

Managing Environmental Knowledge through Learning Processes in Spanish Hospitality Companies

Juan Gabriel Cegarra-Navarro and Aurora Martínez Martínez

Universidad Politécnica de Cartagena (Spain)

The major focus of this research is to investigate whether environmental knowledge has any impact on organizational outcomes through an empirical investigation of 127 Spanish hospitality companies, using structural equation models. Our results show that environmental knowledge is an important determiner for developing organizational outcomes. However, this relationship is completed with just two related constructs: Firstly, the company's acquisition process plays a key role in managing the tension between the knowledge necessary to develop the appropriated environmental initiatives and current knowledge. Secondly, the company's distribution process also sheds light on tangible means for managers to enhance their company's outcomes through environmental knowledge.

Keywords: learning process, environmental knowledge, hospitality industry, hotel outcomes.

El objetivo principal de esta investigación es analizar mediante ecuaciones estructurales aplicadas a 127 empresas del sector español de la hospitalidad, si el conocimiento ambiental ejerce algún impacto en los resultados empresariales. Nuestros resultados muestran que el conocimiento ambiental ejerce un papel importante para alcanzar los objetivos entre las empresas objeto de estudio. Sin embargo, este papel se encuentra condicionado a la presencia de dos dimensiones más que actúan de forma complementaria. En primer lugar, el proceso de adquisición de conocimiento juega un papel clave para lidiar la tensión entre el conocimiento necesario para impulsar las iniciativas ambientales demandadas y el conocimiento actual disponible. En segundo lugar, el proceso de distribución también posibilita medidas palpables y realizables para que los directivos puedan mejorar sus resultados a través del conocimiento ambiental.

Palabras clave: proceso de aprendizaje, conocimiento ambiental, sector de la hospitalidad, resultados hoteleros.

Correspondence concerning this article should be addressed to Juan G Cegarra-Navarro. Facultad de Ciencias de la Empresa. Universidad Politécnica de Cartagena. Paseo Alfonso XIII, 50. 30203 Cartagena. Murcia. (Spain). E-mail: Juan.Cegarra@upct.es.

The environment has become an important factor in the decision making process of companies around the world, not only to meet legislative requirements, but also because of consumers' changing needs. It appears that a growing proportion of individuals rewards businesses that address ecological issues in their marketing practices and punishes corporations that ignore or abuse green directives (Carlson, Grove, & Kangun, 1993). Environmental knowledge can be defined as the degree to which one expresses concern about ecological issues (Amyx, DeJong, Lin, Chakraborty, & Wiener, 1994). Environmental knowledge may be thought of as comprising stocks of data, information and knowledge (environmental memories) that have been accumulated by an organization throughout its history (Walsh & Ungson, 1991). Environmental knowledge in this study is defined as the knowledge created as a consequence of a learning process among a company and its agents (e.g. customers and employees).

The benefits sought by companies considering, or in the process of implementing, environmental initiatives include: cost savings and improved management control; meeting customer expectations; demonstrating commitment to environmental responsibilities; improved environmental performance; staying ahead of legislation; and increased employee motivation (Holt 1998; Rondinelli & Vastag 2000; Zhang, Shon, Love, & Treloar, 2000). These benefits clearly imply that companies desire more from an environmental practice than just a certificate to display on the wall. For example, hotel operators would like to encourage their guests to participate in programs to reuse their washroom towels. Not only do these programs benefit the environment, but they reduce laundry expenses. In addition, beyond the direct savings, a growing proportion of consumers rewards businesses that attend to environmental issues through their business practices (Menon & Menon 1997). However, Sena da Silva and Dumke de Medeiros (2004) suggested that companies that implement environmental initiatives could not know for certain whether these plans are designed to help companies achieve their business goals. Theyel (2000), for instance, found that firms have not been able to improve their environmental performance as expected, primarily because of the differences between business objectives and environmental management objectives.

One possible explanation for the difference in achievement of the two goals (i.e. business objectives and environmental management objectives) may relate to the fact that the environmental knowledge created by the company is one thing and the knowledge used by the company is another. The fact that each company is learning from its environment does not mean that the company as a whole could improve itself, especially because 'our surroundings' are often more complex

than the sense we make of them. Knowledge utilization includes the absorption of the knowledge generated in the learning process, so that what has already been learnt can be applied to businesses and its own activities (Nevis, DiBella, & Gould, 1995). For example, when information on environmental issues is used by decision-makers and it changes their mental models of the market environment, a decision has been made from its application (Boiral, 2002). In this regard, previous arguments provide a static view of environmental knowledge impelled by Environmental Management Systems and ignore the new conceptions of cycles of learning introduced by Nevis, DiBella and Gould (1995).

In order to examine the relative importance and significance of learning processes on 'environmental knowledge' and their effects on business performances, we conducted an empirical investigation of 127 hotels in the Spanish hospitality sector. Data was collected via a telephone questionnaire with constructs based on the key factors discussed in detail in the following section. Section three investigates the development of hypotheses as to how learning processes contribute to environmental knowledge. Details of the survey which was used to collect appropriate data with which to test the hypotheses is presented in the following section, whilst the results of testing the models are presented in the fifth section, followed by the discussion.

Conceptual Framework

Environmental protection has become one of the world's most important priorities in order to attain sustainable development (Nouri, Karbassi, & Mirkia, 2008). Fryxel and Lo (2003) defined environmental knowledge as a kind of general knowledge, which includes the concepts of environmental protection, the natural environment and ecosystems. This means that environmental knowledge involves what people know and are concerned about regarding the natural environment, their responsibilities towards environmental protection and the relationship between the economy and sustainable development (Po-Shin & Li-Hsing, 2009). As Frick, Kaiser and Wilson (2004) suggest, people with this knowledge will know what can be done about the environmental problems and understand the benefits of environmentally responsible actions.

Organizations create knowledge as well as 'environmental knowledge' because their internal agents are related to external agents (e.g. customers, employees, tour operators, etc). The learning process has an individual and social component since it represents the mechanism by which the organization transforms the automatic and conscious knowledge of their agents into 'objective and

collective knowledge'¹ (Spender, 1996). To classify the individual and social component of the 'learning process', this research will take into consideration the classification proposed by Nevis *et al.* (1995), who structure the learning process into three phases (i.e. acquisition, distribution, and utilization of the knowledge). These phases are also called 'transfer, transformation, and harvesting' by Tiemessen, Lane, Crossan and Inkpen, (1997). While the acquisition phase represents an individual's knowledge, which may have automatic and conscious aspects (Spender, 1996), the distribution phase relates to the establishment of a context which is a necessary precursor to embedding knowledge within the organizational memory (Walsh & Ungson, 1991). This division is more pedagogic than structural, which is to say, the variables are neither independent nor autonomous, but permanently interacting.

To adapt to continuously changing environmental conditions and to generate innovations, companies need to acquire new market knowledge, administer it, make their knowledge stock explicit and share knowledge across organizational entities (Boiral, 2002). Knowledge acquisition is defined as the process in which knowledge is acquired or obtained. Because of this, the knowledge acquisition process has become a key element for companies seeking to adapt and anticipate environmental changes through the implementation of new routines. Nevis *et al.* (1995) suggest that individual learning is greater when more assorted interpretations are developed by the organization. In this regard, companies can encourage the acquisition of knowledge through formal meetings, informal meetings or creating external communities of practice where customers and vendors interact and work together for the achievement of a particular objective (Dewhurst & Cegarra, 2004). However, what is done with data and information at this stage of the learning process depends upon a subjective interpretation by individuals, who transform these inputs into experiences, skills and competencies (Nonaka & Takeuchi, 1995). Therefore, the organization will need all these 'updates' to be shared and converted into social knowledge among all the members that form part of the organization, thus, the 'distribution process' starts.

