

## The impact of innovation on firms' performance: an analysis of the hotel sector in Majorca

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Studies of the role of innovation in the survival opportunities of firms and in their financial performance are scarce regarding services, and the hospitality sector in particular. This paper expands the research in this field. First, the determinants of environmental and non-environmental innovations are analysed separately. Common factors are found to have different impacts on innovations of a different nature. Second, the role of varying innovation practices in hotel performance is studied. Non-environmental innovations and only some particular environmental innovations are found to have a positive impact on hotel performance, and to contribute to an understanding of their relative performance, even when controlling for quality or human capital variables. These results highlight the convenience of discriminating among innovation measures to guide hotel policies more efficiently. They also suggest that the environmental regulator may be required to intervene for those innovative measures that do not translate into hotels' self-interest, from a performance point of view.

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Analysis of innovation decisions has been one of the main research foci in recent years, both when studying the management of firms and their performance at

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industry level. Investments in innovation are considered a key element in explaining a firm's competitive advantage, either in costs or differentiation strategy, which in both cases might lead to better performance indicators for the firm (Fernández and Suárez, 1996; Peteraf, 1993).

With regard to services it has been suggested that innovation is better understood when only one specific sector is studied (Drejer, 2004). For the hospitality industry in particular, there is a comparative lack of research devoted to innovation. Innovation itself has been used only to a limited extent. Hjalager (2002) explains that more than the tourism industry *per se*, it is the innovation behaviour of the supplying sectors and regulators that is more crucial. Trigo and Vence (2012) report that in 2004 only 36% of both hotels and restaurants in Spain were innovative, the lowest percentage when compared to all other service subsectors. However, trends are changing, and innovation has gained importance (Aldebert *et al*, 2011).

Other recent studies have contributed to research on innovation in the tourism sector. The existing research can be divided into three groups based on the distinct issues they address. The first group tackles the innovative behaviour of firms. In some of these studies, the nature of the innovative practices carried out by tourism firms is examined (Hjalager, 1997; Orfila-Sintes *et al*, 2005) while in others the innovative behaviour of firms leads to their grouping, as in Sundbo *et al* (2007).

A second group of studies focuses on the identification of the main determinants of innovation for tourism firms. For instance, in Orfila-Sintes and Mattsson (2009), the determinants of innovation are analysed for four different specific types of innovation measures: management, external communication, service scope and back office. They find that the main determinants are: the additional services offered by hotels; the fact that bookings are made through tour operators; that hotels are part of a hotel chain; and that the owners run the business. Sundbo *et al* (2007) likewise explain the innovativeness of firms in terms of particular variables, such as their size, and also in terms of the type of firm given its organizational form. In their work, applied to tourism firms in Denmark and Spain, national differences are also identified. The analysis of innovation determinants is also treated in Razumova (2010), who focuses on the determinants of environmental innovations in the hotel sector.

Finally, a third group considers the impact of innovative activities on the performance of tourist firms. Again, this has been dealt with by Orfila-Sintes and Mattsson (2009), who find evidence of positive effects on occupancy rates for more innovative firms. In recent studies, Molina-Azorín *et al* (2009) and Tarí *et al* (2010) find evidence of the positive effect of the environmental commitment of the firm on different performance indicators including occupancy rate or gross operating profit.

Recently, some studies have raised the idea that human capital is a factor that complements innovation, and that its enhancement is needed for both the adoption of existing innovations and the production of new ones. For instance, Bornay-Barrachina *et al* (2012) find that human capital and innovation interrelate in different ways in a sample of innovative Spanish firms. Furthermore, in Gallié and Legros (2012) the impact of employee training on innovation output is analysed for a dataset of French manufacturing firms. These two

referenced papers focus on the impact of human capital factors on innovation itself, rather than on their simultaneous impact on firms' performance.

In this paper we contribute to the analysis of innovation in the tourism industry in two ways. First, the determinants of environmental and non-environmental (NE) innovations are considered separately. Second, different types of innovations and human resource management practices are simultaneously accounted for when analysing the role of innovation on the performance of hotels.

The rest of the paper is organized as follows. The next section highlights the main features of the survey developed to collect data on hotels, and provides some brief descriptive statistics on the main variables at stake – innovation and performance. Subsequently, the determinants of both environmental and NE innovation practices are analysed econometrically. The subsequent section analyses the determinants of hotel performance, emphasizing the role of innovation investments. The main findings and their policy implications are highlighted in a concluding section. In addition, an appendix has been added in which clarifications are made with respect to the variables used in the econometric exercises performed.

## Methodology and data

The object of this study is to analyse how investment decisions concerning both environmental and NE innovations together with human capital practices affect competitiveness in the Balearic Islands tourism industry. This sector constitutes the main economic driver and employment provider in the islands, with over 41% of the Balearic gross value added derived from the tourism industry (Polo and Valle, 2008; Polo and Valle, 2011). According to the Balearic Council of Tourism, in 2008 over 47,000 people were employed in the islands' hotel sector. This figure represented over 10% of the active population in the Balearics.

The object of study in this paper are hotels. Therefore, this analysis does not include other establishments, such as hostels or boarding houses, or other closely related sectors that make up what is known as the complementary offer. Data were collected during the summer and early autumn of 2008, coinciding with the high season at the destination. A sample of 200 hotels was drawn from a population of 743 hotels, with a confidence interval of 95% and under the least favourable condition  $p = q = 0.5$ , with a sampling error slightly under 5%. The sampling technique was the stratified random procedure, stratified in terms of hotel category and geographical areas in the island of Majorca.

Data were collected by means of personal interviews with hotel managers. The questionnaire requested information on the characteristics of hotels, their management strategies, employees and customers, and also on different performance indicators and the nature of the investments made in recent years.

