Does Environmental Certification Help the Economic Performance of Hotels? Evidence from the Spanish Hotel Industry

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Abstract

The capacity to generate value-added services in order to acquire and retain loyal clients is one of the challenges facing the hospitality sector. For this reason and because of economic realities and government policies, an ever-growing number of hotels are formally adopting certified environmental practices such as the ISO 14001. In this article, we attempt to analyze the relationship between the implementation of a proactive environmental management tool, the ISO 14001 standard, and the generation of economic revenues in the Spanish hotel industry. Also considered are the possible effects on the business results of moderating factors such as company size and the market segment where the hotel operates. Empirical economic information on 2,116 Spanish hotels was obtained from the SABI database (Iberian Balance-Sheet Analysis System) for the year 2008, during which 108 properties had ISO 14001 certification. Quantitative analysis techniques showed significant differences in the economic performance of ISO-certified hotels and those not certified, particularly for urban and beach hotels. The results showed influence of both company size and organizational factors on revenue. Only small rural hotels saw no difference in revenues due to the presence or absence of ISO certification.

Keywords

hospitality industry, environmental certification, economic performance, ISO 14001, Spanish hotel industry

Spain is one of the world's most popular tourist destination, welcoming 59.2 million visitors in 2007. The sector has 358,979 firms, of which 22,662 are hotels, and hotel companies generate some 283,275 jobs (Touristic Institute Studies 2007). Considering that tourism is a resource-intensive industry that leaves a considerable footprint on the environment (Hunter and Shaw 2007) and that tourism sectors require environmental resources as core ingredients (Williams and Ponsford 2009), close attention should be given to the tourism sector, especially to the hotel industry, because of the amount of employment it provides and its effect on regional development (Saarinena 2003; Holjevac 2003).

According to latest research, the future dynamism of the industry can be assured by designing and applying systems aimed at incorporating environmentally sustainable management tools (Bonilla 2008; Bonilla, Najera, and Font 2011; Rodríguez-Antón et al. 2012) such as ISO 14001 certification (Chan and Ho 2006; Chan 2009; Casadesus, Marimon, and Alonso 2010). On the other hand, taking into account that in a global economy in which developed countries have lost a great part of their price advantage, added value differentiation is one of the resources and strategies that can help them maintain or increase competitiveness (Matthyssensa and Vandenbempta 2008; European Commission 2009; Gebauer, Gustafsson, and Witell 2011; Ferrari, Mondéjar-Jiménez, and Vargas-Vargas 2010). In recent years, the ways that competitiveness can be improved by the implementation of environmental management systems has been widely studied (Vastag, Kerekes, and Rondinelli 1996; Giménez Leal, Casadesús, and Valls Pasola 2003; McKeiver and Gadenne 2005; Bernardo et al. 2009), in line with one of the main academic research fields focused on analyzing the adoption of environmental management practices (Gonzalez-Benito and Gonzalez-Benito 2008; Aragón-Correa et al. 2008).

Several authors have studied the strategic approaches to the environmental aspects (Dowell, Hart, and Yeung 2000; Christmann 2000; Welford 2000; Esty and Winston 2006; Hart 2007; Lindhqvist 2007; Bohdanowicz and Zientara

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2008), and environmental proactivity is a key element in corporate social responsibility (Porter and Kramer 2011) that it is emerging as one of the drivers of competitiveness (Azzone and Bertele 1994; Porter and van der Linde 1995; Sharma and Vredenburg 1998; Hitchens et al. 2005; Lopez-Gamero, Claver-Cortés, and Molina-Azorín 2011). Nevertheless, it remains unclear which real actions influence the firm's environmental position and why some firms are adopting environmental management practices (Delmas and Toffel 2004).

Although sustainability implications have been mainly studied for manufacturing firms (Biondi et al. 2002; Brunnermeier and Cohen 2003; Banerjee et al. 2003; Gázquez-Abad et al. 2011; Johnstone and Labonne 2009; Da Silva et al. 2009; Espí 2011), lately environmental factors are increasingly receiving more attention from the service sector (Sharma, Aragón-Correa, and Rueda-Manzanares 2007; Henriques and Sadorsky 1996; Cainelli, Mazzanti, and Zoboli 2011) and especially from the tourism (Miret-Pastor et al. 2011; McNamaraa and Gibson 2008) and hospitality industries (Álvarez and Cespedes 2008; Tzschentke, Kirk, and Lynch. 2008; Erdogan and Tosun 2009).

In this context, management of sustainable development becomes a crucial management function (Lim and McAleer 2005; Mayer and Knox 2010), as does implementation of quality control mechanisms that ensure that products and services comply with stipulated standards of excellence related to the principles and practices of sustainability (Weaver and Lawton 2007) and value creation through environmental certification (Chan and Hawkins 2009). A foremost standard for such certification is ISO 14001 (Raines 2002; Font 2002; Vastag 2004; McKeiver and Gadenne 2005; Chan and Wong 2006; Chan 2008; Chan 2009).