The 'distribution of knowledge' is the ability to maintain the acquired knowledge internally in the organization over time. This conversion is due to a social process between groups and individuals (Nonaka & Takeuchi, 1995). Allen, James and Gamlen (2007) suggest that knowledge management practices within the R&D function can be grouped into two categories: a) those influential factors that facilitate informal interactions among partners (i.e.

accessibility to the capacities of partners to create and transfer collective knowledge); and b), factors that facilitate the formal integration of knowledge among partners in the organization (i.e. efficiency in the transformation of knowledge to create objective knowledge). While formal networks support the transmission of messages through defined relationships (e.g. organizational structure defined by organizational charts, etc), informal networks depend on no permanent structure (e.g. friendship or trust between one another). To explore knowledge distribution, our study adopts two key processes through which tacit and explicit knowledge interact, namely, externalization and combination (Nonaka and Takeuchi, 1995). While 'externalization' codifies tacit knowledge into explicit concepts, as in writing instruction manuals, 'combination' converts explicit knowledge into more systematic sets, for instance by integrating existing information extracted from databases and creating new knowledge (Chou, Chang, Tsai, & Cheng, 2005).

The result of above externalisation and combination processes will be the shared explicit knowledge (i.e. the environmental knowledge) stored in the organizational memory. In this paper, we define environmental knowledge as embedded explanatory, instrumental and evaluative knowledge, offering the 'why' and 'how' for the internal organizational agents (i.e. shareholders, management, and employees). The goal of this 'environmental knowledge' will be that all members of the organization are conscious of where useful complementary abilities reside such as: Who knows what? Who can help with that? Who can exploit environmental information? (Frick *et al.*, 2004). It includes: prior data and information; all internally-generated documentation connected to the environmental activities of the organization such as ISO 14001; energy reduction systems; waste recycling programs and proper environmental designs whose ownership is granted to the company by law, licensing and partnering agreements (Boiral, 2002); and, importantly, institution-created image (Boiral, 2009). Therefore, environmental knowledge will lead to increased company benefits such as cost savings resulting from eco-efficiency, enhanced corporate image, improved relationships with local communities, access to new green markets and superior competitive advantage, among others (Rondinelli & Vastag 2000; Zhang *et al.* 2000).

The maintenance of 'environmental knowledge' supposes in each case, the reactivation and development of new information, which fosters learning, and integration of new knowledge in members of the organization, thus, the 'utilization of knowledge' starts. This process includes

¹ Spender (1996) distinguishes 'individual knowledge' as automatic or conscious, and 'social knowledge' as objective and collective, according to the possible combinations between its tacit and explicit characteristics.

the application of the knowledge generated in the early phases of the learning process (i.e. the internalization of the knowledge in the organization), so environmental knowledge could be applied to businesses and their own activities. Cohen and Levinthal (1990) assert that the 'absorptive capacity' of the organization is a function of the absorptive capacity of its individual members, nevertheless, they also consider that the organizational 'absorptive capacity' is not only the sum of the individual capacities, since not only it is considered the acquisition or assimilation of knowledge, but its application is also important. Crossan, Lane and White, (1999: p. 532) calls this learning process 'feedback', (i.e. moving from using, to the distribution, and acquisition phases). In this process, new knowledge is created due to the rearrangement of existing knowledge, the revision of previous knowledge structures, and the building and revision of theories.

Hypotheses

Managers of companies are reported to have poor knowledge of environmental issues (Tilley, 1999). Hence, it might be expected that they implement environmental initiatives from concerns expressed by employees or customers, through observation of benefits achieved by other companies through their environmental programmes, or because of their personal preferences (Gadenne, Kennedy, & McKeiver, 2009). Environmental scanning is the acquisition of information about events, trends, and relationships in an organization's external environment, the knowledge of which would assist management in planning the organization's future course of action. Acquisition of knowledge reflects the identification function, which represents the generation of intelligence for the organization (Nevis *et al.*, 1995).

However, acquired knowledge (e.g. new meanings) at this stage is individual rather than social, and tacit rather than explicit (Argyris & Schön, 1978). This knowledge therefore needs to be embedded through the externalization and combination processes in order to become a dominant design, otherwise knowledge creation will not take place (e.g. Chou *et al.*, 2005). These considerations lead us to argue that the knowledge acquisition process by itself is insufficient to assure environmental knowledge creation (Boiral, 2002). For example, the acquired knowledge must be aligned with the strategy, and this knowledge must be effectively embedded into the organizational structures and processes. As pointed out by Barker (1998), communication between organizational members and customers is essential to externalisation and combination processes and can indirectly support environmental knowledge creation by communicative oriented processes or databases that provide communication links among members and by storing historical records of decisions. In addition, since companies' environmental initiatives require learning new practices

and knowledge and introducing clean technologies (Porter & Van Der Linde, 1995), the environmental knowledge is expected to be positively associated with the two processes of externalization and combination for knowledge creation (Chou *et al.*, 2005). Considering this, we argue that the knowledge acquisition process may have an indirect effect on environmental knowledge by improving the company's capacity to react to and implement change in response to external factors and by changing the ways individuals interact or come to interpret things. Thus,

Hypothesis 1. The extent to which a company achieves a context for the acquisition of knowledge will determine the extent to which the externalisation and combination processes take place which at the same time will support the creation of environmental knowledge.

According to Bansal and Roth (2000), one of the main drivers of the emerging trend of companies implementing environmental issues is the pressure from big players (e.g. customers). As Naffziger, Ahmed and Montagno's (2003) work shows, there is a positive relationship between the environmental effort of the managers and organizational operating efficiency, profits and business image. With regard to this, Gadenne *et al.* (2009) suggest that when information or knowledge is fragmented within a company, environmental practices are hard to implement and, as a result, the customer relationship suffers. This finding is consistent with Boiral's (2002) conceptualization of environmental knowledge as the facilitator to meet the expectations of stakeholders who are mostly concerned by the formal environmental commitment of companies. Hence, the utilization of environmental knowledge leads to better customer relationships, relying on the participation in environmental activities such as the precontrol and prevention of environmental problems (Tatsuki & Masahisa, 2006). In addition, environmental knowledge enables new environmental tasks to be implemented smoothly, which in turn deliver a better customer service (Po-Shin & Li-Hsing, 2009). Therefore, hotels equipped with environmental knowledge can provide a better and competitive service to their customers, which could enhance organizational outcomes (Klassen & McLaughlin, 1996). These considerations lead us to frame the second hypothesis of the work:

Hypothesis 2. Environmental knowledge is positively related to the knowledge utilization process.