### *Descriptive analysis*

Table 1 presents a descriptive statistical analysis of the data available to measure hotel performance and innovation. With respect to innovation, the questionnaire distinctly addressed environmental and NE innovation practices. Examples

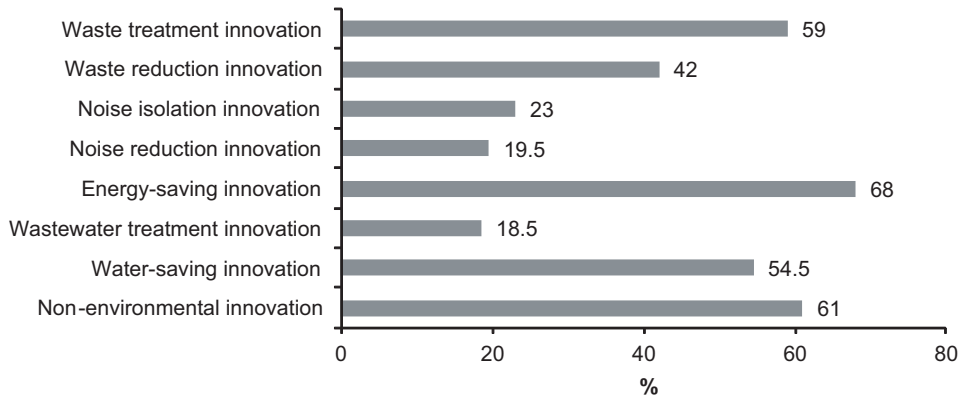
Table 1. Descriptive statistics of performance and innovation variables.

Variable	Units	Observations	Mean	SD	Min	Max
Occupation rate	Percentage	180	79.24	9.35	50	100
GOP comparison	1/7	186	4.24	1.05	1	7
GOP per room	Categorical	148	4.23	1.65	1	6
Extra revenues	1/7	190	3.83	1.32	1	7
Price per room	Quantitative	166	67.04	55.59	18	400
Revenue per room	Quantitative	137	86.33	72.43	25	400
Customers' satisfaction	1/7	179	5.79	0.64	4	7
NE improvement	Yes/no	200	0.61	0.48	0	1
Water saving	Yes/no	200	0.54	0.49	0	1
Wastewater treatment	Yes/no	200	0.18	0.38	0	1
Energy saving	Yes/no	200	0.68	0.46	0	1
Noise reduction	Yes/no	200	0.19	0.39	0	1
Noise isolation	Yes/no	200	0.23	0.42	0	1
Waste reduction	Yes/no	200	0.42	0.49	0	1
Waste treatment	Yes/no	200	0.59	0.49	0	1
Innovative ideas	1/7	195	4.02	1.72	1	7
Research innovations	1/7	195	4.12	1.71	1	7
Incentives to innovate	1/7	193	2.76	1.51	1	7

of implementation of NE innovations include the introduction of new products or services, changes in technological processes and improvements in existing products and services. The most reported environmental innovations include the implementation of systems aimed at reducing waste (such as avoidance of single portion packs or the use of returnable bottles) and the introduction of energy-saving measures (such as air-conditioning control).

It can be seen that the number of hotels that provide answers with respect to performance variables is lower than those answering questions about innovation variables. For this reason, variables that perfectly capture performance, such as revenue per room, price per room or gross operating profit (GOP) per room, were avoided in the regression analysis. Moreover, some other variables returned a really low standard deviation because most of the hotel managers picked the mean value: for instance, the GOP comparison and the customer satisfaction indicator. As a result, occupancy rate, and particularly the hotel's reported capacity to achieve extra revenue, appear to be best suited as performance measures. The latter was finally chosen as the performance indicator. This choice will be justified below.

Figure 1 presents the adoption rates of different categories of innovations. It can be seen that most of the hotels have adopted some type of innovation in the last three years. Only 13 out of the 200 hotels interviewed report no innovation decisions during this period. The database includes seven different types of environmental innovations, whereas NE innovation is unfortunately only gathered by a single indicator, with no further disaggregation. Those with a higher incidence are NE innovations, and also energy-saving, waste treatment and water-saving innovations.



**Figure 1.** Incidence of different types of innovation.

Sixty-one per cent of hotels report NE innovations. A number of environmentally innovative practices were conducted by hotels, some of them becoming almost universal, while others were seldom applied. Given this fact, we found it more appropriate to classify hotels into the environmentally innovative category when at least four, more than half, of the considered environmental measures, had been adopted, and into the non-environmentally innovative category when otherwise. This approach is similar to that followed by Molina-Azorín *et al* (2009) when identifying hotels with advanced environmental commitment. Under this definition, 82 out of the 200 hotels fall into the environmentally innovative group. This criterion will be used in the rest of the section to analyse the relationship between innovation types and other groups of variables.

With respect to hotel size, the average number of rooms in hotels that have implemented NE innovation in the last three years is 158, whereas this figure decreases to 111 rooms in the case of hotels that do not innovate. Thus, the percentage of NE innovative hotels increases with size. This relationship is illustrated in Figure 2. However, the relationship is not so clear for environmental innovations, revealing especially higher innovation incidence for medium-sized hotels, between 151 and 200 rooms. This evidences the need to treat both types of investments differently.

As Figure 3 shows, there is a positive relationship between general training and NE innovation, and between environmental training and environmental innovation. When looking at the relationship between general training and environmental innovation, the result is unclear. This reveals that the complementarities between human capital investments and innovation are better understood when performing a specific analysis that differentiates the type of innovation.

The relationships between NE innovation and all the available performance indicators are summarized in Table 2, which shows the mean values for NE innovative and non-innovative hotels. All the performance indicators, except for occupation rate, result in larger values when NE innovations have been adopted in the past three years. After performing mean difference tests, performance is

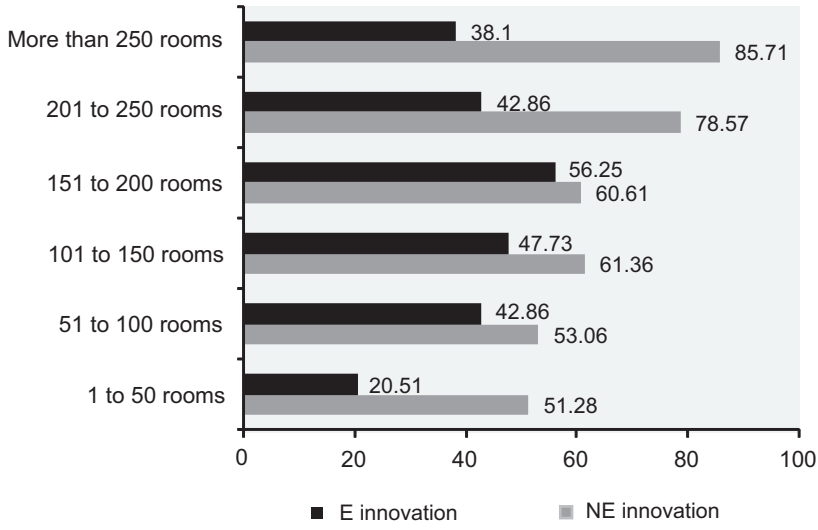


Figure 2. Percentage of innovative hotels by type of innovation and hotel size.

