Looking for Determinants of the Environmental Concern at the Hospitality Industry

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Abstract This study uses the Community Innovation Survey 2010 (CIS 2010, Eurostat) database and data from 695 companies from three different countries to determine potential factors able to determine the environmental concern of the hospitality firms while innovating. The study demonstrates that the innovation orientation, the importance of external information sources for the innovation and the perception of barrier toward innovation are effective factors in predicting the environmental concern. Additionally, we uncovered that the innovation orientation is the most powerful predictor of the environmental concern while innovating, which suggests that innovation is a key driver to encourage companies at the hospitality industry towards the environment.

Keywords Eco-innovation · Hospitality · Environmental concern

JEL Classification Z32 tourism and development · O52 Europe

1 Introduction

The protection of the environment is been under the scope of society and business, in both service and manufacturing industries (Vargas-Vargas et al. 2010). Consumers are concern about how products are obtained and their environmental (Porter and Linde 1995). Although manufacturing industries have been pointed to be responsible for harming the environment, some services industries have been spotted lately and concerns about environmental aspects have emerged in areas such as hospitality.

Most companies move after the promotion of laws and regulations to control environmental damages, however, some companies see environmental concern as

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an opportunity to differentiate and gain competitive advantage (Esty and Winston 2009). This Proactive behavior in organizations is specially important in combination with another powerful promoter of companies' competitiveness, innovation. This behavior in organizations is complex and can be cause by multiple phenomena, and important consequences for personal and organizational development can be derived (Crant 2000).

Uncovering the determinants for this environmental concern is important in order to understand which behavior, relations or beliefs should be promoted or dismantled to achieve it.

The main objective of this study is to explore the capability of few factors to predict the environmental concern of the hospitality firms when they are innovating. The ability to predict will indicate the importance of these factors as drivers of the environmental concern and therefore, will allow us to preform further research on the cause-effect relation.

2 Literature Review

Eco-innovation considers those changes in production and consumption of products and services that reduce the environmental impact. Kemp and Pearson (2007) defined it as "the production, assimilation or exploitation of a product, production process, service or management or business method that is novel to the organization (developing or adopting it) and which results, throughout its life cycle, in a reduction of environmental risk, pollution and other negative impacts of resources use (including energy use) compared to relevant alternatives". This environmental concern while innovating can be driven by external forces, such new regulation or stakeholders pressure, or by the perception of a competitive advantage which will improve firm's performance through cost reduction and/or improved reputation. The combination of these two sources of competitive advantage, innovation and environmental concern, plays a crucial role to moving toward a sustainable economy and society (Esty and Winston 2009).

Even most industries have been driven by the regulatory framework (Beise and Rennings 2005), new green technologies has led to an increase in new environmentally friendly processes and products (Sierzchula et al. 2012).

Previous studies, have denoted the importance of market and other information sources and the key role of process and product orientation in other industries, such the automotive industry (Mondejar-Jimenez et al. 2015). Furthermore, differences between industries and services (Segarra-Oña et al. 2014) or between industries attending to technological level (Peiró-Signes et al. 2011) have been pointed out. However, all this studies have been performed for Spanish industries, which limit the generalization of the conclusions.

In this study, we explore companies for three European countries, which will allow to generalize previous findings, and we also add the perception of innovation barriers a predictor, which hasn't be used till date.

Thus, the aim of this study is to determine if characteristics related to their behavior, such as, the actual orientation toward innovation (product or process), the dependence of external sources to develop the innovations or if they perceived barriers to the innovation, are able to predict whether companies in the hospitality industry consider the environment in some way when they are innovating.

We will expect that companies in the hospitality industry with higher orientation to innovation are also more concern about environment. Moreover, we think perception of barriers towards innovation will not help the innovation and therefore, the consideration of the environment when innovating. Finally, companies that rely on external information sources for the innovation are exposed to agents that develop innovations and, therefore, to environmental orientation.

3 Methodology

For this study we used data from the Community Innovation Survey (CIS) (2010). The CIS is a Eurostat tool to monitor the innovation activities of the European companies.

However, not all the European Union countries report data and only three, Spain, Norway and Croatia surveyed companies from the hospitality industry.

We used NACE code to extract data from 695 companies from the hospitality industry with available data on the variables of interest.

Our study wants to explore the ability of the perception of barriers to product and process innovations, the orientation to product and process innovation and the dependence from external information sources in the innovation activities are relevant in encouraging environmental orientation of the companies while innovating.

The perception of barriers to process and product innovations are factors preventing companies from innovating or hampering innovation activities, such as, cost, knowledge or market factors. These factors are related to uncertainty or lack of information or resources.