As noted above, managers should have many reasons to utilise environmental knowledge, Wagner (2005), for instance, found a positive relationship between corporate environmental strategies and economic performance. Based on this, we assert, following Bansal and Roth (2000), that the utilization of knowledge provides a focus for the sales growth efforts by enabling the business to develop strong relationships with key customers and insights into opportunities for market development. As pointed out by Simpson, Taylor and Barker (2004), the

utilization of knowledge can result in a multitude of benefits to organizations including reduction in waste, cost savings, increased customer satisfaction, higher employee commitment, improved products, better public relations and competitive advantage. These statements support the thesis presented in relevant literature that the knowledge utilization process enables order processing to be computerized and performance to be monitored in real-time (e.g. Jaworski & Kohli, 1993; Kohli, Jaworski, & Ajith, 1993; Simpson *et al.*, 2004). Consequently, we propose that:

Hypothesis 3. The knowledge utilization process is positively related to the organizational performance.

Method

The Spanish Hotel operator industry was the subject of our data collection. The Spanish Hotel operator industry is very relevant to the Spanish economy. Spain ranks second in the world in this sector, both in terms of the number of travellers (behind France) and in terms of income from tourism (behind the US). This industry gave Spain 11.8% of its Gross domestic product (GDP) for 2002 and 12.1% for 2001 (Claver, Molina & Pereira, 2006). Regarding the employment generated by the tourism sector, estimates indicate that it usually absorbs 10% of the total employment available in Spain. From the total Spanish population, 202.673 people worked in hotels and guesthouses in August 2003 (National Statistics Institute Information Bulletin, 2003). Considering this, the hotel industry is a very interesting industry to examine for several reasons. On the one hand, hotels have to contend with huge fixed costs. The management often has to worry about staff wages, enormous utility bills, rooms and facilities maintenance, and other expenses. Obviously, it is not easy to run a hotel well. So have you ever wondered how hotels manage to survive when there is a recession? Regarding this, in 2008 the tourist industry did not contribute to the growth of the Spanish economy for the first time, showing its own negative growth of 1.1% with respect to 2007 (National Statistics Institute Information Bulletin, 2008). On the other hand, the Spanish Hotel operator industry is an appropriate setting for an investigation of environmental knowledge and its impact on business performance since these companies have to face up to highly dynamic environments, strong competition and rapid advances in technology that requires the intensive use of environmental knowledge.

The unit of analysis for this study was the company, on the assumption that aspects relating to the the learning processes and the creation of environmental knowledge

affect the entire organization. The data were collected through telephone interviews with the CEO or owner of the business using a simple structured questionnaire. The individual addressed was expected to have a broad overview of the innovative issues studied in this paper. We made use of a list of 560 Hotel operators provided by the SABI² database (Sistema de Análisis de Balances Ibéricos) as an initial sampling frame. All companies were included in the CNAE-552 (The Spanish National Classification of Economic Activities 552) and had more than ten employees. Before conducting the surveys, the businesses were contacted and asked by our team to participate in the study. They were informed by telephone of the objectives of the research and they were assured of its strictly scientific and confidential character, as well as the global and anonymous treatment of the data. In total, 560 companies were solicited for participation in the study by telephone. A total of 245 companies agreed to participate. The 245 companies were contacted and respondents were asked about environmental activities carried out by their hotels and learning processes implemented to create environmental knowledge in a context of intensive innovation.

Surveying took place over a period of month, from early September to October. From a sample of 245 companies, the total number of surveys that were carried out was 127 companies (41 companies have 10-49 employees, 59 companies have 50-249 employees, 18 companies have 250-499 employees and 9 companies have more than 500 employees), which gives a response rate of 22.67% of the total number of companies solicited for their participation (51.83% response rate from the companies who agreed). This high response rate indicates the high quality of the sampling procedure and it also seems that informants perceived the research as relevant and worthwhile. A comparison between companies who had answered and companies who had not answered yielded no significant differences relevant to turnover, total assets and number of employees, which suggests that non-response bias is not a problem (Armstrong & Overton, 1977). In addition, the size of the sample was considered sufficient, since it was greater than ten times the number of predictors from the indicators on the most complex formative construct or antecedent construct leading to an endogenous construct (Hair, Anderson, Tatham, & Black, 1998).

Measures

Churchill's (1979) approach to questionnaire development was used. Scales were combined from

² This database contains financial information for 520.000 companies (480.000 from Spain and 40.000 from Portugal). This includes public and private, Spanish and Portuguese companies, with up to 10 years of data, updated daily.

several other relevant empirical studies with new items to make an initial list of 24 items (6 x 4 = 24 measuring knowledge acquisition processes, combination processes, externalisation processes, environmental knowledge, knowledge utilization and organizational performance). The survey was initially validated by academics in organizational learning in Murcia and Cartagena (Spain) during the period June – July 2008. We then conducted a series of telephone interviews with managers who comprised a pilot sample of 2 leading Spanish hotels. These respondents were also asked to indicate why they implement environmental initiatives. All answers were related to economic causes e.g., conservation of materials or energy, adherence to industry codes or legislative requirements, decreased costs, process and product innovation. In fact, such initiatives were being used by businesses as communication tools to demonstrate their commitment to the prevention of negative environmental impact. As a result of this pre-testing, we made some minor modifications based on the suggestions received. Specific issues relating to the development of the questionnaire and its related constructs are elaborated on below (see Appendix for a list of items).

- The final measures relating to the existence of knowledge acquisition processes consisted of 4 items adapted from a scale designed by Pérez, Montes and Vázquez, (2004) to measure the construct of knowledge acquisition. Consistent with Pérez *et al.* (2004), items that addressed knowledge acquisition were interwoven with issues related to encouraging individuals in the organization to track changing markets and share market intelligence with external agents.
- The initial measures relating to the existence of combination and externalization processes linking formal network and informal network scales consisted of 8 items (4 x 2 = 8 measuring the two factors) adapted from a scale designed by Lee and Choi (2003) to measure the constructs of knowledge combination and knowledge externalization. Consistent with Lee and Choi (2003), items that addressed knowledge externalization were interwoven with issues related to the encouragement of selected individuals in the organization to transform their tacit knowledge of customers or experts into easily understandable forms. Therefore, knowledge externalization focuses on processes leading to the generation of new insights, taking actions that are experimental in nature and developing the competencies necessary for actually completing tasks and activities. Knowledge combination items described the process of systemizing concepts into a knowledge system, such as databases and knowledge bases so that reconfiguration of existing information through sorting, adding, combining, and categorizing explicit knowledge could be used to create new knowledge.
- Previous studies by Boiral (2002) provide guidance in developing items to measure environmental knowledge. The importance of ‘environmental knowledge’ to cognitively diverse teams relates to enhancement of technical, administrative and social approaches through the accurate understanding of the information available to the group and where it is located in terms of environmental initiatives. These items recognize support of policies, rules, reporting structures and decision-making protocols that encourage the introduction of clean technologies and approaches to reduce pollution that often leads to substantial savings of material and energy.
- The existence of conditions necessary to support the utilization of knowledge was measured using an adapted version of a scale designed by Kohli *et al.* (1993) to measure the ‘response design’ construct. They were focused on the utilization of knowledge about environmental issues to develop plans and the response implementation of such plans.
- As the use of objective measures may pose some difficulties to researchers in making causal inference from the historical data (March & Sutton, 1997), this study adopts subjective measures to get a more comprehensive evaluation of firm performance. In this regard, several measures of business performance have appeared in literature and we adopt the growth based measures proposed by Kaplan and Norton (1992), and Klassen and McLaughlin (1996) for sales, profits and profitability on total assets.