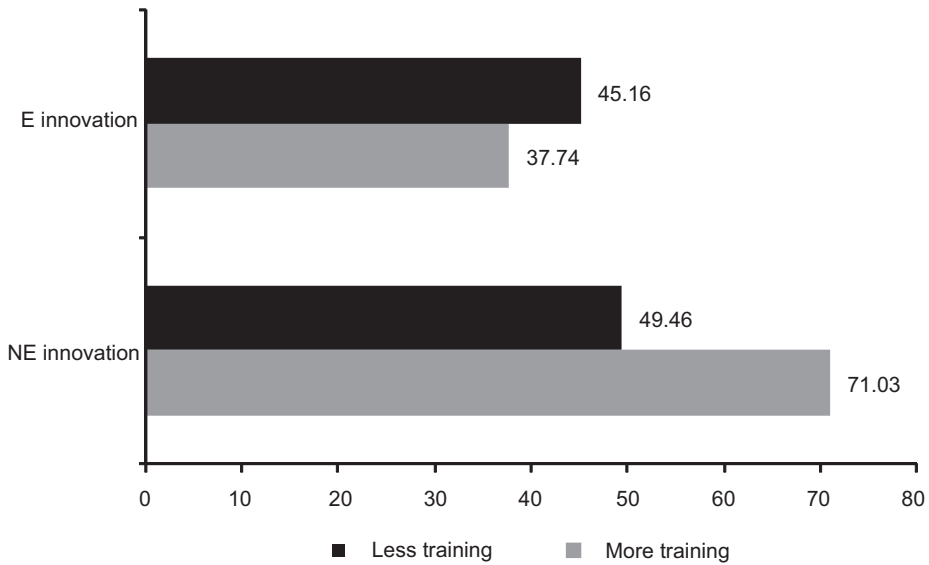


Figure 3. Percentage of NE and environmentally innovative hotels and specific training investment.

significantly better for GOP comparisons, GOP per room, extra revenues and revenues per room.

With respect to environmental innovation measures, a similar analysis was undertaken. The average performance values for environmentally innovative and non-innovative hotels are shown in Table 3. In this instance, however, differences

Table 2. Relationship between NE innovation adoptions and hotel performance.

Performance indicator	Innovative hotels	Non-innovative hotels
Occupation rate	78.42	80.62
GOP comparison*	4.38	4.01
GOP per room*	4.53	3.77
Extra revenues*	4.13	3.33
Price per room	89.95	73.72
Revenue per room*	95.36	70.12
Customers' satisfaction	5.84	5.70

Note: \*Mean differences significant (level of significance = 0.05).

Table 3. Relationship between environmental innovation and hotel performance.

Performance indicator	Innovative hotels	Non-innovative hotels
Occupation rate	78.43	79.76
GOP comparison	4.41	4.12
GOP per room	4.44	4.12
Extra revenues*	4.15	3.62
Price per room	83.25	84.07
Revenue per room	85.62	86.92
Customers' satisfaction	5.88	5.72

Note: \*Mean difference significant (level of significance = 0.05).

in results are not significant except for extra revenues. Extra revenues were on average slightly higher for environmentally innovative hotels. However, this does not support the conclusion that innovation increases performance. Further analysis of this relationship is undertaken in the fourth section.

### Determinants of environmental and non-environmental innovation

The analysis of the determinants of innovation has already been researched in the tourism literature. However, the number of studies available is not high and the analysis does not distinguish between innovation types. It will be shown that, although some determinants are common in explaining innovation decisions regardless of their specific type, others turn out to be significant only for a particular innovation type.

In the following subsection a number of hypotheses related to the determinants of environmental and NE innovation are introduced. Then the empirical exercises are performed to have them tested.

#### *Hypothesis concerning the determinants of innovation in the hotel industry*

*H1: Hotel size positively affects both environmental and NE innovation.*

This is the traditional hypothesis based on the idea that larger establishments would be more likely to make the investment required to implement technologies, as they can take advantage of economies of scale (Baum and Havemanm, 1997; Alvarez Gil *et al*, 2001). Hjalager (2002) considers that the high fragmentation of the tourism industry, with many small- and medium-sized enterprises, is a structural precondition that makes knowledge transfer in tourism problematic. The influence can empirically be positive (impact of scale economies on innovation activities) or negative (the effect of flexibility on the introduction of changes). In many relevant studies, size seems to be positively related to innovation (Orfila-Sintes and Mattsson, 2009; Jones 1996). However, this is not always true in the case of a number of environmental innovations. For instance, Razumova (2010) finds that hotel size is not associated with any specific category of environmental innovation. Likewise, in the work of Teruel and Segarra (2007) a negative relationship is found between hotel performance, measured through their growth, and hotel size.

*H2*: A formal commitment to quality encourages environmental and NE innovation.

Since quality and environmental regulations make firms fundamentally alter their products and processes towards the attainment of the targeted realignment (Horbach, 2008), the voluntary achievement of these goals should reflect a management strategy involved in the promotion of innovative outcomes. The presence of a specific department or staff responsible for quality, innovation or environmental issues, the frequency in which organizing processes are reviewed or the voluntary achievement of different quality and environmental certificates, could be taken as examples of a firm with a commitment to innovation with a spirit of constant update. In this sense, Rennings *et al* (2006) find that multiple revalidations of quality certificates and prior experience with environmental protection organizations are significant factors behind the incidence of environmental process innovation.

*H3*: More human capital positively affects both environmental and NE innovation.

The quality of human resources may directly impact innovation. Hjalager (2002) claims that an important impediment to knowledge transfer in tourism is the limited capacity of staff to hold a firm's knowledge. High turnover rates that discourage training decisions, low education levels and non-standard working conditions make innovative decisions in tourism problematic. Furthermore, Tugores (2012) shows the positive correlation between innovation and human capital investments in the hotel industry. Likewise, Orfila-Sintes and Mattsson (2009) differentiate among employees' qualifications, training and the sensitivity of management towards change, leading to the following hypotheses.