This study extends existing research by examining the role of proactive environmental management tools in creating value in the Spanish hotel sector—specifically, the effects of ISO 14001. We review studies on the implementation of environmental management systems, the relationship between size and hotel type, and segmentation in the tourist industry, trying to identify the most important aspects that affect the economic performance of environmental-certified hotel companies. We present an analysis and evaluation of a Spanish hotel sample that has implemented ISO 14001 as compared to a sample of hotels that have not done so. Empirical relationships will be established between environmental management with the ISO 14001 and economic performance. After the statistical analysis and discussion of the results, the conclusions drawn from the study will be given.

Background and Objectives

Given the lingering effects of the economic crisis of the previous decade, hotel companies must incorporate the variables that affect the decisions taken by their clients, and managers should be aware of the uncertainty involved in decision making in a turbulent situation (Chong 2004). Zhang, Joglekar, and Verma (2010) detected how worldwide hotel managers are trying to improve the sustainability of their operations while analyzing measures for environmental sustainability in hotels in two main areas: an operating factor (which can be controlled by management) and a behavioral factor (which responds to guests' activities). For such an analysis, the ISO 14001 certification can have a positive influence.

According to the proposal by Flowers and Easterling (2006), the investment effort and strategy in the hotel industry should concentrate on creating specialized products or services that imply a continual improvement of the destination as well as adopting a more sustainable tourist model (Tepelus and Córdoba 2005) that involves a proactive management strategy to channel demand toward sustainable destinations (Claver-Cortés, Molina-Azorín, and Pereira-Moliner 2007).

Many authors have studied questions regarding sustainable environmental tourism (e.g., Moeller et al. 2011; Tsaur, Lin, and Lin 2006; Weaver and Lawton 2007; Williams and Ponsford 2009). The lessons of these studies is that both a proactive stance (Aragón-Correa et al. 2008) and the appropriate environmental tools are vital for the value-creating process (Chan 2008) or to maintain the image of the hotels (Lee et al. 2010).

Some authors have pointed out that a relationship exists between environmental orientation and performance in the tourist sector (Claver-Cortés et al. 2007; Tarí et al. 2010; Molina-Azorín et al. 2009; Kim and Han 2010), and furthermore, a relationship has also been found between hotels' environmental responsibility and economic performance (García and Armas 2007). Some authors have analyzed the implementation of environmental management tools (McKeiver and Gadenne 2005; El Dief and Font 2010; Kasim 2009), analyzing both the external and internal factors influencing the implementation of environmental management systems.

Following Bonilla (2008), the Spanish hospitality industry led the way in certifications under the Eco-Management and Audit Scheme (EMAS). However, implementation of EMAS has taken place to a lesser extent than has ISO 14001 (Heras, Arana, and Molina 2008) because of the higher cost of EMAS, the fact that it is less well known in the rest of the world, and higher regulatory pressure. In contrast, ISO 14001 is the most frequently used environmental management standard (Chan and Hawkings 2009), with Spain and Italy being the European countries with the highest number of ISO 14001 certifications in the services sector (Bonilla 2008).

The work of Chan and colleagues (Chan and Wong 2006; Chan and Ho 2006; Chan 2008) shows that hotels that have put ISO 14001 into practice have recognized that the standard confers operating advantages, although those

benefits have not been specified. As described in Chan and Wong (2006), the motivation for the adoption of the ISO 14001 standard is determined more by internal forces than by external forces. They identified two motivating factors for the adoption of ISO 14001 by the hospitality industry, namely, corporate governance and legislation. Chan (2008) also identified six barriers to implementing eco-management in the hotel industry, with implementation and cost maintenance, the lack of professional advice, and lack of knowledge and skills as the three most important barriers.

The environmental practices of the Spanish hospitality industry have been broadly studied. Tarí et al. (2010) and also Álvarez and Céspedes (2008) showed that the commitment to quality and environmental practices influences hotel performance. Molina-Azorín et al. (2009) state that environmentally proactive hotels have a higher level of economic performance and exhibit a positive relationship between environmental management and firm performance. On the other hand, it has been shown that the most strategically advanced proactive hotels are also the most competitive (Claver-Cortés, Molina-Azorín, and Pereira-Moliner 2007).

However, we have seen little research in the hotel industry that evaluates whether there is any relationship between the use of ISO 14001 and hotels' economic results. There is still a research gap regarding the linkage between implementation of environmental management tools and economic performance. From this line of study, we will determine whether it is possible to identify moderating factors that influence this link. We consider the following hypotheses.

Hypothesis 1: Environmental certification (ISO 14001 standard) contributes to creating value in the hotel business by improving economic performance.

We also have to consider the possibility that there are considerable differences among the different types of hotels with regard to the effects of ISO 14001. Segmentation in the hotel industry has been used to identify consumer characteristics (Bowie and Buttle 2004) or users' attitudes (Bowen 1998). Geographical segmentation has been made by country, region, city, town, or neighborhood (Lewis and Chambers 1989); urban, suburban, rural, and beach; and by population density, size of city, or climate. In this article, the Spanish hotel sector will be evaluated according to geographic segmentation (Smolyayinova 2007), with hotels classified into three groups: urban, beach, and rural. We use this classification for the following hypothesis.