Assessment of the measures

The items of the proposed model were evaluated using exploratory techniques to assess the reliability and dimensionality of the measures. In the first stage, each construct was assessed using the item-to-total correlation, Cronbach’s alpha, and exploratory factor analysis. The decision to retain items was based on a recommendation proposed by Hair *et al.* (1998) with regard to statistical criteria (loadings and regression weights). As a result of the exploratory analysis, several items were dropped, because of the psychometric properties of the measures improved when contrasted with the original set of measures. The fit statistics for the resulting 18 items, which are summarized in Table 1, indicate a reasonable data fit, with $\chi^2_{(120)} = 339.66$; *Comparative Fit Index [CFI] = .91*; *Incremental Fit Index [IFI] = .92*; *Goodness Fit Index [GFI] = .90*; *Root Mean Square Error of Approximation [RMSEA] = .063*. The fit index of RMSEA is below .08, and indices of *GFI*, *CFI* and *IFI* are above the common standard of .9 (Hair *et al.*, 1998). Although a significant chi-square value indicates that the model is an inadequate fit, the sensitivity of this test to sample size confounds this finding and makes rejection of the model on the basis of evidence alone inappropriate

(Bagozzi, 1980). However, a ratio of less than three ($\chi^2/df < 3$) indicates a good fit for the hypothesized model (Carmines & McIver, 1981).

The reliability of the measures is calculated using Bagozzi and Yi's (1998) composite reliability index and with Fornell and Larcker's (1981) average variance extracted index. For all the measures, both indices are higher than the evaluation criteria of .7 for the composite reliability and .5 for the average variance extracted (Bagozzi & Yi, 1988). Based on these results, we conclude that the reliability and the convergent validity of our measurements are sufficiently established. These results suggest the use of three items to measure the presence of the combination of knowledge ($p_c^{SCR} = .75, p_c^{AVE} = .50$), three to measure the knowledge externalisation ($p_c^{SCR} = .76, p_c^{AVE} = .51$), three to measure environmental knowledge ($p_c^{SCR} = .75, p_c^{AVE} = .51$), three to measure utilization of knowledge ($p_c^{SCR} = .78,$

$p_c^{AVE} = .55$), three to measure business performance ($p_c^{SCR} = .76, p_c^{AVE} = .51$), and finally another three to measure the knowledge acquisition ($p_c^{SCR} = .75, p_c^{AVE} = .50$).

Discriminant validity was determined by calculating the shared variance between pairs of constructs and verifying that it was lower than the average variances extracted for the individual construct (Fornell & Larcker, 1981). The shared variances between pairs of all possible scale combinations indicated that the variances extracted were higher than the associated shared variances in all cases. In the interest of thoroughly discriminant validity, an additional test was examined, which supports this assumption since the confidence interval (± 2 standard errors) around the correlation estimated between any two latent indicators never includes 1.0 (Anderson & Gerbing, 1988). The construct's correlation matrix, shared variances, means and standard deviations are showed in Table 2.

Table 1
Construct summary, confirmatory factor analysis and scale reliability

| Construct | Value | T-value | Reliability (SCR ^a , AVE ^b) |
|------------------------------|-------|---------|--|
| Combination of knowledge | | | |
| COM_1 | .89 | 12.52 | SCR = .75 |
| COM_3 | .88 | 12.18 | AVE = .50 |
| COM_4 | .89 | 12.54 | |
| Externalisation of knowledge | | | |
| EXT_1 | .83 | 11.12 | SCR = .76 |
| EXT_2 | .86 | 11.76 | AVE = .51 |
| EXT_4 | .91 | 12.92 | |
| Environmental knowledge | | | |
| EK_1 | .83 | 11.04 | SCR = .75 |
| EK_2 | .85 | 11.40 | AVE = .51 |
| EK_3 | .79 | 10.33 | |
| Utilization of knowledge | | | |
| UTI_1 | .76 | 9.56 | SCR = .78 |
| UTI_3 | .62 | 7.44 | AVE = .55 |
| UTI_4 | .91 | 12.45 | |
| Business Performance | | | |
| BP_1 | .78 | 9.88 | SCR = .76 |
| BP_2 | .89 | 11.91 | AVE = .51 |
| BP_3 | .80 | 10.16 | |
| Acquisition of knowledge | | | |
| AK_1 | .90 | 12.49 | SCR = .75 |
| AK_2 | .84 | 11.25 | AVE = .50 |
| AK_3 | .70 | 8.64 | |

The fit statistics for the measurement model were:

$\chi^2_{(120)} = 339.66; CFI = .91; IFI = .92; GFI = .90; RMSEA = .063;$

^a Scale Composite Reliability (SCR) of $p_c = (\sum \lambda_i)^2 \text{var}(\xi) / [(\sum \lambda_i)^2 \text{var}(\xi) + \sum \theta_{ii}]$ (Bagozzi and Yi, 1998).

^b Average variance extracted (AVE) of $p_c = (\sum \lambda_i^2 \text{var}(\xi)) / [(\sum \lambda_i^2 \text{var}(\xi) + \sum \theta_{ii})]$ (Fornell and Larcker, 1981).

Table 2
Construct correlation matrix

| | Mean | Standard deviation | Correlation matrix | | | | | |
|----------------------------------|------|--------------------|--------------------|-----|-----|-----|-----|-----|
| | | | I | II | III | IV | V | VI |
| I. Combination of knowledge | 6.69 | 2.08 | .50 | .45 | .49 | .21 | .10 | .48 |
| II. Externalisation of knowledge | 6.42 | 2.06 | .51 | .51 | .49 | .49 | .26 | .48 |
| III. Environmental knowledge | 6.24 | 2.09 | .58 | .64 | .51 | .37 | .32 | .49 |
| IV. Utilization of knowledge | 6.86 | 2.14 | .37 | .50 | .38 | .55 | .18 | .46 |
| V. Business Performance | 6.66 | 2.01 | .25 | .40 | .44 | .28 | .51 | .18 |
| VI. Acquisition of knowledge | 7.94 | 1.44 | .55 | .58 | .54 | .58 | .28 | .50 |

Intercorrelations are presented in the lower triangle of the matrix. The Average Variance Extracted (AVE) is depicted on the diagonal. Shared variances are given in the upper triangle of the matrix

Results

Once the psychometric properties of the measures had been checked, the next step was the evaluation of the hypotheses developed from consideration of the relevant literature. Following the recommendations of Anderson and Gerbing (1988), we tested our theoretical model (TM), with externalization and combination processes as intermediate variables between the knowledge acquisition process and the environmental organizational process, against an alternative model (AL), considering that the knowledge acquisition process does not need to be done first. Figure 1 provides a synopsis of these models. While in the first model (Theoretical Model) the impacts of the process of knowledge acquisition on environmental knowledge is potentially mitigated by the extent to which externalization and combination processes exist, in the case of the Alternative Model, the impact of the acquisition of knowledge is not mediated through the two processes of externalization and combination.