- *H3.1*: Better staff education positively affects environmental and NE innovation. Innovation decisions may be embedded in employee qualification (Preissl, 2000).



- *H3.2*: Increased staff training positively affects environmental and NE innovation.  
Innovation decisions may be updated through training (Ramos *et al.*, 2004).
- *H3.3*: A positive managerial attitude towards changes positively affects environmental and NE innovation.  
Hotel managers' attitudes as regards changes might determine innovation decisions (Guerrier and Deery, 1998).
- *H4*: The profile of hotel customers has an impact on environmental and NE innovation.

Johns and Mattsson (2003) and Preissl (2000) point out the importance of considering the role of customers in service innovation. The tourism market is increasingly segmented, with distinct groups having different motives to travel. Olsen and Conolly (1999) discovered new tourist segments based on the types of interaction and technology used.

#### *Econometric analysis of the determinants of innovation: model and results*

To discern the determinants of innovation in Majorcan hotels, a probit model is used in order to test the hypotheses. A distinction between environmental and NE innovations is made. In the first case, the dependent variable acquires value 1 if the hotel has implemented at least four different environmental measures and 0 otherwise; in the second case, the dependent variable is a dummy variable which takes value 1 if the hotel has adopted any NE-related innovation in the last three years and 0 otherwise.

To explain both types of innovation determinants, basic structural hotel characteristics, service features and also management organizational decisions must be taken into account. Moreover, human capital decisions and specialization in a particular customer typology should also be considered. Table A1 in the appendix fully describes these and provides details regarding the particular measurements and how they enter the analysis.

Several models were estimated by combining different elements of the set of possible explanatory variables. Those that turned out to be non-significant were dropped from the final chosen estimated models, which appear in Table 4.

Different hotel characteristics help to explain innovation, for instance, the age of a hotel. This result is coherent with the Jovanovic (1982) effect, according to which new firms perform comparatively better because they learn and imitate from incumbents. Location plays a role as well. Accommodation units located in beach areas and near a large urban centre (Palma de Mallorca) experience more NE innovation. Likewise, environmental innovation is more likely to take place when hotels are located close to the beach. Hotel size plays a role, too. Surprisingly enough, though, the impact is not clear-cut, since the sign of the coefficient changes according to the type of innovation under analysis. While previous studies concerning the tourism industry (Jones, 1996; Orfila-Sintes and Mattsson, 2009) found a positive effect of size on innovation, our results show that hotel size positively impacts NE innovation but has a negative effect on environmental innovation. Thus, H1 would be rejected, or at least it should be qualified to only consider NE innovation. It could be reasoned that with NE innovation the economies of scale factor prevails, while

Table 4. Probit estimations for analysing the determinants of NE and environmental innovation.

Variable category	Variables	Innovation type	
		Non-environmental innovation	Environmental innovation
I. Hotel	Hotel size	0.6987*	-0.7580**
	New hotel	0.6022**	0.9811***
	Beach location near city	0.6687***	
II. Management	No beach location		-0.9324***
	Owner management		-0.7009**
	Tour operator marketing	-0.7765**	
	Quality certificates		0.5162*
	Number of quality certificates	0.3776*	
	Organizing processes revision	0.6401**	
III. Human capital	Environmental accounting processes		0.8484**
	Remuneration of innovative workers	0.9494**	0.7331*
	Training	0.6206***	
	Environmental training		0.7693***
	Returns from training	0.1610*	
IV. Customers	University studies	0.6034**	0.5780**
	Repeaters	0.5825**	
	Night preferences	-1.0954***	-0.4671*
	Sport preferences		-0.5309
Estimation values	Pseudo $R^2$	0.3023	0.3019
	Prob > $\chi^2$	0.0000	0.0000
	Number of observations	166	174

Note: \*\*\*Significant to 1%; \*\*significant to 5%; \*significant to 10%.

the comparatively more flexible environments found in smaller establishments would favour environmental innovation. This result reinforces the convenience of differentiating between innovation types when possible, since more insightful lessons can be learned concerning the drivers of innovation.

All the management features considered prove to be significant for one or the other type of innovation, but not for both of them simultaneously: environmental innovation is more likely to occur when environmental accounting is in place and when hotels enjoy quality certifications (in favour of H2); however, it is less likely if ownership and management coincide, contradicting the available evidence in favour of a positive role of ownership on innovation (González and León, 2001; Crespí-Cladera and Ofila-Sintes, 2005). With respect to NE innovation, the intensive use of tour operators as a marketing channel has a negative effect. NE innovation is positively affected when hotels have standardized revision processes in place and when the number of quality certifications increase. These results also support H2, suggesting that hotels formally committed to quality innovate more.

The group of human capital related variables stands out as a determinant of innovation, and several varying aspects of education and training are shown

to have an impact. With respect to the staff's level of education, both environmental and NE innovations increase with the share of workers holding a university degree, a result that supports H3.1. Regarding training, having at least half the staff involved in training activities encourages NE innovation, which is further boosted by the managers' perception of returns from training. Specific environmental training is accompanied by more environmental innovation. Having more environmentally trained workers enhances the occurrence of environmental innovations and makes them easier to put into practice. The above results agree with H3.2. Finally, H3.3 is also supported by the significance and positive sign of the coefficients of the variable capturing whether hotels reward innovations arising from workers. Providing adequate incentives from management spheres is thus an additional aspect to attain more environmental and NE innovation.

Finally, some of the customer aspects turn out to be significant in explaining innovation (supporting H4), namely whether customers are likely to be repeater visitors and their preferences towards nightlife and sport activities. Thus, NE innovation is positively affected by having loyal customers. Also, the more interested customers are in nightlife activities, the fewer environmental and NE innovations occur. Likewise, a preference of customers towards sport activities makes environmental innovation less likely.

### **Role of innovation in hotel performance**

This section analyses the factors that contribute to explaining the competitiveness and performance of firms in the Balearic hotel industry. Many hotels devote an increasing amount of resources to promoting innovation, which calls for a better understanding of how innovation investments actually contribute to hotel performance. Different types of innovation investments are considered separately. This should not only help in identifying the particular innovative measures that have a greater influence on firms' financial results, but also guide management towards more efficient innovation policies at hotel level.