Hypothesis 2: Environmental certification (ISO 14001 standard) has an unequal influence on the economic performance of hotels according to their geographical location.

Another way to assess environmental performance is through the evaluation of environmental management practices, such as waste minimization and conservation, energy saving, compliance with recycling legislation, and purchasing policy (Mensah 2006). These actions are part of an overall learning process and management action protocols (Nelson and Winter 1982). Many studies have analyzed the economic impact on firms that have implemented ISO 14001. Empirical evidence suggests that implementing ISO 14001 improves both environmental and economic results by reducing costs, improving quality, or improving reputation (Melnyk, Sroufe, and Calantone 2002, 2003; Kelly et al. 2007; Montabon et al. 2000; Raines 2002; Matuszak-Flejszman 2009). Such improvements are due to the fact that ISO 14001 helps to generate valuable resources to maintain or create competitive advantages (Cañón and Garcés 2006). Other authors, such as Russo and Fonts (1997) or Melnyk, Sroufe, and Calantone (2002), suggest that environmental management systems provide a business company with an information system that not only reduces contamination but also helps to improve corporate results.

Along the same lines of study, Lazaric and Denis (2005), in an empirical analysis of the implementation of the ISO 14001 standard, highlight the importance of acquiring confidence in new management processes in order to face the change involved. Another study shows how establishing organizational routines (Nelson and Winter 1982) becomes a key aspect in successfully introducing innovation as part of the organizational evolution of the firm (Churchill and Lewis 1983). As highlighted by Ghobadian and Gallear (1997), it is generally recognized that size influences organizational behavior because of a higher level of specialization, standardization, and formalization.

Based on our study objectives and the theory already discussed, we state our third hypothesis.

Hypothesis 3: Environmental certification (ISO 14001 standard) has an unequal influence on the economic performance of hotels according to their size.

Method and Results

The Sample

A hotel's legal category and the dominant type of tourism clientele affect its environmental management practices (Álvarez and Céspedes 2008); therefore, it is important to identify the characteristics of hotels since these affect their environmental management practices. In this study, the hotels analyzed were all located in Spain and none belonged to large chains.

The data referring to hotels with environmental certification were taken from the IHOBE database,[1] AENOR (The Spanish Association for Standardization and Certification), Bureau Veritas, and TÜV Rheinland certification companies. Of the 2,116 Spanish hotels identified, economic

information was obtained from the Iberian Balance-Sheet Analysis System (SABI) database for the year 2008. Of these hotels, 108 had ISO 14001 certification. Exhibit 1 shows the data divided into city, beach, and rural hotels by segment, total hotels, and hotels with ISO certification. Thirty-four establishments that did not fit any of the three geographical categories were excluded from the study.

Company size is measured by number of employees. Firms with fewer than 50 employees were considered to be small companies, those between 50 and 249 were considered to be medium size, and those with more than 250 were classified as large companies (European Commission 2003).[2]

Exhibit 1:
Classification of Establishments Studied According to Type and Size

	City Hotels	Beach Hotels	Rural Hotels
Without ISO 14001	800	814	394
Size <50	659	578	377
50 < Size < 250	128	194	17
Size >250	13	42	0
With ISO 14001	27 (3.4%)	45 (5.5%)	36 (9.2%)
Size <50	13	24	36
50 < Size < 250	7	18	0
Size >250	7	3	0
Total	827	859	430

Source: Self-compilation with information from IHOBE, AENOR (The Spanish Association for Standardization and Certification), Bureau Veritas, TÜV Rheinland, and SABI (Iberian Balance-Sheet Analysis System) databases.

Data Analysis

Mean differences analysis. First, we applied the ANOVA test that can detect mean differences across business functions comparing ISO 14001 certified hotels with noncertified firms, using these specific performance indicators: trading income (TI); net sales (NS); size by number of employees (Size); profit margin (PM); earnings on sales before interest, taxes, depreciation, and amortization (EBITDA); return on assets (ROA); and return on equity (ROE). The same indicators had previously been used to analyze economic performance (Albors-Garrigós, Márquez, and Segarra-Oña 2009; Segarra, Miret-Pastor, and Peiró-Signes 2011). To construct the indicators, we used information from the SABI database.

The ANOVA analysis seeks to break down the variability in a set of data into independent components that can be assigned to different causes. It is a statistical technique designed to analyze the significance of the mean differences of the different populations. As such, it is considered as an extension of the means difference test and is used to study the relationship between nominal, ordinal, and interval variables (Hair et al. 1998). The ANOVA technique indicates whether we reject the null hypothesis that reflects the equal means value for each α level of significance. In this way, we confirm whether the mean of the variable performance is significantly different for the firms according to their ISO 14001 environmental certification. The database was analyzed using SPSS 17.0 (see Exhibit 2).

After analyzing the overall mean value of the eight studied variables, we found significant differences between hotels with ISO 14001 certification and those without for TI, NS, Size, and EBITDA. It is interesting to observe how the mean values of both trading income and net sales of ISO-certified hotels are twice those of non-certified establishments. Considering the mean size gives some indication of the relationship between size, process organization, and economic performance. This indication is supported by the EBITDA values.