The goodness of fit indices show that the theoretical model has more adequate fit indices: *RMSEA*, *GFI*, *CFI*, *IFI* and *PNFI* (see Table 3), than the alternative model. It is interesting to note that the difference of *PNFI* (James, Muliak, & Brett, 1982) between the two models is above .08, a critical value recommended by Hair *et al.* (1998) as indicating that one model represents a significant gain of parsimony over another. Furthermore, the theoretical model explains more variance in organizational performance than the alternative model. Therefore, the data we obtained provides support for the theoretical model where knowledge externalization and knowledge combination are considered as mediating variables between knowledge acquisition and environmental knowledge.

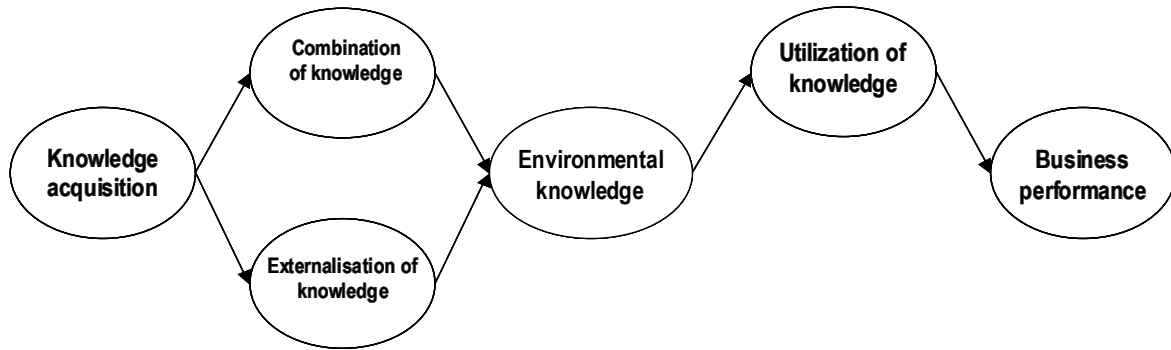
Table 3 shows that knowledge acquisition had a positive influence on the existence of combination and externalisation processes at a level of ($p < .01$). Table 3 also

shows that knowledge combination at a level of ($p < .01$) had a significant effect on the existence of environmental knowledge. The effect of knowledge externalization on environmental knowledge had a standardized coefficient of ($\beta_{21} = .38$). This analysis indicates that knowledge acquisition has an indirect effect on environmental knowledge through combination and externalization processes. Hence, this analysis provides full support for H_1 . The effect of environmental knowledge had a positive influence on the knowledge utilization processes at a level of ($p < .01$), thus suggesting a positive influence of knowledge utilization on the business performance at a level of ($p < .01$). Therefore, this analysis provides full support for H_2 : (environmental knowledge \rightarrow knowledge utilization), and also for H_3 : (knowledge utilization \rightarrow business performance).

Discussion

This research's first contribution is to question the existing models of the relationship between learning and environmental knowledge. In doing so, the concept of learning was explored by capturing the processes behind the learning process (adquisition and distribution of knowledge) and testing its impact on environmental knowledge. In summary, a null hypothesis (that 'acquisition of knowledge' is a prior step in the learning process) was tested against the alternative hypothesis (that 'acquisition of knowledge' is not a prior step, i.e. could be undertaken in parallel or is unnecessary, in the creation of environmental knowledge) through an empirical study of 127 companies in the Spanish hospitality sector through structural equation modelling. The results indicate that 'environmental knowledge' is unlikely on a company basis without being fostered by the acquisition and distribution of knowledge among organizational members. In this regard, this paper provides a starting point to bring together customers and hotel

Theoretical Model



Alternative Model

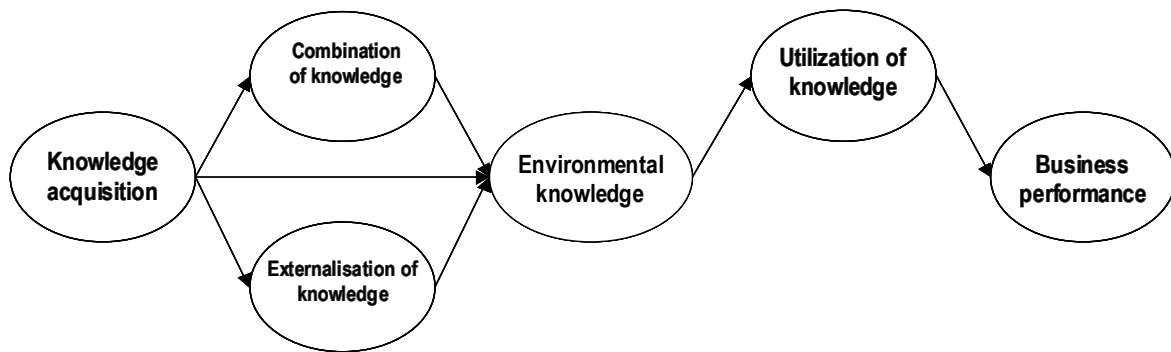


Figure 1. Competitive models of the environmental knowledge

Table 3
Construct structural model

| | Parameter | Theoretical model (TM) | | Alternative model (AM) | | |
|---|---------------|------------------------|-------------------|------------------------|-------------------|--------------|
| | | Estimate | t-value | Estimate | t-value | |
| <i>Direct effects</i> | | | | | | |
| Acquisition of knowledge ® Combination of knowledge | γ_{11} | .73 | 8.24 ^a | .73 | 8.23 ^a | |
| Acquisition of knowledge ® Externalisation of knowledge | γ_{21} | .81 | 8.64 ^a | .80 | 8.53 ^a | |
| Acquisition of knowledge ® Environmental knowledge | γ_{31} | --- | --- | .17 | 1.08 | |
| Combination of knowledge ® Environmental knowledge | β_{31} | .28 | 3.39 ^a | .22 | 2.15 ^a | |
| Externalisation of knowledge ® Environmental knowledge | β_{32} | .68 | 6.98 ^a | .58 | 4.36 ^a | |
| Environmental knowledge ® Utilization of knowledge | β_{43} | .70 | 6.29 ^a | .71 | 6.38 ^a | |
| Utilization of knowledge ® Business Performance | β_{54} | .46 | 4.34 ^a | .46 | 4.35 ^a | |
| <i>Fit indices for the models</i> | | | | | | |
| Models | RMSEA | GFI | CFI | IFI | PNFI | χ^2/df |
| Alternative model (AM) | .083 | .87 | .89 | .90 | .58 | 385.71/(128) |
| Theoretical model (TM) | .080 | .90 | .91 | .91 | .66 | 382.45/(129) |

^a < .01; ^b p < .05

managers in the implementation of a knowledge creation network from which common measures for target markets can derive.

The second contribution of this research derives from the results of the empirical test in the hypotheses. This finding corroborates the notion that specific practices have to be used to acquire, distribute and apply environmental knowledge and thereby contribute to its dissemination and retention within a company (Boiral, 2002). We think that this is an important finding, as potential for any country's tourism industry to develop will depend substantially on its ability to maintain a competitive advantage in its delivery of goods and services to visitors (Ahmed, Montagno, & Firenze, 1998; Avila 1993; Rome 1994; Theyel, 2000), thus, hotels may be trapped in a suboptimal stable equilibrium. As many overloaded hotel managers are paring their sources, they are not actively listening to their customers, and they may be over-investing in the development of promotion initiatives, and under-investing in (or underestimating) mechanisms and aspects to translate what is learnt from a knowledge creation network into an action plan. The theoretical and managerial implications of the bi-directional relationships observed across those constructs are discussed below.