To carry out the econometric analysis, our chosen competitive performance variable is the capacity to obtain extra revenue as reported by hotel managers. This variable showed both the highest response rate and the best correlations with NE and environmental innovations. This variable is similar to others included in previous papers (Molina-Azorín *et al*, 2009; Tarí *et al*, 2010). An initial advantage is that it is more easily reported by managers, as compared to alternative measurable and frequently used variables such as occupancy index, price or GOP per room. A second, and more important, advantage is that it would better capture the competitiveness of hotels (Brown and Dev, 1999), in the sense that it is more closely related to the direct capacity of managers to be competitive and influence revenues, whereas price and GOP, for instance, are in many instances more subject to external negotiations.

#### *Hypotheses concerning the determinants of hotel performance*

In the general economic literature, there is a debate regarding the capacities that most affect a firm's competitiveness. The work by Prahalad and Hamel (1990)

considers technological improvements to be the resource that gives competitive advantage to firms. Other authors, such as Kogut and Zander (1992) and Porter Liebeskind (1996), conclude that technology is easily imitable and cannot generate competitive advantages in the long run. Thus, knowledge and employee skills would generate a better competitive advantage. Huybers and Bennett's (2002) contribution analyse the importance of these two elements for the competitiveness of tourism destination.

Taking this context into account, the following two hypotheses were formulated.

*H5:* Both environmental and NE innovation positively affect hotel performance, measured in terms of capacity to obtain extra revenue.

The idea that technological change will result in improvements in performance, such as improving quality or flexibility, is appealing. However, some innovations may have an indirect or lagged impact that prevents performance indicators from showing improvements in the short run, or they could even have a non-significant impact on performance. Further, environmental innovations may be implemented because they are mandatory or convenient for other purposes different from performance, as suggested by Chan and Wong (2006), Chan and Ho (2006), Chan (2005) and Chan (2008). Studies either make no distinction as to the type of innovation (Klomp and Van Leeuwen, 2001; Orfila-Sintes and Mattsson, 2009) or focus on only one type (Alvarez Gil *et al*, 2001; Carmona-Moreno *et al*, 2004; Molina-Azorín *et al*, 2009; Tarí *et al*, 2010). Heine *et al* (2003) and Hipp *et al* (2000) emphasize the importance of differentiating between different types of innovation, as well as the difficulty of isolating the effect each type has on the final result.

*H6:* Investments in human capital positively affect hotel performance, measured in terms of capacity to obtain extra revenues.

Based on the work of Becker (1962), several other studies show the importance of human capital investment and, in particular, the importance of education and on-the-job training investments, as a competitive strategy to generate sustainable growth and wealth (Mincer, 1974; Bishop, 1994). Many focus on returns from training activities. In the context of the tourism sector it is worth mentioning the work of Ramos *et al* (2004), showing that on-the-job training has a significant role to play in the transition from a mass tourism to a high-quality tourism strategy. In contrast, Cho *et al* (2006) do not find evidence of human resource practices having a significant effect on hotel performance. Other studies find that training programmes positively impact manager and customer satisfaction, but none uses more direct measures of productivity (Hocutt and Stone, 1998; Jameson, 2000; Davies *et al*, 2001).

#### *Econometric analysis of hotel performance: model and results*

An ordered probit model is applied to analyse the performance results achieved by hotels in the Balearic hotel industry, measured by their relative capacity to generate extra revenues. Different groups of explanatory variables are taken into

account, conveying information regarding innovation decisions and human capital – understood as investment in human resources – marketing channels, and the structure characteristics of the hotel establishment. The comprehensive list of variables used is shown in Table A2 in the Appendix.

Four different specifications are presented below to better understand the effect of each of the model's variables. The first specification includes only environmental and NE innovations; the second adds human capital characteristics; marketing and commercialization elements are also considered in the third specification; finally, a fourth general specification is presented containing other general characteristics related to the ownership, structure and location, usually included in any hotel industry analysis. The model's explanatory capacity as a whole increased as it was enriched. It is an interesting exercise to compare the value of coefficients and the significance of certain variables as more explanatory variables are incorporated into the model.

Table 5 presents the results. The method of estimation used is based on ML techniques<sup>1</sup> and in particular is an ordered probit model, as the dependent variable is a categorical variable with seven different values. The estimated coefficients and their degree of significance are presented for each specification of the model.

The most sound specification devoted to generally explaining the performance of hotels is provided in the last column of Table 5, this general specification shows the highest pseudo  $R^2$ . However, since the main focus of the paper is on innovation, it was found convenient to start by including innovation variables only, and then to incorporate additional ones. In so doing, more insight can be obtained as to how the innovation role is affected by the progressive inclusion of other variables.

Thus, the first specification shows that four variables related to environmental and NE innovation are significant and have a positive sign on the capacity to obtain extra revenues. However, other environmental innovative measures do not turn out to be significant. Hotels with the application of NE innovations in the last three years and those that have implemented particular environmental innovations attained significantly higher performance results for the firm. These results support hypothesis H5 at this earlier stage, but it is worth mentioning that this support is robust to other variables being included later on. The likelihood of having a better performance in terms of competitive extra revenues also increases in a significant way, although with a smaller effect, with the entrepreneurs' valuation of their sensitivity to innovative ideas. This subjective variable attempts to capture the willingness of the hotel manager to accept innovative ideas.

Variables related to human capital decisions were then introduced in a second stage of the analysis. Three out of the four human capital variables are significant and show the expected sign, and so the hypothesis of human capital having a positive influence on hotel performance can be accepted (H6). Hotels with a high proportion of workers with university studies result in better performance levels compared to competitors. Also, the reported importance given to human capital when recruiting new workers significantly and positively affects the performance of the firm. When controlling for human capital variables, the significance and value of the coefficients remain high for three of the innovation variables, in particular those that capture the implementation of NE, waste

Table 5. Ordered probit of determinants of performance in the hotel sector.

