innovative activity within the hotel industry. Once this has been determined, it will be necessary to look at how a more innovative attitude affects profitability.

Should innovation have repercussions on the profitability obtained by hotels, such repercussions may be favourable (external economies) or unfavourable (external diseconomies). Callejón and Costa (1996) indicate that technological externalities can affect costs by reducing them. Nevertheless, information has the particular characteristics of public goods and as such, the use of information by a hotel does not diminish the amount available to other hotels. Consequently, a hotel that does not invest in innovation could get the advantages from the externalities without defraying the costs of innovation. This implies that the hotel which innovates may have relatively less profitability that the one that does not innovate as much.

A model of simultaneous recursive equations has been estimated in which the innovative activity and profitability of tourism firms are the endogenous variables. The first equation depicts the relationship between innovation and variables associated with the diffusion of knowledge. At the same time, the level of innovation is a potential explanatory variable of profitability, which is reflected in the second equation. Thus, the specific model is:

\[ I_i = \beta Z_i + u_i \]  
\[ R_i = \rho I_i + \alpha X_i + \varepsilon_i \]

in which \( I_i \) is the proportion of firm i’s innovations over total innovations; \( Z_i \) is a vector of explanatory variables which includes, among others, variables related to specialization and competition; \( R_i \) is the profitability; \( LI_i \) is the logarithm of the proportion of innovations over total innovations; and \( X_i \) is a vector of other explanatory variables. The expected effect of specialization and competition depend on the theory which dominates, as shown in Table 1.

The size of a firm is another factor that can affect the innovation made by a firm. Mansfield (1963) claims that the inclusion of innovation in the productive process can be directly related to the size of the firm. Nevertheless, Main (2001) found that although in past years the size of the hotel played a key role, nowadays this does not have a significant impact.
Table 1. Impact of external economies on innovation

<table>
<thead>
<tr>
<th>Diffusion of knowledge</th>
<th>Innovation activity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Specialization</td>
<td>Competition</td>
</tr>
<tr>
<td>MAR</td>
<td>+</td>
</tr>
<tr>
<td>Porter</td>
<td>+</td>
</tr>
<tr>
<td>Jacobs</td>
<td>-</td>
</tr>
</tbody>
</table>

Source: Prepared by authors based on Glaeser et al. (1992)

3. DESCRIPTION OF THE DATABASES AND VARIABLES USED

In order to quantify and contrast the relationships described above, an econometric model has been prepared using information about firms taken from two different information sources. One of these is taken from the AMADEUS database and the other is from an adhoc survey. The reason for using two information sources is the absence of important information in the AMADEUS database.

The AMADEUS database provides information on 741 Spanish hotels, such as their profitability and size in 2002, but does not provide information on innovative activity. An adhoc survey was, therefore, designed and applied to a sample of 392 hotels from which information was gathered on innovations adopted and the profitability of each of them. The survey was designed in such a way as to ensure that all of the Spanish regions were represented as well as the different categories of hotels. From this adhoc survey, information was obtained on the innovations carried out by firms as well as some of their more general characteristics such as the category of the establishment, the number of rooms, the number of workers, its seasonal nature, and room prices. Summarizing, the AMADEUS database provides information on profitability but not on innovation activity, and the adhoc survey provides information on innovation activity but not on profitability. Since the specified econometric model is one of simultaneous recursive equations, and the endogenous variable in the first equation is innovation, this equation has been estimated using the adhoc survey. Then, the variable that captures the innovative activity has been inferred for the hotels of the AMADEUS database using the estimated equation (1). To do so, it is necessary to have information about the variables specified in the first equation in both information sources. Once the innovation variable has been inferred, the second equation has been estimated using the AMADEUS database.

The first equation, then, includes as explanatory variables the index of specialization of the regions to which hotel i belongs ($S_i$); the index of competition ($C_i$); the logarithm of the number of rooms in hotel i ($LR_i$), and the number of stars hotel i has ($St_i$).