Regarding H_1 , the organizational mechanisms associated with the learning processes provide somewhat surprising results. Our data indicates that the acquisition of knowledge has an indirect effect on the environmental knowledge through combination and externalization processes. Otherwise, acquisition processes will have insignificant effects on environmental knowledge. A possible explanation for that insignificant effect may relate to the fact that before environmental knowledge can be created, new acquired knowledge should be embedded and reviewed. This means that although shared values, beliefs, and the resulting trust and predictability that arises between employees and managers, which have been created through the knowledge acquisition process, represent an important antecedent for environmental knowledge (Klassen & McLaughlin, 1996). However, very little is achieved if the organizational members do not structure this knowledge through the combination and externalization processes. In other words, since much of the individual's knowledge is created as a consequence of the interaction with external agents it is likely to be mostly tacit. Therefore, it is necessary to convert this knowledge into social knowledge either in explicit form or in the form of processes, procedures and rules. Otherwise, only a few people in the organization will have access to this relevant knowledge leading to the under-utilization of relevant knowledge or the utilization of irrelevant knowledge, both of which are liable to lead to a degradation of environmental knowledge.

Another possible explanation would be the fact that making employees responsible for environmental questions can have negative side-effects, as proposed by Tsang and Zahra, (2008). Some of the things that individuals know may be incomplete, dangerously flawed, or simply incorrect

(e.g. new legal, professional and regulatory requirements applicable to work services). This idea is also recognized by Boiral (2002), who suggests that environmental initiatives often presuppose tacit knowledge that can only be transmitted formally. Under this framework, managers should be aware that expertise creates perceptual filters that keep experts from noticing social and environmental changes. Additionally, as Starbuck (1992) highlights, experts tend to overlook relevant events just outside their domain. Therefore, through combination and externalization processes, individuals will update their mental models by focusing organization efforts on problems that are more important for the organization and its customers, which in turn facilitates the easy retrieval of environmental knowledge.

With regard to H_2 , the results support the position that the utilization of knowledge is likely to suffer if a hotel does not have a solid knowledge base for making the right decisions and prioritizing activities on environmental issues. Thus, the utilization of environmental knowledge is likely to be critical to gaining a competitive advantage and hence responding to the growing customer demand for environmentally friendly programs (Bohdanowicz, 2005). We further suggest that knowledge utilization may help in the identification of the goals and environmental demands of customers. For example, a solid knowledge base of venues for all types of environmental events, whether hosted in the city - museums, convention centers, historical buildings and parks - or outside of the city, will help to create relationships and experience with all customers, making it easy for hotels to assist customers with their questions. Considering this, environmental knowledge should be based on performance audit results and must address all possible needs for changes needed in the policy, objectives and other elements of the organizational outcomes, changing circumstances and the commitment to continual improvement.

Regarding H_3 , the results support the position that, in order to improve the performance of business operations, companies need to provide and support knowledge-utilization processes. Therefore for a hotel to grow and prosper in a dynamic environment, such as the Spanish hospitality market during the period we have examined, it is necessary for the company to use its environmental knowledge. This confirms the position adopted by Erdogana and Baris (2007) when they argue that hotels plan environmental protection activities to reduce the consumption of energy, water, and materials, thus reducing operating costs. In other words, while customers are driven by a need to preserve the local environment, companies are driven by perceived benefits such an opportunity to reduce operating costs, environmental regulations and institutional pressures. However, the utilization of environmental knowledge also needs to involve changes in the organization (e.g. technologies, structure, responsibility, etc), the consequences of which, in turn may involve initial set-up costs and subsequent maintenance and improvement

(Babakri, Bennet, & Franchetti, 2003). Considering this, we argue that the cost of implementation of environmental programs in the hospitality industry is not too high and the economic and institutional benefits are often short term.

Limitations and the direction of future research

This study has some limitations. First, it has been observed that the existing production facilities and practices in most of the industrial companies, particularly production processes, need to be enhanced so that they become more environmentally friendly (Sena da Silva & Dumke de Medeiros, 2004). In this regard, Sena da Silva and Dumke de Medeiros detected that companies belonging to the chemical industry have a strong concern with the impacts that this sector can cause to the environment. Consequently, future research, including companies from different sectors (e.g. hospitality, telecommunications and chemical) should be addressed to analyse the relationship between the company's activity and its environmental knowledge. Secondly, national cultural issues might influence the way organizations promote environmental initiatives. Therefore, it would also be interesting to extend the study to other countries, since national cultural issues might influence the results. Thirdly, we would further observe this study relies on the assumption that the manager or general director of each of the companies is a key knower of the company and therefore the emphasis here is on finding commonalities among firms in terms of the critical knowledge areas they considered important and had available. Although this kind of subjective information is commonly used in studies (e.g. Glaister, Dincer, Tatoglu, Demirbag, & Zaim, 2008; Xu, 2005), future research sampling multiple knowers within a firm (e.g. managers, customers and employees) will be helpful to test for inter-rater reliability and to improve the internal validity of learning processes and environmental knowledge. In addition, the model presented in this study was general and did not capture the possible moderating effects of environmental turbulence and uncertainty. Prior research has also shown that the effect of environmental initiatives on organizational outcomes can vary substantially with environmental conditions and therefore, under turbulent conditions, the existence or otherwise of environmental knowledge might produce different results. Therefore, other factors which have not been included in this study are also likely to affect the firm's performance. In this study we have only considered the presence of high level of environmental concern among hotels and different environmental initiatives have not been included. Future research should investigate the link between different initiatives such as reducing waste production and resource and energy consumption by controlling and improving lighting, heating, ventilation, air conditioning, and water use, by making proper purchasing decisions on containers, use of returnable containers and recycling materials

and the company goals (Carmona, Céspedes, & Burgos, 2004). Finally, it may also be interesting to observe the change in the performances of companies after adopting environmental activities, through case studies.

Conclusions

There are many methods for managing the environment, but companies still show some resistance to the adoption of environmental programs. The general notion among many businesses is that social responsibility based on environmental concerns may be contrary to company goals and performance (e.g. Ahmed *et al.* 1998; Sena da Silva & Dumke de Medeiros, 2004). The results from this study contradict this. It has been observed that environmental hotels are better performing in organizational performances than the non-environmental hotels. These findings are important in the ongoing debate of the relationship between environmental practices and organizational performance, since there is selective evidence that the adoption of these initiatives leads to improved organisational performance. Therefore, the article's first conclusion is to propose a general framework for the management of environmental knowledge. This framework hinges on a three-stage process, namely acquisition, distribution and utilization. This process appears to be an interesting analysis framework to understand how environmental knowledge emerges and can be used to improve an organization's outcomes.

The article's second conclusion stresses that hotels may be over-investing in the adoption of knowledge acquisition processes, and under-investing on mechanisms to facilitate the flow of knowledge creation (i.e. combination and externalization processes). Regarding this, the hotels that consider organizational learning as a lineal process (i.e. knowledge acquisition → knowledge distribution → environmental knowledge → knowledge utilization) can expect to achieve higher levels of the introduction of environmental initiatives into the organization. Consequently, in the context of environmental knowledge, it is important to note that managers should encourage employees to distribute knowledge rapidly as a prior step and use knowledge effectively in a subsequent step.