	Innovation specification	Innovation and human capital specification	Innovation, human capital and marketing specification	General specification
NE innovation	0.5402***	0.5081***	0.5298***	0.5862***
Waste reduction	0.6421***	0.7532***	0.7981***	0.7479***
Energy saving	0.6318***	0.6652***	0.7087***	0.7201***
Water saving	-0.0887	-0.1138	-0.0389	0.0260
Wastewater treatment	0.1643	0.0895	0.2062	0.4356
Noise isolation	-0.0050	-0.0517	-0.1164	-0.0437
Noise reduction	0.2466	0.1782	0.1236	0.0900
Waste treatment	-0.1967	-0.1941	-0.2136	-0.1988
Entrepreneurial sensibility to innovative ideas	0.1700***	0.0987	0.0770	0.0474
Number of workers		0.0065***	0.0077***	0.0016
Training		0.2202	0.2178	0.1069
HC importance in recruitment			0.1867***	0.2097***
0.2128***				
University studies		0.0004*	0.0002	0.0005***
Repeaters' percentage			0.0110**	0.0132**
Sport services			0.3385*	0.5533***
TTOO booking			-0.0024***	-0.0022***
Hotel category				0.2509**
Main city				0.9494***
Chain				0.3954*
Owners' management				-0.3589*
Size				0.0017**
Pseudo R2	0.0790	0.1216	0.1443	0.1770
Number of observations	178	178	178	178

Note: \*\*\*Significant to 1%; \*\*significant to 5%; \*significant to 10%.

reduction and energy-saving innovations. Hotels with a larger number of workers, which could be a good proxy of size, are found to perform better, too.

Variables related to commercialization and marketing traits of hotels were introduced into the third specification and it can be observed that some of them contribute to improving the performance of the hotel. Marketing strategies directed at repeater tourists and focused on the supply of sports services (such as tennis, golf and specifically cycling services) significantly increase hotel performance in terms of higher extra revenues. In contrast, commercialization through tour operators versus other channels, such as the Internet, significantly and negatively affects the extra revenues of the hotel.

Finally, the fourth specification includes other important general characteristics of hotels. As expected, the variable that reflects hotel category is significant, thus a better quality has a positive effect on the performance of the hotel. Belonging to a hotel chain and having a greater size improves hotels' results too, although then the number of workers variable is no longer



significant. Also, the location is a determinant of hotel performance. In this sense, it is interesting to note that in a sun and sand tourist destination like Majorca, the fact of being a city hotel increases the options of gaining extra revenues. Finally, the owner's direct management of the hotel was found to negatively affect performance.

The significance and value of the coefficients of variables capturing the implementation of environmental and non-environmental innovations remain constant throughout each of the specifications, even when other variables have been included. In this sense, being a high category hotel, a city hotel, belonging to a chain, specialization in sport tourism or in repeaters, or the value of education in recruitment decisions, is not enough to explain the competitive performance of a hotel establishment. Innovative waste reduction or energy-saving measures along with NE innovations would have to be accounted for, too.

### Conclusion

This paper investigated the hotel industry of the Balearic Islands to contribute to the understanding of the role of innovation in services, and in particular of its importance in the performance of the firms involved. According to the data collected, innovation takes place in a significant share of sampled firms. This would indicate that innovative practices have widely penetrated the hotel sector.

There are differences when finding the determinants of innovation that might be worth considering when developing policies to promote innovation, hence this differentiation between innovation types is a research novelty in this paper. When it comes to explaining innovation in the accommodation sector, in terms of groups of variables, the category of human capital variables probably stands out. The incidence of innovations of a different nature is to an extent explained by common elements such as the age of hotels, workers' level of education and some customer profile traits. However, for a full recognition of the determinants of innovation, a separate analysis is recommended for each innovation type. Thus, for the Balearic hotel sector, it is found that the impact of identical variables differs depending on the nature of the innovation. Hotel size constitutes a noteworthy example: positively impacting NE innovations and negatively impacting environmental innovations. Likewise, for environmental innovations, general training does not play a significant role, and a specific training approach would be called for. Tourism policies should account for these specificities when promoting innovation at the hotel unit.

Our findings in terms of the impact of innovation on performance evidence significantly better results for innovative hotels; in particular, for those that have implemented waste reduction, energy-saving schemes and NE innovations. Moreover, the sign and value of these coefficients remains positive and high after controlling for other characteristics, in particular human capital decisions, commercialization strategies and the usual control variables such as size, category or location.

Thus, it turns out that investments in environmental and NE innovations are two important competitive elements in the hotel sector that firms should take into consideration if they want to obtain a good performance compared

with other tourist establishments offering similar quality, location and services. From this perspective, future research should test the robustness of our findings when alternative performance indicators are used.

It is advisable to bear in mind the different nature of innovation options, given their varying incidence on performance. This makes it possible to gain insight into whether the impact is comparable to other investment or dependent on other complementary policies, which might constitute a more efficient approach both of the hotel when developing its innovation policy and of the public regulator providing incentives for innovation. Likewise, from a broader perspective, not all environmental innovation measures would turn out to be worth pursuing, from a strict performance point of view. This suggests that the regulation of some environmental innovations might be needed, when their implementation does not translate into the self-interest of hotels. The use of disaggregated measures of innovation is then advisable for a better understanding of the innovation phenomenon. While environmental investments were detailed in our dataset, NE innovation was not. It should therefore be an object of further research to ascertain whether comparable results would arise when dealing with NE innovation investments.

### Endnote

1. Standard errors are computed using the Huber–White–Sandwich estimator of variance to guarantee robustness; hence, significance is free from heteroscedastic problems.

### References

- Aldebert, B., Dang, R.J., and Longhi, C. (2011), 'Innovation in the tourism industry: the case of Tourism@', *Tourism Management*, Vol 32, No 5, pp 1204–1213.
- Alvarez Gil, M.J., Burgos-Jimenez, J., and Céspedes-Lorente, J.J. (2001), 'An analysis of environmental management, organizational context and performance of Spanish hotels', *The International Journal of Management Science*, Vol 9, pp 457–471.
- Baum, J., and Haveman, H.A. (1997), 'Love the neighbor? Differentiation and agglomeration in the Manhattan hotel industry', *Administrative Science Quarterly*, Vol 42, No 2, pp 304–338.
- Becker, G.S. (1962), 'Investment in human capital: a theoretical analysis', *Journal of Political Economy*, Vol 70, pp 9–49.
- Bishop, J.H. (1994) 'The impact of previous training on productivity and wages', in Lynch, L.M., ed, *Training and the Private Sector: International Comparisons*, Chicago University Press, Chicago, IL.
- Bornay-Barrachina, M., De la Rosa Navarro, D., López-Cabrales, A., and Valle-Cabrera, R. (2012), 'Employment relationships and firm innovation: the double role of human capital', *British Journal of Management*, Vol 23, pp 223–240.
- Brown, J.R., and Dev, C.S. (1999), 'Looking beyond RevPAR: productivity consequences of hotel strategies', *The Cornell Hotel and Restaurant Administration Quarterly*, Vol 40, No 2, pp 23–33.
- Carmona-Moreno, E., Céspedes-Lorente, J., and de Burgos-Jiménez, J. (2004), 'Environmental strategies in Spanish hotels: contextual factors and performance', *The Service Industries Journal*, Vol 24, No 3, pp 101–130.
- Chan, E.S.W. (2008), 'Barriers to EMS in the hotel industry', *International Journal of Hospitality Management*, Vol 27, No 2, pp 187–196.
- Chan, E.S.W., and Wong, S.C.K. (2006), 'Motivations for ISO 14001 in the hotel industry', *Tourism Management*, Vol 27, pp 481–492.
- Chan, W.W. (2005), 'Partial analysis of the environmental costs generated by hotels in Hong Kong', *Tourism Management*, Vol 24, pp 517–531.
- Chan, W.W., and Ho, K. (2006), 'Hotels environmental management systems (ISO 14001) creative financing strategy', *International Journal of Contemporary Hospitality Management*, Vol 18, No 4, pp 302–316.