Product and process innovation relate to innovation aiming to increase the range or quality of goods or services, to increase the market share, to increase flexibility or capacity or to reduce cost through innovations.

Finally, the dependence of external information sources refers to the sources that provided information for new innovation projects or contributed to the completion of existing innovation projects from outside the sphere of the company market, such us, university, trade fairs, industry associations,… (Table 1).

We classified companies attending to their environmental orientation while innovating using the variable OREI from CIS survey. OREI represents how important was to reduce environmental impacts for your activities to develop product or process innovations during the 3 years 2008–2010. Although, the variable is reported as categorical attending to the degree of importance (high, medium, low and not important) we recoded it into a dummy to reflect if in any

Table 1 Variables of the study and factor analysis

Factor	Variable	Description	Factor loading
Factor 1 perception of barriers towards innovation (50.87%)	HFENT	Lack of funds within your enterprise or group	0.808
	HFOUT	Lack of finance from sources outside your enterprise	0.832
	HCOS	Innovation costs too high	0.803
	HPER	Lack of qualified personnel	0.791
	HTEC	Lack of information on technology	0.848
	HINF	Lack of information on markets	0.852
	HPAR	Difficulty in finding cooperation partners for innovation	0.804
	HDOM	Market dominated by established enterprises	0.726
	HDEM	Uncertain demand for innovative goods or services	0.799
Factor 2 process and product orientation (13.37%)	ORANGE	Increase range of goods or services	0.738
	OREPL	Replace outdated products or processes	0.760
	ONMOMS	Enter new markets or increase market share	0.784
	OQUA	Improve quality of goods or services	0.812
	OFLEX	Improve *flexibility* for producing goods or services	0.804
	OCAP	Increase *capacity* for producing goods or services	0.799
	OLBR	Reduce labour costs per unit output	0.743
	ORME	Reduce material and energy costs per unit output	0.706
Factor 3 importance of external information sources (7.57%)	SINS	Consultants, commercial labs, or private R&D institutes	0.619
	SUNI	Universities or other higher education institutions	0.850
	SGMT	Government or public research institutes	0.813
	SCON	Conferences, trade fairs, exhibitions	0.677
	SJOU	Scientific journals and trade/technical publications	0.733
	SPRO	Professional and industry associations	0.728

KMO (0.944) Bartlett's Test of Sphericity (Sig.0.000). Rotation Method: Varimax with Kaiser Normalization. Total Variance Explained 72.82%

sense environment is considered (high, medium and low) or not considered (not important).

We use Discriminant Analysis (DA) to classify the dependent variable, the consideration of environment in the innovation activities of the firm, which has two categories, using as predictors a number of factors. The discriminant analysis will indicate if the factors can predict if the hospitality firm's consider environmental orientation while they are innovating. The discriminant prediction equation will allow us to classify cases into two groups attending to their environmental orientation and to investigate differences between or among groups.

As we are dealing with 2 categories in the grouping variable, there will be only one function or dimensions in de DA. The discriminant scores tell us how closely a variable is related to each function.

4 Results

Our study states that we can classify hospitality firms in two groups, those that consider the environmental in developing their innovations and those that do not. To classify them we considered three factors that have been obtained from 23 observable variables.

We developed the discriminant model based on our three factors obtained from the previous factor analysis and considering that firms were originally classified into two groups, attending to their environmental concern. The coefficients for the discriminant function, Wilk's lambda and the mean scores are reported on 2(A) for each of the two groups (Hair, Black, Babin, Anderson, and Tatham 2006).

The discriminant function was statistically significant based on Wilk's lambda $p < 0.001$. Moreover the values of the coefficients denoted the relative importance of the factors on the discriminant function (see Table 2A). The coefficient for the innovation orientation (0.638) was the highest and substantially higher than the importance of external information sources (0.351) or the perception of barriers to innovation (0.164).

Coefficient signs indicate in which direction the factors are acting. As all the coefficients signs were positive, it indicates for example that the higher the innovation orientation the higher chance to be classify on group 1 (environmental concern). Unexpectedly, the perception of barriers had a positive value, which indicates that a higher perception of barriers will increase the environmental concern, however the impact much smaller than the other factors.

Group centroids indicate the mean value of the discriminant score for each of the groups and they differed substantially (Group 1 -1.032 and Group 2 1.675), which is an indicator differences of the scores of the companies in the two group. As the discriminant function scores were standardized (mean of 0.00 and a standard deviation of 1.00) we can say that groups means differ more than 2.5 standard deviations between each other, which indicates that the distribution from the two

Table 2 Discriminant analysis results for environmental orientation of the firms

(A) Standardized canonical discriminant function coefficients and groups means

	Function
Factor 1	0.164
Factor 2	0.638
Factor 3	0.351
Wilks' lambda	0.366. $p < 0.001$
	Mean Scores
Group 1 (not oriented)	−1.032
Group 2 (oriented)	1.675

(B) Classification results for original cases overall accuracy 89.1%

Actual/predicted	1	2	Total
1	**396 (92.1%)**	34 (7.9%)	430
2	42 (15.8%)	**223 (84.2%)**	265
Total	438	257	695

Maximum chance criterion = 61.9%; Proportional chance criterion = 52.8%; Hair et al. criterion = 77.34%

groups will overlap only in a few cases, pointing to a good power of the model to classify the companies.