Once innovations have been inferred, it must be assured that the effects of the variables which explain innovations in equation (2) are not related with the effect of the innovations. Therefore not all the explanatory variables used in the first equation are included in the second. The second equation includes as explanatory variables the logarithm of the proportion of innovations in firm i over total innovations ($LI_i$), the price per room of hotel i ($PR_i$) and the logarithm of the total assets of firm i ($LASS_i$). Therefore the specified model is finally:

$$I_i = \beta_1 + \beta_2 S_i + \beta_3 C_i + \beta_4 LR_i + \beta_5 St_i + u_i$$  (3)
Innovations carried out in firms from the hotel industry have been classified into four large groups or types: innovation in information and communication technology (ICT), innovation in the productive process (PP), innovations in management processes (MP) and total innovations (TI). A list of innovations in each group can be found in the Annex. The innovation variable has been defined as the quotient between the number of innovations adopted in a hotel and the number of potential innovations. Therefore, the endogenous variable is a limited variable that takes values between zero and one.

In order to quantify the externalities two indices have been defined, the purpose of which is to measure the characteristics of the industrial structure of the regions where hotels are located. The variables which have been defined are called the index of competition and the index of specialization.

In order to quantify the degree of specialization, an index proposed by Glaeser et al. (1992) has been used which can be expressed as follows:

\[
E_d = I_{esp}(Y)_{\text{JR}} = \frac{Y_{\text{JR}} / Y_{R}}{Y_{\text{JN}} / Y_{N}} \quad \forall j = 1,2,...,k
\]

where \(Y_{\text{JR}}\) = VAB of sector \(j\) in \(r\) region \(R\); \(Y_{R}\) = total VAB of region \(R\); \(Y_{\text{JN}}\) = VAB of sector \(j\) for the national total; and \(Y_{N}\) = VAB national total.

If the index value is greater than one, the destination concerned is specialized in the sector (in this case the hotel industry). If the index of specialization is less than one, this indicates that the sector is relatively less important for the economy of the destination than the average national level.

With regard the competition of tourism firms, this is measured in this study as the number of tourism firms in a geographic area per inhabitant. The index calculated in this manner is called concentration. To show whether or not there is a high level of concentration of tourism firms in a specific region, the concentration index (\(C_{R}\)) has been calculated for each region in relation to the national territory as:

\[
C_{R} = \frac{\text{hotels in } R}{\text{inhabitants in } R} / \frac{\text{total hotels}}{\text{total inhabitants}}
\]

If the value of the index is greater than one, the region in question has more hotels than the national level.

4. ESTIMATED RESULTS OF THE ECONOMETRIC MODEL

The final results of the econometric model specified in section 3 are given in Table 2 and Table 3. The first equation attempts to analyse the relationship that specialization and concentration have with innovation.

The estimation has been made with a sample of hotels based on the results of an adhoc survey carried out by the “Innovation, Location and Profitability of Tourism Firms” project (Sancho et al. (2002)). The estimation of the model is by least weighted squared because heteroscedasticity has been observed in the perturbations of the model and because it allows for more efficient estimators to be obtained.
The results show that there are several variables which are indicative of innovation. The size of the firm measured by the number of rooms in the hotel has a positive influence since the larger the size, the greater the number of innovations. This result supports Manfield’s argument and, as such, the conclusions reached by Main (2001) cannot be generalised to the entire hotel industry. The number of stars the hotel has also reflects positively on innovation, since the number of stars indicates, to a certain extent, the number of services the hotel offers. This positive effect on innovation suggests that the more services a hotel offers, the greater its need to incorporate new technology to better organise those services and reduce costs. The level of hotel industry specialization (of the region with regard to the national average) also has a positive effect; but competition, which takes in the level of density of firms in the province where the hotel is located, has a negative effect on innovation.