- Cho, S., Woods, R.H., Jang, S., and Erdem, M. (2006), 'Measuring the impact of human resource management practices on hospitality firms' performance', *International Journal of Hospitality Management*, Vol 25, No 2, pp 262–277.
- Crespí-Cladera, R., and Orfila-Sintes, F. (2005) 'Environmental innovation in the hotel industry of the Balearic Islands', in Sharma, S., and Aragón, A., eds, *Corporate Environmental Strategy and Competitive Advantage*, Edward Elgar, Cheltenham.
- Davies, D., Taylor, R., and Savery, L. (2001), 'The role of appraisal, remuneration and training in improving staff relations in the Western Australia accommodation industry: a comparative study', *Journal of European Industrial Training*, Vol 25, No 7, pp 366–373.
- Drejer, I. (2004), 'Identifying innovation in surveys of services: a Schumpeterian perspective', *Research Policy*, Vol 33, No 3, pp 551–562.
- Fernández, Z., and Suárez, I. (1996), 'La estrategia de la empresa desde una perspectiva basada en los recursos', *Revista Europea de Dirección y Economía de la Empresa*, Vol 5, No 3, pp 73–92.
- Gallié, E-P., and Legros, D. (2012), 'Firms' human capital, R&D and innovation: a study on French firms', *Empirical Economics*, Vol 43, No 2, pp 581–596.
- González, M., and León, C. (2001), 'The adoption of environmental innovations in the hotel industry of Gran Canaria', *Tourism Economics*, Vol 7, No 2, pp 177–190.
- Guerrier, Y., and Deery, M. (1998), 'Research in hospitality human resource management and organizational behavior', *Hospitality Management*, Vol 17, pp 145–60.
- Heine, M.L., Grover, V., and Malhotra, M.K. (2003), 'The relationship between technology and performance: a meta-analysis of technology models', *Omega*, Vol 31, pp 189–204.
- Hipp C., Tether B.C., and Miles, I. (2000), 'The incidence and effects of innovation in services: evidence from Germany', *International Journal of Innovation Management*, Vol 4, No 4, pp 417–53.
- Hjalager, A.M. (1997), 'Innovation patterns in sustainable tourism. An analytical typology', *Tourism Management*, Vol 18, No 1, pp 35–41.
- Hjalager, A.M. (2002), 'Repairing innovation defectiveness in tourism', *Tourism Management*, Vol 23, No 5, pp 465–474.
- Hocutt, M.A., and Stone, T.H. (1998), 'The impact of employee empowerment on the quality of a service recovery effort', *Journal of Quality Management*, Vol 3, No 1, pp 117–132.
- Horbach, J. (2008), 'Determinants of environmental innovation: new evidence from German panel data sources', *Research Policy*, Vol 37, No 1, pp 163–173.
- Huybers, T., and Bennett, J. (2002), *Environmental Management And The Competitiveness Of Nature-Based Tourism Destinations*, Edward Elgar Publishing, Cheltenham.
- Jameson, S.M. (2000), 'Recruitment and training in small firms', *Journal of European Industrial Training*, Vol 24, No 1, pp 43–49.
- Johns, N., and Mattsson, J. (2003), 'Service encounters in tourism', in Kusluvan S., ed, *Managing Employee Attitudes and Behaviours in the Tourism and Hospitality Industry*, Nova Science Publishers, New York, NY.
- Jones, P.A. (1996), 'Managing hospitality innovation', *The Cornell Hotel and Restaurant Administration Quarterly*, Vol 37, No 5, pp 86–95.
- Jovanovic, B. (1982), 'Selection and evolution of industry', *Econometrica*, Vol 50, pp 649–670.
- Klomp, L., and Van Leeuwen, G. (2001), 'Linking innovation and firm performance: a new approach', *International Journal of the Economics of Business*, Vol 8, No 3, pp 343–364.
- Kogut, B., and Zander, U. (1992), 'Knowledge of the firm, combinative capabilities, and the replication of technology', *Organization Science*, Vol 3, No 3, pp 383–397.
- Molina-Azorín, J.F., Claver-Cortés, E., Pereira\_Moliner, J., and Tarí, J.J. (2009), 'Environmental practices and firm performance: an empirical analysis in the Spanish hotel industry', *Journal of Cleaner Production*, Vol 17, pp 516–524.
- Mincer, J. (1974) *Schooling, Experience and Earnings*, Columbia University Press for NBER, New York.
- Olsen, M., and Conolly, D. (1999), 'Antecedents of technological change in the hospitality industry', *Tourism Analysis*, Vol 4, pp 29–46.
- Orfila-Sintes, F., Crespí-Cladera, R., and Martínez-Ros, E. (2005), 'Innovation activity in the hotel industry: evidence from Balearic Islands', *Tourism Management*, Vol 26 No 6, pp 851–865.
- Orfila-Sintes, F., and Mattsson, J. (2009), 'Innovation behavior in the hotel industry', *OMEGA: The International Journal of Management Science*, Vol 37, pp 380–394.
- Peteraf, M.A. (1993), 'The cornerstones of competitive advantage: a resource-based view', *Strategic Management Journal*, Vol 14, pp 179–191.