These findings further suggest that knowledge acquisition is important, but not enough to create environmental knowledge. A possible explanation for these findings would be the fact that managers' environmental concerns are conditioned on preconceived ideas such as beliefs, trust and predictability, which have been acquired over time. Therefore, through combination and externalization processes, managers can update their preconceived ideas and can help employees to solve related problems more effectively. We would further observe that the utilization of environmental knowledge strongly depends on learning new practices and introducing clean policies and plans. What this means for managing environmental knowledge

is that when an environmental initiative has already been developed to improve customer performance, customers should be taken into account if a company wishes to give a new environmental initiative fair consideration. This in turn may affect the creation of new knowledge, for instance, in terms of increased investor confidence, customer satisfaction or loyalty, which in turn facilitates the easy retrieval of relevant knowledge from the repositories, and enables the users to apply this knowledge in the implementation of environmental initiatives within the company.

References

- Ahmed N. U., Montagno R. V., & Firenze, R. J. (1998). Organizational performance and environmental consciousness: an empirical study. *Management Decision*, 36(2), 57-62.
- Allen, J., James, A. D., & Gamlen, P. (2007). Formal versus Informal Knowledge Networks in R&D: A Case Study Using Social Network Analysis. *R&D Management*, 37(3), 179-196.
- Amyx, D. A., DeJong, R. E., Lin, X. L., Chakraborty, G., & Wiener, J. L. (1994). Influencers of purchase intentions for ecologically safe products: An exploratory study. In C. W. Park & D. L. Smith (Eds.), *AMA Winter Educators' Conference Proceedings* (pp. 341-347). Chicago: American Marketing Association.
- Anderson, J. C., & Gerbing D. W. (1988). An updated paradigm for scale development incorporating unidimensionality and its assessment. *Journal of Marketing Research*, 25(2), 186-192.
- Argyris, C., & Schön, D. A. (1978). *Organizational learning: A theory of action perspective*. Reading, MA: Addison Wesley.
- Armstrong, J. S., & Overton, T. S. (1977). Estimating nonresponse bias in mail surveys. *Journal of Marketing Research*, 14(3), 396-402.
- Avila, J. A. (1993). What is environmental strategy. *The McKinsey Quarterly*, 4(1), 53-69.
- Babakri, K. A., Bennet, R. A., & Franchetti, M. (2003). Critical factors for implementing ISO 14001 standard in United States industrial companies. *Journal of cleaner production*, 16(2), 122-131.
- Bagozzi, R. P. (1980). *Causal models in marketing*. New York: John Wiley.
- Bagozzi, R. P., & Yi, Y. (1988). On the evaluation of structural equation models. *Journal of the Academy of Marketing Science*, 16(1), 74-94.
- Bansal, P., & Roth, K. (2000). Why companies go green: a model of ecological responsiveness. *Academy of Management Journal*, 43(4), 717-736.
- Barker, T. (1998). The role of communication in creating and maintaining a learning organization: preconditions, indicators, and disciplines. *Journal of Business Communication*, 35(4), 443-467.
- Bohdanowicz, P. (2005). European hoteliers' environmental attitudes: Greening the business, Cornell Hotel and Restaurant. *Administration Quarterly*, 46(2), 188-204.
- Boiral, O. (2002). Tacit knowledge and environmental management. *Long Range Planning*, 35(3), 291-317.
- Boiral, O. (2009). Greening the Corporation Through Organizational Citizenship Behaviors. *Journal of Business Ethics*, 87(2), 221-236.
- Carlson, L., Grove, S. J., & Kangun, N. (1993). A content analysis of environmental advertising claims: a matrix method approach. *Journal of Advertising*, 22(3), 27-39.
- Carmines, E. G., & McIver, S. P. (1981). Analysing models with unobserved variables: analysis of covariance structures. In G. W. Bohrnstedt, & E. F. Borgatta (Eds.), *Social measurement: current issues* (pp 65-115). Beverly Hills, CA: Sage.
- Carmona, E., Céspedes, J., & Burgos, J. (2004). Environmental strategies in Spanish hotels: Contextual factors and performance. *The Service Industries Journal*, 24(3), 101-129.
- Chou, T. C., Chang, P. L., Tsai, C. T., & Cheng, Y. P. (2005). Internal learning climate, knowledge management process and perceived knowledge management satisfaction. *Journal of Information Science*, 31(4), 283-296.
- Churchill, G. A. (1979). A paradigm for developing better measures for marketing constructs. *Journal of Marketing Research*, 16(1), 64-73.
- Claver, E., Molina, J. F., & Pereira, J. (2006). Strategic groups in the hospitality industry: Intergroup and intragroup performance differences in Alicante. *Spain Tourism Management*, 27(6), 1101-1116.
- Cohen, W. M., & Levinthal, D. (1990) Absorptive capacity: a new perspective on Learning and innovation. *Administrative Science Quarterly*, 35(1), 128-152.
- Crossan, M. M., Lane, H. W., & White, R. E. (1999). An organizational Learning framework: from intuition to institution. *Academy of Management Review*, 24(3), 522-537.
- Dewhurst, F. W., & Cegarra, J. G. (2004). External communities of practice and relational capital. *The Learning Organization*, 11(4-5), 322-331.
- Erdogana, N., & Baris, E. (2007). Environmental protection programs and conservation practices of hotels in Ankara, Turkey. *Tourism Management*, 28(2), 604-614.
- Fornell, C., & Larcker, D. F. (1981). Evaluating structural equation models with unobservable variables and measurement error. *Journal of Marketing Research*, 18(1), 39-50.
- Frick, J., Kaiser, F. G., & Wilson, M. (2004). Environmental knowledge and conservation behavior: Exploring prevalence and structure in a representative sample. *Personality and Individual Differences*, 37(8), 1597-1613.
- Fryxel, G., & Lo, C. W. (2003). The influence of environmental knowledge and values on managerial behaviours on behalf of the environment: An empirical examination of managers in China. *Journal of Business Ethics*, 46(1), 45-69.
- Gadanne, D., Kennedy, J., & McKeiver, C. (2009). An Empirical Study of Environmental Awareness and Practices in SMEs. *Journal of Business Ethics*, 84(1), 45-63.
- Glaister, K. W., Dincer, O., Tatoglu, E., Demirbag, M., & Zaim, S. (2008). A causal analysis of formal strategic planning and firm performance: Evidence from an emerging country. *Management Decision*, 46(3), 365-391.