**Table 2. Determinants of innovation in hotels**

<table>
<thead>
<tr>
<th>Explanatory Variables</th>
<th>Coefficient</th>
<th>T of Student</th>
</tr>
</thead>
<tbody>
<tr>
<td>Specialization</td>
<td>0.1095**</td>
<td>3.9034</td>
</tr>
<tr>
<td>Ln (Number of rooms)</td>
<td>0.0348*</td>
<td>1.8237</td>
</tr>
<tr>
<td>Number of stars (category)</td>
<td>0.0292**</td>
<td>2.8801</td>
</tr>
<tr>
<td>Concentration</td>
<td>-0.0063**</td>
<td>-4.3109</td>
</tr>
<tr>
<td>Constant</td>
<td>0.5496**</td>
<td>5.3456</td>
</tr>
<tr>
<td>R²</td>
<td>0.9113</td>
<td></td>
</tr>
</tbody>
</table>

The endogenous variable is the percentage of innovations in a tourism firm. Concentration is defined as the number of firms per every 10,000 inhabitants. The method of calculation is based on least squared weighted to correct the heteroscedasticity on which the observations have been weighted by the inverse of the number of workers.

* Significant at 10%; ** Significant at 5%.

Since it is obtained that the greater the specialization, the greater the degree of innovations adopted, the Jacobs’ externalities are not relevant in the context of hotels. Thus, the negative sign of the parameter associated with the competition variable indicates that the competition of firms in the province does not favour innovation in the sector, it being related in this case with MAR externalities. A positive sign of the competition variable parameter indicates that the result is in accordance with the considerations of Jacobs and Porter.

From observing the signs of the estimated coefficients which accompany the specialization and competition variables, it can be concluded that both are in agreement with the MAR theory. That is, the greater the intra-industrial inter-relation (specialization), the greater the innovation, while with less competition, there is greater innovation. This result implies that the diffusion of innovations is higher between firms from different sectors since the knowledge shared between firms from the same sector is assimilated more easily. With regard to the effect of competition for the same level of specialization, a greater concentration of firms in a territory leads to a reduction in the total number of innovations made in the firms.

**Table 3. Determining factors in the profitability of hotels**

<table>
<thead>
<tr>
<th>Variable</th>
<th>Coefficient</th>
<th>T de Student</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ln (Innovations)</td>
<td>1.2619**</td>
<td>2.0470</td>
</tr>
<tr>
<td>Price per room</td>
<td>0.0032**</td>
<td>2.3590</td>
</tr>
<tr>
<td>Ln (Total assets)</td>
<td>-0.2194**</td>
<td>-2.2030</td>
</tr>
<tr>
<td>Constant</td>
<td>0.4047</td>
<td>0.4436</td>
</tr>
<tr>
<td>R²</td>
<td>0.1273</td>
<td></td>
</tr>
</tbody>
</table>
The explanatory variable is the neperian logarithm of profitability.
* Significant at 10%; ** Significant at 5%.

Table 3 contains the results of the second equation of the model specified in the previous section. The results of the empirical analysis show that significant determinants of the profitability of hotels are the innovations, these having a positive effect. The greater the innovative activity, the greater the firm’s profitability, just as Callejón and Costa (1996) claim. Innovation is therefore, one of the most important factors affecting the productivity of the hotel industry, and therefore, its profitability as suggested by Sheldon (1997). Similarly, the greater the firm’s assets, the lower its profitability, while the higher the price of lodging is, the greater the profitability obtained. The effects that assets and price have on profitability are influenced by many factors, such as the degree of monopoly held and the quality of the services provided, to mention only two, and as such it is difficult to interpret the signs obtained and consequently to provide conclusive results.

In short, the proposed model describes the behaviour and attitude of the firms towards profitability and innovations, and it can be proven that there is an important association between innovation and profitability.

5. CONCLUSIONS AND IMPLICATIONS FOR ECONOMIC POLICY

Within the framework of the Spanish hotel industry, different initiatives have been developed for the application of quality technology to this sector since the beginning of the 1990s. In fact, the definition of technical quality systems is a pioneering initiative in the international hotel industry. The final objective of the quality plans is to guarantee the excellence of services which, once they become generally accepted, give a new image to Quality Spanish Tourism and additionally develop business management instruments to improve the attractiveness of the tourism product for the consumer. The idea behind the quality plans is to foster innovation and thus the profitability of firms in the sector. This article has attempted to show which characteristics of the sector influence innovation and profitability in hotels in Spain.