A total of four one-way analyses of variance were conducted on each of the different performance measures in order to examine differences among the three geographically segmented groups. The results are shown in Exhibits 3 to 5.

Urban hotels performed similarly to the whole sample, with significant differences in TI, NS, Size, and EBITDA between hotels with ISO 14001 certification and those without. Similar values of size, NS, and TI to the whole sample revealed significant differences between hotels that had adopted this environmental management tool and the rest of the sample. Here again, a relationship between size and performance can be observed.

The data obtained from the ANOVA analysis of beach hotels shows significant results for those same variables (TI, NS, Size, and EBIDTA).

The results obtained from the analysis of the rural hotel segment, by contrast, do not show any relationship between implementation of the standard and profits in any of the variables studied. The mean size of rural hotels with and without the ISO 14001 standard is similar, all of them being small (<50 employees).

Even though it can be seen from the means comparison analysis that hotels that have implemented ISO 14001 have, in general terms, higher economic returns (EBITDA) and also their total incomes and net sales and size are found to be higher, we cannot determine whether that result is caused directly by having implemented the environmental certification system. For this purpose, we conducted a regression analysis study considering the entire sample and the former variables studied. For this analysis we also created new dummy variables to let us analyze in an isolated way the effects of size and allocation on the economic and financial variables. Then we ran another regression analysis to see the effects when these situations are crossed, as detailed in next section.

Exhibit 2:
Comparison of Means (One-Way ANOVA) for Economic Performance: The Entire Sample

ANOVA		Mean	*F*	Significance
TI	With ISO 14001	6707.45	5.580	.018*
	Without ISO 14001	3502.50		
	Total	3559.42		
NS	With ISO 14001	6399.94	5.471	.019*
	Without ISO 14001	3371.4		
	Total	3425.4		
Size	With ISO 14001	102	10.153	.001*
	Without ISO 14001	47		
	Total	48		
PM	With ISO 14001	2.27%	0.163	.686
	Without ISO 14001	4.85%		
	Total	4.80%		
EBITDA	With ISO 14001	1617.6	8.474	.004*
	Without ISO 14001	544.5		
	Total	563.6		
ROA	With ISO 14001	2.74%	1.062	.303
	Without ISO 14001	1.13%		
	Total	1.06%		
ROE	With ISO 14001	10.85%	0.128	.721
	Without ISO 14001	5.06%		
	Total	5.16%		

Linear regression. To examine whether size (large, medium, or small) and location (beach, city, or rural) and the implementation of the ISO 14001 environmental management system (EMS) are related, we developed four indicators or dummy variables representing size and location (S1, S2, T1, and T2) to see whether firm performance variables (total income, net sales, size, profit margin, EBIT, EBITDA, ROA, ROE and productivity) taken as dependent variables, were expected to have some influence on the economic performance of these hotels. Thus, these variables are also modeled to sort data into mutually exclusive categories and see their influence. Typical of dummy variables, they will take a value of 0 or 1, depending on whether they are present or absent. The definitions of the dummy variables are shown in Exhibit 6.

In the regression models for economic and financial performance, performance variables are dependent on the implementation of EMS, property size, the number of employees, and location, as well as whether the hotel is located in the city, in a beach area, or in a rural area. The estimation model is as follows:

$$\text{Indicator} = C + \beta_1 ISO + \beta_2 S_1 + \beta_3 S_2 + \beta_4 T_1 + \beta_5 T_2 + E$$

Thus, β1 helps to determine whether there is a difference in the performance indicator between certified and uncertified hotels, or β2 and β3 will help to evaluate if hotel size is having a significant influence in the performance indicators.

A negative coefficient for one variable like ISO will indicate that, for the same value in other factors influencing the performance indicator, hotels with ISO will have less value in the performance indicator than the ones with no ISO, while a positive coefficient will indicate a higher performance indicator.

In the models, the base group would become the omitted category: That is, a small-size hotel without ISO 14001 in a rural area. All comparisons would be made in relationship to this base group or omitted category.

Results for the economic and financial indicators are shown in Exhibit 7. The significance of dummy variables have to be assessed as a set, using the R^2-change method and ignoring the individual *t*-tests SPSS produced by default for each dummy β coefficient. Also note that R^2-change and ANOVA *F*-change for the first set of variables are equal to R^2 and ANOVA *F*, respectively.

The beta weights in the regression measure the relative predictive power of the specific levels of each variable. β coefficient shows us how much more the dependent variable increases (or decreases if β is negative) when each independent variable increases one unit, that is, in comparison to the omitted reference category.

