

Environmental good Practices, Quality Certifications and Productivity in the Andalusian Hotel Sector

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ABSTRACT: Recent studies have shown that firms that have adopted environmental standards and those that have obtained official quality certifications achieve higher labour productivity than firms that have not done so. Unlike previous studies, this paper analyzes the combined effect of implementing environmental good practices and obtaining quality certifications on apparent labour productivity using a sample of 106 hotels in Andalusia (Spain). To this end, a descriptive analysis and an econometric estimation of a production function were conducted based on data obtained from the Quality, Productivity and Competitiveness in the Hospitality Industry for Andalusia project. We applied a standard Cobb-Douglas production function to this data, and extended the function by introducing an indicator of the implementation of good environmental practice by hotels and four different types of quality certifications as additional explanatory variables. The econometric results indicate that labour productivity increases only when both the Q-mark is awarded and environmental good practices are implemented (by 18.74% and 7.51%, respectively). In conclusion, the positive response of consumers towards improving environmental and quality measures may be an incentive to invest in these measures.

Key words: Environmental good practices, Quality certifications, Productivity, Andalusia

INTRODUCTION

Spain ranks fourth in international traveller arrivals and second in revenues from international tourism (WTO, 2013). This indicates the importance of tourism for the Spanish economy. In the late 1990s, given the growing economic importance of tourism and an increasingly competitive market, the Spanish tourism sector became aware of the significance of the quality factor as a guarantee of differentiation in relation to the many emerging tourism destinations competing with Spain. It has been demonstrated that the Spanish tourism sector is able to attract a market share based on the premise that higher quality tourism products are valued by consumers in economic terms. In this regard, as Sánchez-Ollero *et al.* (2012) have shown, there are two main ways tourists are able to identify improvements in service quality: by means of perceived quality, or by the existence of quality marks or certifications. Regarding perceived quality, environmental compliance may be considered an element that increases the quality of the tourism product and that has economic value for the consumer. Moreover, environmental responsibility is a task fundamentally shared by the local government,

companies, and consumers as well as the media, which is able to exert pressure and change opinions by spreading information that promotes environmental protection (Mondejar-Jiménez *et al.*, 2011; Pérez-Calderón *et al.*, 2011; Segarra-Oña *et al.*, 2012). As Bohdanowicz (2006) point out, tourism is traditionally associated with a clean natural environment. This is a basic component of service quality and the operation of the hotel industry since the surrounding environment is not just the physical basis for the activity, but forms part of the hotel's product. Specifically, hotels in which the natural environment forms part of this tourism product, such as those specializing in sun and beach tourism (Alvarez *et al.*, 2001) or nature tourism (García-Pozo *et al.*, 2011), would be expected to be more concerned with environmental issues. Carmona-Moreno *et al.* (2004) found that the abovementioned situation affects at least three features of hotel environmental management: (1) the voluntary nature of environmental management activity; (2) the need to involve the customer in the implementation of environment management measures; and (3) the emphasis of these measures on the prevention of pollution and/or organizational aspects of environment

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management. Ayuso (2007) point out that one of the most common voluntary tools applied by the hotels is best environmental practice. This article analyses environmental proactivity in terms of the implementation of diverse environmental practices and attempts to identify the main channels linking better environmental practice with labour productivity.

In Spain, the international quality standards awarded for all sectors (mainly ISO-9001 and ISO-14000) exist alongside the standards specific to the Spanish tourism sector, such as the Q-mark for Tourism Quality and the internal distinctive quality marks developed by some hotel chains. Spanish hotel establishments attempt to obtain one or more of these quality standards to increase their client base and client loyalty. However, obtaining quality certifications requires a considerable financial investment and so hotels need to transfer these costs to their prices, providing the market truly values the added value the certificates represent.

This study assesses the joint impact of implementing good environmental practices and obtaining quality certifications on productivity in a sample of hotels in Andalusia. The available database allowed us to study the impact on productivity, on the one hand, of implementing quality marks or certifications and, on the other, the use of good environmental practices in the hotel sector. This article contributes to the economic literature in this field using labour productivity in a sample of hotels as the basic variable. In addition, unlike previous studies, a Cobb-Douglas production function is specified in which good environmental practice and quality certifications are included as explanatory variables of variations in productivity. Therefore, our approach is based on a widely used production function.