From the results obtained, it can be concluded that with the same degree of specialization, a narrow concentrated set of economic activity leads to a decrease in the total innovations made by firms. The greater the number of firms competing with each other the less easy it is to appropriate the profitability generated by an innovation, which, in turn, discourages from innovating.

Thus, greater innovation results in improved productivity, causing a reduction in costs which in the long run leads to increased economic growth in the geographical area where the firms that introduce the innovations are located. Consequently, authorities are confronted with a dilemma when implementing policy as this will be determined by the time horizon they are facing, given that a lesser concentration of firms in a geographical area usually reduces the level of competition amongst them. Considering the results obtained in this study, incentives should not only be provided for quality programmes. But also to stimulate greater innovation in the tourism sector given that innovation diffusion is greater amongst firms belonging to the same tourism sector than it is amongst firms from different sectors due to the fact that the information shared by firms of the same sector, facilitates the implementation of technological advances.

As expected, this study confirms that greater innovative activity improves the profitability of hotels. Not only has the competition among tourism firms in terms of prices, the traditional strategy used by Spanish tourism firms, failed to achieve the objective of profit maximization, it has also proven to be an inoperable alternative in the present socio-economic climate, making quality strategies stand out as an important strategy to be followed in the future.
Acknowledgements

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Annex

As stated in the text, the innovations of firms within the tourism sector have been grouped in the following way:

**ICT:** The following have been considered as indicative of innovations in information and communication technology:

1. Computer (dichotomic variable which takes the value 1 if the firm has a computer and 0 if it does not)
2. Renewal of general software (dichotomic variable which takes the value 1 if the firm renews its general software and 0 if it does not)
3. Renewal of specific software (dichotomic variable which takes the value 1 if the firm renews its specific software and 0 if it does not)
4. Internet connection (dichotomic variable which takes the value 1 if the firm is connected to the Internet and 0 if it is not)
5. Offers Internet to clients (dichotomic variable which takes the value 1 if the firm offers Internet to clients and 0 if it does not)
6. Cable connection to the Net (dichotomic variable which takes the value 1 if the firm is connected to the Net by cable and 0 if it is not)
7. Intranet (dichotomic variable which takes the value 1 if the firm has intranet and 0 if it does not)
8. Videoconference (dichotomic variable which takes the value 1 if the firm has videoconference facilities and 0 if it does not)
9. Web page (dichotomic variable which takes the value 1 if the firm has a web page and 0 if it does not)
10. Uses eCommerce (dichotomic variable which takes the value 1 if the firm uses eCommerce and 0 if it does not)
11. Computer staff specialized in programming (dichotomic variable which takes the value 1 if the firm has computer staff specialised in programming and 0 if it does not)
12. Computer staff specialized in computerization (dichotomic variable which takes the value 1 if the firm has computer staff specialised in computerization and 0 if it does not)

**PP:** The following have been considered as indicative of innovations in the productive processes of firms or hotel establishments:

1. Photocell (dichotomic variable which takes the value 1 if the firm has photocell and 0 if it does not)
2. Electronic locks (dichotomic variable which takes the value 1 if the firm has electronic locking devices and 0 if it does not)
3. Yield Management Systems (dichotomic variable which takes the value 1 if the firm employs yield management systems and 0 if it does not)
4. Point of Sale Systems (dichotomic variable which takes the value 1 if the firm employs point of sale systems and 0 if it does not)

**MP:** The following have been considered as indicative of innovations in the management processes of firms or hotel establishments:

1. Advance Booking (dichotomic variable which takes the value 1 if the firm has advance booking facilities and 0 if it does not)
2. CRS or GDS booking facilities (dichotomic variable which takes the value 1 if the firm has CRS or GDS booking facilities and 0 if it does not)
3. Credit card (dichotomic variable which takes the value 1 if the firm has credit card services and 0 if it does not)
4. Virtual cash (dichotomic variable which takes the value 1 if the firm provides virtual cash services and 0 if it does not)
5. Editourism (dichotomic variable which takes the value 1 if the firm provides Editourism services and 0 if it does not)

**TI:** total innovations includes innovations in ICT in the production process and in the management process of firms and hotel establishments.

**References**