- Hair, J. F., Anderson, R. E., Tatham, R. L., & Black, W. C. (1998). *Multivariate Data Analysis*, 5th ed. Englewood Cliffs, N.J.: Prentice-Hall.
- Holt, D. (1998). The perceived benefits of an environmental management standard. *Business Process Management Journal*, 4(3), 204-213.
- James, L. R., Muliak, S. A., & Brett, J. M. (1982). *Causal analysis assumptions, models and data*. Beverly Hills, CA: Sage.
- Jaworski, B. J., & Kohli, A. K. (1993). Market orientation: Antecedents and consequences. *Journal of Marketing*, 57(3), 53-70.
- Kaplan, R. S., & Norton, D. P. (1992). The Balance Scorecard—Measures That Drive Performance. *Harvard Business Review*, 70(1), 71-79.
- Klassen, R. D., & McLaughlin, C. P. (1996). The Impact of Environmental Management on Firm Performance. *Management Science*, 42(8), 1199-1214.
- Kohli, A., Jaworski, B. J., & Ajith, K. (1993). MARKOR: A Measure of Market Orientation. *Journal of Marketing Research*, 30(4), 467-477.
- Lee, H., & Choi, B. (2003). Knowledge management enablers, processes, and organizational performance: An integrative view and empirical examination. *Journal of Management Information Systems*, 20(1), 179-228.
- March, J. G., & Sutton, R. I. (1997). Organizational performance as a dependent variable. *Organization Science*, 8(6), 698-706.
- Menon, A., & Menon, A. (1997). Environpreneurial Marketing Strategy: The Emergence of Corporate Environmentalism as Market Strategy. *Journal of Marketing*, 61(1), 51-67.
- Naffziger, D. W., Ahmed, N. U., & Montagno, R. V. (2003). Perceptions of environmental consciousness in US small businesses: an empirical study. *SAM Advanced Management Journal*, 68(2), 23-32.
- National Statistics Institute Information Bulletin (2003). Tourism in 2002. Development of tourism from the point of view of tourist supply. Retrieved on May 12, 2009 from http://www.ine.es/revistas/cifra/cifra_turismo02.pdf
- National Statistics Institute Information Bulletin (2008). Development of tourism from the point of view of tourist supply. Retrieved on February 5, 2009 from <http://www.ine.es/welcoing.htm>
- Nevis, E. C., DiBella, A. J., & Gould, J. (1995) Understanding Organizations As Learning Systems. *Sloan Management Review*, 36(2), 73-85.
- Nonaka, I., & Takeuchi, H. (1995). *The knowledge-creating company. How Japanese companies create the dynamics of innovation*. New York: Oxford University Press.
- Nouri, J., Karbassi, A. R., & Mirkia, S. (2008). Environmental management of coastal regions in the Caspian Sea. *International Journal of Environmental Science and Technology*, 5(1), 43-52
- Pérez, S., Montes, J. M., & Vázquez, C. J. (2004). Managing knowledge: The link between culture and organizational learning. *Journal of Knowledge Management*, 8(6), 93-104.
- Porter, M. E., & Van Der Linde, C. (1995). Green and competitive: ending the stalemate. *Harvard Business Review*, 73(5), 120-134.
- Po-Shin, H., & Li-Hsing, S. (2009). Effective environmental management through environmental knowledge management. *International Journal of Environmental Science and Technology*, 6(1), 35-50.
- Rome, N. (1994) Business strategy, R&D management and environmental imperatives. *R&D Management*, 24(1), 65-83.
- Rondinelli, D., & Vastag, G. (2000) Panacea, common sense or just a label? The label of ISO 14001 environmental management systems. *European Management Journal*, 18(5), 499-510.
- Sena da Silva, G. C., & Dumke de Medeiros, D. (2004) Environmental management in Brazilian companies. *Management of Environmental Quality: An International Journal*, 15(4), 380-388.
- Simpson, M., Taylor, N., Barker, K. (2004). Environmental responsibility in SMEs: does it deliver competitive advantage? *Business Strategy and the Environment*, 13(3), 156-171.
- Spender, J. (1996). Making knowledge the basis of a dynamic theory of the firm. *Strategic Management Journal*, 17(1), 45-62.
- Starbuck, W. H. (1992). Learning by knowledge-intensive firms. *Journal of Management Studies*, 29(6), 713-740.
- Tatsuki, S., & Masahisa, N. (2006). Application of knowledge management to environmental management project: A case study for lake management. *Lakes & Reservoirs: Research and Management*, 11(2), 97-102.
- Theyel, G. (2000) Management practices for environmental innovation and performance. *International Journal of Operations & Production Management*, 20(2), 249-266.
- Tiemessen, L., Lane, H. W., Crossan, M., & Inkpen, A. C. (1997) Knowledge management in international joint ventures. In P. W. Beamish, & J. P. Killing. (Eds.). *Cooperative strategies: North American perspectives*, (pp.370-399). San Francisco, CA: The New Lexington Press.
- Tilley, F. J. (1999). Small-Firm Environmental Strategy: The UK experience. *Greener Management International Spring*, 25, 1-14.
- Tsang, E. W., & Zahra, S. A. (2008). Organizational unlearning. *Human Relations*, 61(10), 1435-1462.
- Wagner, M. (2005). How to reconcile environmental and economic performance to improve corporate sustainability: corporate environmental strategies in the European paper industry. *Journal of Environmental Management*, 76(2), 105-118.
- Walsh, J. P., & Ungson, G. R. (1991). Organizational memory. *Academy of Management Review*, 16(1), 57-91.
- Xu, J. (2005). Adoption and diffusion of knowledge management systems: an Australian survey. *The Journal of Management Development*, 24(4), 335-361.
- Zhang, Z., Shon, L., Love, P., & Treloar, G. (2000). A framework for implementing ISO14000 in construction. *Environmental Management & Health*, 11(2), 139-148.

Received July 24, 2009

Revision received December 10, 2009

Accepted February 13, 2010

APPENDIX

QUESTIONNAIRE ITEMS

Combination of knowledge (1 = high disagreement and 10 = high agreement):

COM_1: Our company (hotel) stresses planning strategies by using published literature, computer simulation and forecasting.

COM_2: Our company (hotel) stresses building databases on products and services

COM_3: Our company (hotel) stresses creating manuals and documents on products and services

COM_4: Our company (hotel) stresses transmitting newly created concepts.

Externalisation of knowledge (1 = high disagreement and 10 = high agreement):

EXT_1: Our company (hotel) stresses creative and essential dialogs

EXT_2: Our company (hotel) stresses the use of deductive and inductive thinking

EXT_3: Our company (hotel) stresses the use of metaphors in dialogue for concept creation

EXT_4: Our company (hotel) stresses exchanging subjective opinions and dialogs.

Environmental knowledge (1 = high disagreement and 10 = high agreement):

EK_1: The company (hotel) uses less polluting industrial processes and products

EK_2: The company (hotel) has developed a green program (waste management, control of effluents, inventory of pollution sources)

EK_3: The company has a environmental policy

EK_4: The company (hotel) has developed a drafting of environmental emergency plans and measures

Utilization of knowledge (1 = high disagreement and 10 = high agreement):

UTI_1: There is a total commitment of employees with the environmental activities carried out

UTI_2: Employees participate in the revision of competitor activities relate to environmental issues

UTI_3: When we find out that customers are unhappy with the environmental activities carried out, we take corrective actions immediately

UTI_4: Departments meet periodically to plan a response to changes taking place in our business environment

Business Performance (1 = much worse than competitors and 10 = much better than competitors):

BP_1: Growth rate of sales

BP_2: Growth rate of profits

BP_3: Profitability rate on total assets

BP_4: Greater productivity

Acquisition of knowledge (1 = high disagreement and 10 = high agreement):

AK_1: Our company stresses gathering information from sales and production sites.

AK_2: Our company stresses sharing experience with suppliers and customers.

AK_3: Our company stresses engaging in dialogs with competitors.

AK_4: Management meet with relevant customers at least one a year to review the likely effects of changes in the business environment