As indicated by the results, we can see that, when variable S1 (large size) is acting in an isolated way, it is mainly influencing net sales and total income (NI standarized coefficient, 0.625; TI, 0.63), which confirms the logical assumption that bigger hotels log higher sales and, therefore, higher incomes. But what is more interesting is seeing that size

Exhibit 3:
Comparison of Means (One-Way ANOVA) for Economic Performance: Urban Hotels

ANOVA		Mean	*F*	Significance
TI	With ISO 14001	8182.93	4.394	.036*
	Without ISO 14001	3381.6		
	Total	3442.5		
NS	With ISO 14001	7956.2	5.325	.021*
	Without ISO 14001	3195.7		
	Total	3256.1		
Size	With ISO 14001	105	9.833	.002*
	Without ISO 14001	41		
	Total	41.7		
PM	With ISO 14001	7.54%	0.053	.818
	Without ISO 14001	4.03%		
	Total	4.07%		
EBITDA	With ISO 14001	1794.84	3.761	.053
	Without ISO 14001	554.57		
	Total	570.3		
ROA	With ISO 14001	3.18%	0.219	.640
	Without ISO 14001	356		
	Total	311		
ROE	With ISO 14001	2689	0.021	.886
	Without ISO 14001	6876		
	Total	6823		

*Significant at the 0.05 level.

Exhibit 4:
Comparison of Means (One-Way ANOVA) for Economic Performance: Beach Hotels

ANOVA		Mean	*F*	Significance
TI	With ISO 14001	9776.9	3.434	.064
	Without ISO 14001	4740		
	Total	4832		
NS	With ISO 14001	9197.8	2.974	.085
	Without ISO 14001	4630.6		
	Total	4714		
Size	With ISO 14001	91.5	0.513	.474
	Without ISO 14001	66.1		
	Total	66.6		
PM	With ISO 14001	4.45%	0.005	.943
	Without ISO 14001	5.14%		
	Total	5.13%		
EBITDA	With ISO 14001	2548.5	5.613	.018*
	Without ISO 14001	758.2		
	Total	790.6		
ROA	With ISO 14001	2.67%	0.510	.475
	Without ISO 14001	2.03%		
	Total	1.94%		
ROE	With ISO 14001	9.53%	0.065	.799
	Without ISO 14001	2.78		
	Total	2.90		

*Significant at the 0.05 level.

Exhibit 5:
Comparison of Means (One-Way ANOVA) for Economic Performance: Rural Hotels

ANOVA		Mean	*F*	Significance
TI	With ISO 14001	1743.5	0.798	.372
	Without ISO 14001	1206.6		
	Total	1221.2		
NS	With ISO 14001	1712.3	0.848	.358
	Without ISO 14001	1175.7		
	Total	1190		
Size	With ISO 14001	18.45	0.034	.854
	Without ISO 14001	19.72		
	Total	19.69		
PM	With ISO 14001	7.06%	2.707	.101
	Without ISO 14001	6.41%		
	Total	6.04%		
EBITDA	With ISO 14001	295367	1.806	.180
	Without ISO 14001	138144		
	Total	142414		
ROA	With ISO 14001	2.77%	0.531	.467
	Without ISO 14001	1.35%		
	Total	1.24%		
ROE	With ISO 14001	21.38%	0.358	.550
	Without ISO 14001	3.99%		
	Total	4.43%		

Exhibit 6:
Dummy Variables Definitions

	ISO
With ISO 14001	1
Without ISO 14001	0

	50 < Size	50 < Size < 250	Size > 250
S1	0	0	1
S2	0	1	0

	City	Beach	Rural
T1	1	0	0
T2	0	1	0

also affects EBIT and EBITDA values, which are more realistic economic performance indicators. Another interesting conclusion is that ISO 14001 doesn't show incremental sales, incomes, or EBIT or EBITDA results, but it does positively affect productivity.

Following the quantitative analysis, interaction terms have been added to the model to incorporate the joint effect of ISO, size, and location variables on a dependent variable over and above their separate effects (see Exhibits 8 and 9). Thus, in this case the *F*-test of the significance of the interaction variables is the significance of the change of R^2 of the equation with the interaction terms and the equation without the set of terms associated with the ordinal variables (size and location).

The parameter R^2 quare, called the coefficient of multiple determination, indicates the percentage change in the dependent variable that can be explained by the independent variables in the model. It is noteworthy that the highlighted values are considered sufficient to denote a significant relationship, as some researchers such as Salojärvi, Furu, and Sveiby (2005) consider values up to 0.099.

As the size variables have been restricted in their variance by reducing the number of employees into three categories and then by building the corresponding dummy variables, s1 and s2, correlation is attenuated and lower R^2 values are more justified.

If sig(F) <.05, as it is for TI, NS, EBIT, EBITDA, and productivity, then the model is considered significantly better than would be expected by chance, and we reject the null hypothesis of no linear relationship of each of these variables to the independent variables.

As indicated by the results when analyzing cross effects (ISO × S1 and ISO × T2), we again find that in big hotels that have implemented the ISO 14001 environmental certification, both total incomes and net sales data improve, but what really is important is that EBIT and EBITDA are also improved.

From this analysis we can also state that in beach area hotels (T2), the ISO 14001 standard has a direct effect on improving productivity.