MATERIALS & METHODS

In recent years, a major concern in the tourism industry has been the improvement of service quality and the implementation of good environmental practices driven by the need for firms to respond to increasing competition, globalization of the markets, and changes in demand. Furthermore, as in other economic sectors, international studies on the relationship between quality certification and business profitability in hotels remain inconclusive. The combined impact of obtaining quality certifications and implementing good environmental practices on productivity in the hotel industry has been barely addressed in the economic literature. One of the most important standards of quality certifications is provided by the International Organization for Standardization (ISO) (Campos-Soria & Sanchez-Ollero, 2003). The

impact of ISO or equivalent certification on firm profitability has not yielded conclusive results. Although some studies have demonstrated negative effects on firm performance (Singels *et al.*, 2001; Wayhan *et al.*, 2002), the great majority of recent studies have found a positive balance in profits (Pertusa-Ortega *et al.*, 2013; Mokhtar & Muda, 2012; Salem *et al.*, 2011).

As pointed out by Campos-Soria & Sanchez-Ollero (2003), a major concern in the tourism industry in recent years has been the improvement of service quality. The studies conducted on the hotel industry in Spain suggest that improving quality has a positive impact on firm performance (Pertusa-Ortega *et al.*, 2013; Alonso-Almeida *et al.*, 2012; Tari-Guilló & Pereira-Moliner, 2012; Garcia-Pozo *et al.*, 2011; Sanchez-Ollero *et al.*, 2011 and 2012, among others).

On the other hand, the empirical literature presents mixed results regarding the impact of good environmental practice on firm performance. In an exhaustive review of the literature that included several economic activities, Vries *et al.* (2012) found that good environmental practice had mainly positive impacts on the environmental and business indicators studied. Recent empirical studies have analysed the application of environmental practices and initiatives in the hotel industry (García-Pozo *et al.*, 2013; Blanco *et al.*, 2009; Molina-Azorín *et al.*, 2009). The results obtained in these surveys suggest that the ability of many establishments to manage their environmental performance is a strategic issue and that in most cases has a significant positive influence on hotel financial performance. On the other hand, as García-Pozo *et al.* (2013) point out, these results show that the implementation of good environmental practices involves an improvement in service and has a positive influence on the price of this service. Thus, improvements in service quality increase the price of accommodation and, finally, increase the productivity of the establishment. To the best of our knowledge, no empirical evidence has been presented on the combined impact of implementing good environmental practices and obtaining quality certifications on labour productivity in the hospitality industry.

In this context, in line with Mairesse & Kremp (1993), we extend the standard Cobb-Douglas production function to include an indicator of good environmental practice and the impact of quality certifications as explanatory variables. Specifically, this is based on the following production function:

$$Y = AK^\alpha L^\beta e^{\gamma env + \delta_q cert_q} \quad (1)$$

where Y represents the gross value added (GVA), L the total number of full-time equivalent filled jobs, K

the stock of physical capital, *env* the indicator of good environmental practice, which takes values between 0 and 7, and *cert_q* every type of certification in the econometric models. The construction of this indicator and its statistical representativeness are presented in the following section. In the production function (1), α is the elasticity of output in terms of physical capital (capital elasticity), β the elasticity of output in terms of labour (labour elasticity), γ the semi-elasticity of the product regarding the good environmental practice indicator (*env*), and δ the semi-elasticity of the product regarding each of the four certifications analyzed in this article (*cert*).

Using logs in (1) and subtracting on both sides of the equation, we obtain the proposed empirical equation to be estimated:

$$\ln\left(\frac{Y}{L}\right)_i = \ln A + \alpha \ln K_i + (\beta - 1) \ln L_i + \gamma env_i + \delta_q cert_{qi} \quad (2)$$

Adding a vector of control variables to expressions (2), as well as random disturbance independently distributed as $N(0, \vartheta^2)$ with ϑ^2 being constant, we obtain the equations to be estimated. The additional variables considered in this study are introduced in the empirical model to control the observed heterogeneity related to the specific characteristics of the hotels in the sample.