- Polo, C., and Valle, E. (2008) 'An assessment of the impact of tourism in the Balearic Islands', *Tourism Economics*, Vol 14, No 3, pp 615–630.
- Polo, C., and Valle, E. (2011), 'The weight of tourism in the Balearic Islands: 1983–1997–2004', *Estudios de Economía Aplicada*, Vol 29, No 3, pp 737–754.
- Porter Liebeskind, J. (1996), 'Knowledge, strategy, and the theory of the firm', *Strategic Management Journal*, Vol 17, pp 93–107.
- Prahalad, C.K., and Hamel, G. (1990), 'The core competence of the corporation', *Harvard Business Review*, Vol 68, No 3, pp 79–91.
- Preissl, B. (2000), 'Service innovation: what makes it different? Empirical evidence from Germany', in Metcalfe, J.S., and Miles, I., eds, *Innovation Systems In The Service Economy*, Kluwer Academic Publishers, Boston, MA.
- Ramos, V., Rey-Maqueira, J., and Tugores, M. (2004), 'The role of training in changing an economy specializing in tourism', *International Journal of Manpower*, Vol 25, No 1, pp 55–72.
- Razumova, M. (2010) 'Essays on environmental regulation, environmental innovation and competitiveness in the hotel sector', DPhil thesis, Universitat de les Illes Balears, Palma de Mallorca.
- Rennings, K., Ziegler, A., Ankele, K., and Hoffmann, E. (2006), 'The influence of different characteristics of the EU Environmental management and auditing scheme on technical environmental innovations and economic performance', *Ecological Economics*, Vol 7, No 19, pp 45–59.
- Sundbo, J., Orfila-Sintes, F., and Sørensen, F. (2007), 'The innovative behavior of tourism firms: comparative studies of Denmark and Spain', *Research Policy*, Vol 36, pp 88–106.
- Tarí, J.J., Claver-Cortés, E., Pereira Moliner, J., and Molina-Azorín, J.F. (2010), 'Levels of quality and environmental management in the hotel industry: their joint influence on firm performance', *International Journal of Hospitality Management*, Vol 29, pp 500–510.
- Teruel, M., and Segarra A. (2007), 'Growth, age and location in Spanish hotels', in Arauzo, J.M., and Manjón, M., eds, *Entrepreneurship, Industrial Location and Economic Growth*, Edward Elgar, Cheltenham.
- Trigo, A., and Vence, X. (2012), 'Scope and patterns of innovation cooperation in Spanish service enterprises', *Research Policy*, Vol 41, pp 602–613.
- Tugores, M. (2012), 'Human capital and innovation as determinant factors of competitiveness', in Homlong, N., ed, *Tourism Destinations and Tourism Businesses: Issues of Competition and Cooperation*, Athens Institute for Education and Research, Athens.

## Appendix

**Table A1. Description and descriptive statistics of the variables in the probit models analysing the determinants of innovation.**

Variable name	Description	Mean	SD	Min	Max
NE innovations	The hotel has adopted a NE-related innovation in the last three years	0.61	0.48	0	1
E innovations	The hotel has implemented at least four different environmental measures in the last three years	0.41	0.49	0	1
Hotel size	Hotels with 250 rooms or more	0.11	0.30	0	1
New hotel	Hotels less than 10 years old or that have undergone total refurbishment in the last 10 years	0.59	0.49	0	1
Beach location near city	Hotels in beach destinations but close to large urban cores	0.33	0.47	0	1
No beach location	Hotels in cities, which are not sun and sand destinations	0.22	0.41	0	1
Owner management	Hotels directly managed by the owners	0.83	0.37	0	1
Tour operator marketing	Percentage of contracting through tour operators higher than 95%	0.11	0.31	0	1
Quality certificates	Hotels with some quality certification	0.19	0.39	0	1
No of quality certificates	Number of quality certifications	0.26	0.59	0	3
Organizing processes revision	Hotels that review their productive structure and their organizational processes at least once a year	0.81	0.38	0	1
Env accounting processes	Hotels specifically carrying out environmental accounting	0.10	0.29	0	1
Remuneration of innovative workers	Hotels that reward innovative workers' initiatives	0.13	0.33	0	1
Training	Hotels with more than 50% of workers involved in training activities	0.53	0.50	0	1
Environmental training	Hotels specifically carrying out environmental training activities	0.47	0.50	0	1
Returns from training	Level of utility of training investment reported by the manager	5.95	1.30	1	7
University studies	Percentage of workers with higher education	6.03	9.84	0	60
Repeaters	Hotels with percentage of repeaters greater than 10%	0.69	0.46	0	1
Night preferences	Hotels with clients specifically interested in the destination's nightlife	0.24	0.42	0	1
Sport preferences	Hotels with clients specifically interested in sporting activities	0.32	0.46	0	1

**Table A2. Description and descriptive statistics of variables in econometric specifications analysing hotel performance.**

Variable name	Description	Mean	SD	Min	Max
Performance	Relative capacity of the hotel for generating extra revenues, in comparison with the mean of the total sector in the Balearics	3.81	1.32	1	7
NE innovation	The hotel has adopted a NE-related innovation in the last three years	0.61	0.48	0	1
Waste reduction	The hotel has implemented waste reduction measures in the last three years	0.42	0.49	0	1
Energy-saving	The hotel has implemented energy-saving measures in the last three years	0.68	0.47	0	1
Entrepreneurial sensitivity to innovative ideas	Entrepreneurs' scoring of their sensitivity to innovative ideas	4.00	1.72	1	7
Number of workers	Total number of workers	51.03	47.84	2	285
Training	Hotels with more than 50% of workers involved in training activities	0.53	0.50	0	1
HC importance in recruitment	Importance for entrepreneurs of human capital when carrying out recruitment decisions	5.51	1.14	2	7
University studies	Percentage of highly educated workers	6.03	9.84	0	60
Repeater percentage	Percentage of repeaters	21.21	17.81	0	80
Sport services	Hotels with specific sport facilities	0.32	0.46	0	1
Tour operator booking	Percentage of contracting through tour operators	73.85	27.05	0	100
Hotel category	Hotel number of stars	3.23	0.81	1	5
Main city	Hotels in the main city	0.14	0.35	0	1
Chain	Hotels belonging to a hotel chain	0.62	0.48	0	1
Owner management	Hotels directly managed by the owners	0.83	0.37	0	1
Size	Total number of rooms	140.18	122.01	6	812