Exhibit 7:
Regression Results

	TI	NS	PM	EBIT	EBITDA	ROA	ROE	Productivity	CPE
C	642.64	643.7	–5.709	–38.57	7.16	–1.441	4.94	2.2	38.505
S1	29852.02 (0.625)	28586.2 (0.63)	3.344 (0.016)	2308.35 (0.244)	5596.2 (0.426)	–0.5 (–0.004)	16.74 (0.032)	–0.41 (–0.031)	–1.367 (–0.014)
S2	6169.11(0.279)	5873.7 (0.28)	0.373 (0.004)	290.65 (0.066)	921.29 (0.152)	–0.988 (–0.017)	–4.06 (–0.017)	–0.25 (–0.04)	–0.642 (–0.014)
T1	911.14 (0.051)	816.3 (0.048)	1.267 (0.016)	181.02 (0.051)	243.63 (0.049)	1.749 (0.036)	1.87 (0.01)	–0.17 (–0.033)	1.191 (0.032)
T2	1221.69 (0.07)	1203 (0.072)	0.183 (0.002)	128.6 (0.037)	292.31 (0.061)	–0.072 (–0.002)	–1.95 (–0.01)	0.04 (0.008)	2.463 (0.068)
ISO	1219.05 (0.032)	1121.9 (0.031)	2.349 (0.014)	562.11 (0.074)	751.31 (0.071)	3.118 (0.03)	6.49 (0.016)	1.36 (0.122)	1.32 (0.016)
ANOVA F	339.7*	346.9*	0.267	31.847*	108.975*	0.979	0.82	7.286*	1.164
R^2	.458*	.464*	.001	.073*	.213*	.002	.002	.018*	.003

Exhibit 8:
Linear Regression Considering Interactions I

	TI	NS	PM	EBIT	EBITDA	ROA	ROE	Productivity	CPE
C	886.13	871.09	–6.38	16	90.26	–1.58	4.23	2.28	38.34
S1	28851.97 (0.604)	27712.56 (0.611)	2.87 (0.013)	1641.67 (0.174)	4930.01 (0.376)	–0.92 (–0.007)	13.62 (0.026)	–0.15 (–0.011)	–2.34 (–0.024)
S2	6314.86 (0.286)	6001.76 (0.286)	–0.63 (–0.006)	302.98 (0.069)	943.3 (0.155)	–1.29 (–0.022)	–4.54 (–0.019)	–0.1 (–0.016)	–1.11 (–0.024)
T1	745.67 (0.042)	655.74 (0.038)	2.41 (0.03)	145.87 (0.041)	190.53 (0.039)	2.01 (0.042)	3.23 (0.017)	–0.23 (–0.046)	1.24 (0.033)
T2	799.02 (0.046)	811.26 (0.049)	1.25 (0.016)	71.46 (0.021)	179.5 (0.037)	0.2 (0.004)	–1.03 (–0.006)	–0.18 (–0.036)	3.08 (0.085)
ISO	–2171.41 (–0.057)	–2016.12 (–0.055)	9.25 (0.054)	–396.02 (–0.052)	–558.91 (–0.053)	4.4 (0.043)	13.11 (0.031)	0.47 (0.042)	3.04 (0.038)
ISO × S1	7454.1 (0.067)	6536.26 (0.061)	8.66 (0.017)	4377.78 (0.197)	4568.82 (0.148)	4.04 (0.013)	26.07 (0.022)	–1.3 (–0.041)	4.21 (0.018)
ISO × S2	–2606.43 (–0.034)	–2300.21 (–0.032)	19.23 (0.056)	–187.88 (–0.012)	–379.56 (–0.018)	5.65 (0.028)	11.19 (0.014)	–2.66 (–0.123)	7.86 (0.049)
ISO × T1	401.3 (0.005)	560.09 (0.008)	–21.67 (–0.065)	–50.9 (–0.003)	–19.45 (–0.001)	–5.12 (–0.025)	–28.38 (–0.035)	0.59 (0.026)	1.35 (0.009)
ISO × T2	7534.54 (0.129)	6882.7 (0.124)	–16.41 (–0.063)	1389.13 (0.12)	2267.32 (0.141)	–4.14 (–0.026)	–10.79 (–0.017)	3.5 (0.211)	–10.21 (–0.084)
ANOVA *F*	197.2	200.3	0.9	27	69.8	0.7	0.6	10.1	1.8
R^2	.469	.474	.004	.108	.238	.003	.003	.044	.008
F change	10.814*	9.65*	1.69	19.397*	16.601*	0.979	0.4	13.41*	2.699*
R^2 change	0.011*	0.01*	0.003	0.035*	0.025*	0.002	0.001	0.026*	0.005*