RESULTS & DISCUSSION

The database was created as part of the Quality, Productivity and Competitiveness in the Hospitality Industry for Andalusia project. It includes representative parameters from 106 Andalusian hotels (96 rated as 4 star, and 10 as 5 star). These parameters were obtained from semi-structured questionnaires administered to the hotel managers by the researchers. According to SIMA (the Multiterritorial Information System of Andalusia), which was created by the

Institute of Statistics and Cartography of Andalusia, there were a total of 822 establishments in these categories in Andalusia in 2009, and thus the database provides direct information on 12.9% of all hotels in the region. In addition, we included control variables to identify establishments according to the establishments' structural and management characteristics. The fieldwork was conducted in person by researchers from the universities of Malaga, Granada, and Seville in 2009 and 2010. The economic data were obtained directly via questionnaires and the annual accounts filed by firms in the Mercantile Registry (In Spain, firms are required to file their annual financial accounts in the Mercantile Registry, thus making them an important source of reliable data on Spanish firms). A directory of the hotels to be surveyed was created using Camerdata and the Turespaña Hotel Guide, which lists certified hotels and is published by the local government of Andalusia (i.e. the Junta de Andalucía). Camerdata S.A., created in 1985 by the Spanish Chamber of Commerce, is a pioneering company in creating business databases that include the censuses of all Spanish Chambers of Commerce. It also has a permanent program that ensures that the national census is fully updated at least once a year using data from all Chambers of Commerce. This database is complemented by data from other sources or public media, such as the Mercantile Registry. This source was also used to verify which hotels in Andalusia are still currently operating.

After discarding the questionnaires that had not been correctly completed, the final sample consisted of 106 hotels. We created the variable environmental good practice (*env*) that represents the commitment of the hotel's management to introduce measures that encourage environmental sustainability. Seven questions were used (see Annex 1) in the construction of this variable; its value was obtained by awarding a score of 1 for an affirmative reply to each question, and 0 otherwise.

Table 1. Certified quality management systems

	Labour Productivity in € at 2008 prices				Percentage of Labour Productivity differences (%)
	Number of hotel in parentheses				
	Accredited		Non-accredited		
Standard ISO-9000	33120.52	(18)	39573.80	(88)	-16.31
Standard ISO-14000	36053.19	(16)	38909.03	(90)	-7.34
Internal quality certification	39228.36	(15)	38557.89	(91)	1.74
Standard "Q-quality"	39995.76	(16)	38227.78	(90)	4.62
Sample (106 hotels)			38477.96		

Source: Quality, Productivity and Competitiveness in the Hospitality Industry Project [PO7/SEJ-02889]

This approach is similar to the one used by Sinclair *et al.* (1990), Abrate *et al.* (2011), and Garcia-Pozo *et al.* (2011) to construct explanatory variables for services provision. In this way, we built an index of the environmental involvement of the establishment with values ranging from 0 to 7, where a value of 0 was awarded to establishments that had not implemented any measure to improve sustainability, and 7 when commitment to environmental sustainability was at its highest based on the criteria established in this paper. The Kuder-Richardson (KR-20) formula was used (Kuder & Richardson, 1937) to test reliability since the type of data is binary. In this respect, the minimum recommended value — 0.7 (Nunnally, 1978) — is exceeded for our indicator of good environmental practice. In this study, the value of the KR-20 formula is 0.7839.

As shown in Annex 1, the items included in the indicator of good environmental practice directly represent control and prevention in the use of materials, energy, and services (items 1, 3, 5 and 6), employee training and job satisfaction (items 2 and

7) and the use of the environmental management in marketing strategies and campaigns (item 4). Product differentiation is indirectly included since, according to Garcés-Ayerbe & Galve-Górriz (2001), reducing the material or energy costs of a product may facilitate the incorporation of environmental features into the product, thus helping to develop a differentiation strategy. In terms of good environmental practice, 87.32% of the hotels had implemented at least one measure. Most of the hotels implemented measures aimed at saving energy and water (item 5) and recycling waste (item 6) (81.13% and 67.92%, respectively). In addition, 41.51% of the hotels in the sample used the variable environment in marketing strategies and campaigns (item 4), 33.9% applied “green” purchasing policies (item 3), and 40.57% quantified environmental costs and savings (item 1). Finally, on-the-job-training (item 2) and the measure used to increase employee involvement in environmental sustainability (item 7) were applied by more than 33% of the hotels in the sample.