Although it is important to have a statistically significant function, it is also very important that the discriminant functions perform well in classifying firms into their original groups for calibration and validation samples.

Table 2B presents the classification results based on the discriminant function shown in Table 2A for calibration sample. The rows of Table 2B show the actual classification based on Orientation variable value, while the columns show the predicted group based on the discriminant function. The companies in the main diagonal have correct predictions (shown in bold), while the other cells represent the misclassified firms.

To evaluate the accuracy of the function to classify the companies we reported three measures. If each group had the same amount of companies, without any additional prior information, the firms would be randomly assigned into one of the two groups and we will have a 50% chance of making a correct decision. However, in our sample, the group sizes are 430 and 265, thus, proportional chance criterion looks more appropriate to assess the predictive accuracy of the discriminant model (Hair et al. 2006). Then, if *pi* represents the expected probability that a randomly chosen observation will be classified in group *i,* we can calculate the proportional chance criterion for a discriminant model as $\sum_{i=1 \cdot k}(p_i)^2$. p_i can be calculated as the ratio of number of observations group with respect to total sample size. Since our sample has 695 companies, the expected probabilities for the two groups are, 61.9% and 38.1%, and the proportional chance criterion 52.8%. For a good discriminant

model, Hair et al. (2006) suggested that classification accuracy should be at least 25% higher than the proportional chance criterion (1.25 * 52.8% = 66%). In Table 2B we report the classification accuracy for the estimated model as 89.1%, which is considerably higher than Hair et al. (2006) reported guideline. Additionally, the classification accuracy of the estimated discriminant model is also higher than the maximum chance criterion probability of being in the group with the largest sample size 61.9% chance of being in Group 1 (Hair et al. 2006).

We can validate the estimated discriminant models using either a split sample (e.g. holdout sample) or a cross-validation technique (e.g. U-Method and Jackknifing). Hair et al. (2006) prefer cross-validation techniques over a split sample approach because they repeat the procedure multiple times. In cross-validation, discriminant models are estimated by leaving one observation out and then the estimated models are used to predict the membership of the unselected observation, repeating this process for each observation in the sample. We used U-Method over Jackknifing. Even they are based on the same principle, Jackknifing focuses on the stability of discriminant functions and U-Method focuses on classification accuracy, which fits better to the aim of the study. The results from the cross-validated where exactly the same as the one reported in Table 2B and therefore show a fair accuracy exceeding the proportional chance criterion, maximum chance criterion and Hair et al. (2006) criterion.

5 Conclusion

The objective of this study was to empirically assess the capability of certain characteristics to predict the environmental orientation of the firms at the hospitality industry. Using data collected from CIS (2010) database, which includes 695 hospitality companies with available data from three different countries we got interesting insights about which characteristics have higher impact in determining environmental concern of these firms while innovating.

The results in this paper show that the orientation towards innovation, the importance of the external information sources and the perception of barriers to the innovation are good predictors of the environmental concern.

Additionally, the results also suggest that the innovation orientation is crucial in determining the environmental concern of the hospitality companies when innovating.

This might be because, those firms that understand innovation as an important factor for the future of the company also detect environmental concern as a way to assure the future. Nonetheless, some key actors in the industry, i.e. tripadvisor, has been promoting the use of specific labels to detect hotels that are working on reducing their environmental impact as a way to differentiate them.

The discriminant analysis we performed, validates the descriptive power of some characteristics in grouping firms attending to their environmental concern. Even though, classifying firms in the same industry which might have similar view of the environment is inherently a difficult task, our function could classify correctly about 89.1% of the cases, which is a good improvement than random classification for proportional chance criterion.

Although very encouraging, we consider this study to be only exploratory. Even there are a number of limitations in the study, such as, the number of variables considered, our research has incorporated data from different countries, which has been a limitation of other studies conducted in the past related to the environmental orientation or eco-innovation. Future studies should try to expand the analysis to a large number of variables.

Overall, we believe that we have managed to address a number of relevant and important issues, which should be of interest to policy makers, showing that they should pay close attention to the promotion of innovation and encouraging collaboration between stakeholders in the hospitality industry to increase environmental concern.

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