Exhibit 9:
Linear Regression Considering Interactions II

	TI	NS	PM	EBIT	EBITDA	ROA	ROE	Productivity	CPE
C	940.18*	913.93	–6.33	18.9	103.82	–1.7	3.6	2.27	38.14
S1	–26597.94 * (–0.557)	–24396.16 (–0.538)	–61.6 (–0.289)	–8157.38 (–0.863)	–9329.06 (–0.711)	–15.19 (–0.119)	–71.19 (–0.138)	–0.67 (–0.05)	39.59 (0.399)
S2	5250.1 * (0.238)	5157.89 (0.246)	–1.73 (–0.018)	245.91 (0.056)	676.12 (0.111)	1.02 (0.017)	7.83 (0.033)	0.03 (0.005)	2.71 (0.059)
T1	729.28 ** (0.041)	690.26 (0.04)	3.04 (0.038)	125 (0.035)	175.98 (0.036)	2.93 (0.061)	1.63 (0.008)	–0.28 (–0.055)	1.77 (0.047)
T2	672.78 ** (0.039)	663.38 (0.04)	0.48 (0.006)	84.19 (0.024)	158 (0.033)	–0.39 (–0.008)	2.18 (0.012)	–0.11 (–0.023)	3.08 (0.085)
ISO	701.98 (0.018)	690.01 (0.019)	12.94 (0.076)	117.35 (0.015)	172.64 (0.016)	5.14 (0.05)	18.45 (0.044)	0.5 (0.045)	0.44 (0.005)
ISO × S1	27149.86 * (0.242)	24986.29 (0.235)	27.6 (0.055)	7774.72 (0.35)	9718.64 (0.315)	9.32 (0.031)	48.03 (0.04)	–1.16 (–0.037)	–8.34 (–0.036)
ISO × S2	–604.26 (–0.008)	–449.8 (–0.006)	21.26 (0.062)	179.48 (0.012)	139.44 (0.007)	5.57 (0.027)	15.36 (0.019)	–2.6 (–0.12)	5.99 (0.038)
ISO × T1	–5288.86 * (–0.071)	–4756.56–0.067)	– 29 (–0.087)	–1116.11 (–0.075)	–1463.41 (–0.071)	–5.52 (–0.027)	–43.09 (–0.054)	0.42 (0.019)	7.2 (0.046)
ISO × T2	2632.51 ** (0.045)	2270.56 (0.041)	–22.37 (–0.086)	529.47 (0.046)	1012 (0.063)	–5.5 (–0.035)	–17.99 (–0.029)	3.47 (0.209)	–6.2 (–0.051)
S1 × T1	44253.24 * (0.509)	41643.36 (0.504)	60.49 (0.156)	8104 (0.47)	11178.03 (0.467)	8.94 (0.038)	94.62 (0.099)	0.72 (0.029)	–40.4 (–0.223)
S1 × T2	59241.79 *(1.015)	55676.43 (1.004)	66.27 (0.254)	10354.43 (0.896)	15294.35 (0.953)	16.49 (0.105)	79.88 (0.128)	0.42 (0.025)	–42.35 (–0.349)
S2 × T1	2067.8 (0.061)	1554.37 (0.048)	–2.18 (–0.014)	336.4 (0.05)	604.32 (0.064)	–6.05 (–0.066)	–1.27 (–0.003)	0.14 (0.014)	–5.79 (–0.082)
S2 × T2	567.28 (0.02)	521.19 (0.02)	3.58 (0.029)	–121.4 (–0.022)	83.89 (0.011)	0.08 (0.001)	–21.77 (–0.073)	–0.33 (–0.042)	–2.92 (–0.051)
ANOVA *F*	168.2	169.5	1.2	26.8	62	1	0.9	7.2	2.3
R^2	.522	.525	.007	.1483	.287	.006	.006	.045	.015
F change	55.047*	53.158*	1.737	23.743*	34.194*	0.347	1.357	0.684	3.257*
R^2 change	0.053*	0.051*	0.003	0.04*	0.049*	0.001	0.003	0.001	0.006*

Again, results show that TI, NS, EBIT, EBITDA, and productivity are affected by at least one of the indicators taken into account. In this case, TI and NS are highly affected by size, to a lesser extent by location and by ISO 14000 certification. As expected, size coefficients are positive because small size companies act as reference group, so the bigger the size the bigger the net sales and the total income should be expected. Note that ISO is less statistically significant and has much lower influence than size, which might be explained by the fact that certification is not making big difference in increasing hotel sales value. Also, we should point out that location, although significant statistically, has much less influence on sales value than size, as can be expected by the fact that bigger hotels with more employees might have more rooms available to sell, and therefore they might be able to achieve higher incomes.

It should be underlined that EBIT and EBITDA models are affected by all the studied variables, which means that size, location, and whether the hotel has implemented the ISO standard are making a difference in those indicators' values.

As happened with TI and NS, big hotels (S1 = 1) are expected to have much higher results, but when it comes to other sizes, ISO certification has an influence on the results of the firm, in this case almost twice the influence of size and three times the influence of location. Note that the EBIT value can be modified companies when companies calculate EBITDA because of the flexibility of the Spanish regulations regarding depreciation and amortization.

In addition, the productivity model shows significance mainly by the strong weight of the certification variable. Note that size and location coefficients are much lower than certification coefficients, showing no significant influence in changing productivity value.

Finally, we underscore that this discussion has been about economic performance, and it should be highlighted that none of the financial performance indicators seem to be affected by size, location, or the ISO 14000 certification

Discussion and Conclusion

The purpose of this study was to analyze Spanish hotels' economic performance when adopting the ISO 14001 environmental certification tool. Our findings showed that there was a difference in the economic performance of hotels that were using ISO 14001 as an environmental management tool and those that were not.

In the analysis of the sample segmented by geographic location, it can be seen that size is a differentiating factor for urban and beach hotels. For properties in those locations, the mean establishment size can be classified as medium, or between 50 and 250 employees, as compared to the small mean size of rural hotels, all of which have fewer than 50 employees. Hotels that had implemented ISO 14001 are generally larger than those that have not. The mean of the entire sample is 48 employees, but hotels with ISO 14001 averaged 102 workers. Dividing the sample by location tells a different story, except for the rural hotels, all of which are small. The average number of employees for urban hotels is 42, but those with ISO 14001 average 105 workers. For beach hotels, the full sample mean was 67 employees but the size with ISO 14001 was 91.5. By contrast, the overall average for rural hotels was 20 workers and those with ISO 14001 averaged just 18. Not surprisingly, the ANOVA did not reveal any significant differences in business results between the two sets of rural hotels.

The interaction of size and the ISO standard was an important finding but in order to validate our first hypothesis (Hypothesis 1: Environmental certification [ISO 14001 standard] contributes to creating value in the hotel business by improving economic performance), a complementary analysis was run using dummy variables to isolate the effects of factors in the first analysis, namely, ISO 14001, size of the hotels measured by number of employees, and geographical location of the hotel. Because the results indicated different performance, the data could not support the assumption that better economic revenues were caused directly by the ISO 14001 environmental certification.

Consequently, we investigated the solo effects of size, location, and ISO 14001 on the selected variables. We found that the factors that had an important effect on net sales and total income were the size of the hotel and improving economic results (EBIT and EBITDA). Data showed that our first hypothesis could not be validated completely, because although ISO 14001 was positively affecting EBIT, EBITDA, and (mainly) the productivity indicator, the variable that is really affecting economic performance is hotel size.

Our cross study of the relationship between size and ISO 14001 and location and ISO 14001 implementation resulted in an improved regression model that revealed a better economic performance for big hotels that had implemented the ISO 14001 standard certification. This was true in all the variables studied, except for TI, confirming the hypothesis H1 for big hotels classified as beach hotels. This also confirms hypotheses 2 (Environmental certification [ISO 14001 standard] has an unequal influence on the economic performance of hotels according to their geographical location) and 3 (Environmental certification [ISO 14001 standard] has an unequal influence on the economic performance of hotels according to their size).

The differences between the urban and beach segments as compared to rural hotels are evident. On one hand, the most important difference is size. This could be interpreted as a maturity issue of the firm, and we note a large number of empirical studies that have confirmed the use of formal systems for and changes characterizing an organization's evolutionary periods (Greiner 1997; Tushman, Newman, and Romanelli 1986). In addition, as could be expected from the theory (Kroeger 1974), small firms need support systems to help managers in their development needs, while

larger firms can afford to have a team of specialists. Rural hotels with a proactive attitude can aid in assessing current challenges as soon as they enter in a "resource maturity" stage (Churchill and Lewis 1983).

A further point regarding environmental activities is that hotels in natural surroundings are essentially forced to respect the environment as a part of their core concept. This means small hotel size, individual attention to customers, and integration with the environment, apart from any other specific regulations. So it is reasonable to assume that the clientele of rural hotels is environmentally aware and purposely looks for this type of establishment. Given that insight, it is reasonable to argue that possessing ISO certification does not give any advantage over noncertified hotels, since both types can basically be considered to be environmentally friendly, without the need for official certification.

The data analyzed in this research seem to be in agreement with other studies. The results show that firms with proactive practices exhibited a significantly positive economic performance (Aragón-Correa et al. 2008; Martín-Tapia, Aragón-Correa, and Rueda-Manzanares 2009).

The role that size is playing has also been disentangled, showing that being bigger implies higher net sales and total income and that productivity, EBIT, and EBITDA indicators are also improved when inroducing the ISO 14001 environmental certification.

To sum up, our analysis shows that there are significant differences between hotels that have adopted the ISO 14001 proactive environmental management tool and those that have not, but there is still a research gap in the understanding of what part (or how much) of the better performance is due to the internal improvement in its operations due to the implementation of the ISO 14001 and to what extent the size (and therefore the organizational maturity) is acting as a moderating factor.

Limitation and Future Research

The results indicate the options that can be used to improve productivity while implementing a sustainable management tool and an analysis of the economic impacts that such a tool has on hotel performance, also highlighting the direction of future environmental policy making (Kandel et al. 2007; Del Brío and Junquera 2003). This field of research should also be studied to clarify whether productivity of hotels is due to better internal performance.

The limitations of this research include the available sample and data and the proportion of rural hotels, which somehow bypass the statistical analysis. Future research will focus on the use of different methodologies with more complex (a larger variety of organizational factors) and larger databases, as well as longitudinal studies. An in-depth qualitative case study will be necessary to obtain further information on the results obtained by the different hotel segments. Another line of research will consist of the analysis of the hotel performance in other countries, such as the United States, where hospitality industry and tourism mean a considerable contribution to the GDP.

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Notes

1. Ihobe is a monthly updated list of Spanish companies certified according to the ISO 14001 standard, with a search system by sector, National Spanish Activities Classification, CNAE, or province. Affiliate-level information includes name of the affiliate, host region and economic activity as defined by the CNAE codes, the address, and the certifying organisation.
2. On May 6, 2003, the Commission adopted Recommendation 2003/361/EC.

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