Table 2. Descriptive statistics of the variables used in the estimation

Variable	Units	Mean	S. D.
GVA/Number of full-time equivalent jobs (at 2008 prices)	Euros	38477.96	24270.40
Number of rooms	Number	194.24	167.41
Number of full-time equivalent jobs	Number	66.83	50.17
Age of the establishment	Years	12.99	14.89
Percentage of workers with a full-time permanent contract	% of workers	55.67	0.31
Dummy = 1 if the establishment belongs to a chain; otherwise = 0	% of establishments	76.42	0.43
Dummy =1 if the establishment outsources services; otherwise = 0	% of establishments	79.25	0.41
Dummy = 1 if the establishment is a family business; otherwise = 0	% of establishments	55.66	0.50
Number of measures implemented	Number	2.81	1.49
Dummy = 1 if the establishment is ISO-9000 accredited; otherwise = 0	% of establishments	16.98	0.36
Dummy = 1 if the establishment is ISO-14000 accredited; otherwise = 0	% of establishments	15.09	0.32
Dummy = 1 if the establishment has its own internal certification of quality; otherwise = 0	% of establishments	14.15	0.35
Dummy = 1 if the establishment is "Q-quality" accredited; otherwise = 0	% of establishments	15.09	0.35

Source: Quality, Productivity and Competitiveness in the Hospitality Industry Project [PO7/SEJ-02889]

On the other hand, we used variables that represent the establishment's quality certification. In this case, four dummy variables were constructed to represent the certifying bodies: the variables *Standard ISO-9000* and *ISO-14000* represent the establishment's certification according to these international and intersectorial standards; the variables *Internal quality certification* and *Q-quality* represent the establishment's certification according to sectorial standards; *Internal quality certification* indicates whether the establishment is certified according to the norms of the chain to which it belongs or is associated; and *Q-quality* indicates whether the establishment has met Spanish tourism standards. In all cases, the variable takes the value of 1 if the establishment is certified and 0 otherwise. Table 1 shows apparent labour productivity in hotels in relation to whether they have a certificate of quality compared to establishments that do not accredit quality certificates.

Firstly, although commitment to quality is increasing, relatively few establishments have received quality certificates from independent bodies. The Standard ISO-9000 is the most widely used certificate in the sector and was obtained by 18 establishments, representing just 17% of the sample. The percentage of establishments that have received the other quality certificates (Q-mark, internal quality certification, and ISO-14001) is very similar to the previous percentage. Secondly, labour productivity differs between establishments that have quality certifications and those that do not. The descriptive analysis reveals the following:

1) General quality standards certificates that are not adapted to the characteristics of the tourism sector, or of hotels in particular, are unprofitable regarding productivity, because establishments with ISO-9001 certificates are, on average, more than sixteen points less productive than those without certification. In the case of ISO-14001, productivity is 7.34 % lower.

2) Within the sector itself, productivity is increased by certificates such as those awarded within hotel chains (1.74%) or the Q-mark certificate. In particular, the Q-mark increases productivity by nearly 4.62 %.

These differential features of the hotels may explain the observed differences in productivity levels. However, in the subsequent econometric analysis, these determinants have to be controlled to determine whether, *ceteris paribus*, the variables representing the implementation of good environmental practice and obtaining a quality

certificate could explain some of the variability in productivity observed in the establishments analyzed.

The variables included in the econometric analysis are now presented (Table 2). The results of the descriptive analysis show that the average level of apparent labour productivity in 2008 was € 38,477.96, as measured by the quotient between the GVA generated by the establishment and the number of full-time equivalent jobs. This figure is very similar to the € 35,227 per active worker estimated in the 2008 Services Annual Survey conducted by the Spanish National Institute of Statistics (INE) [Data available from the Spanish National Institute of Statistics: <http://www.ine.es>. (downloaded 02/09/2013)]. Thus, there is a high degree of consistency between our database and the INE database.

The equation to be estimated included a vector of control variables representing the more relevant characteristics of the hotels used in this database. This set of variables was included to control for the establishments' specific characteristics and their management. These variables are as follows:

-Age of establishment. This indicates the number of years the establishment has been open. The hotels in the sample had an average age of 12.99 years. The square of this variable has also been included in the econometric analysis to represent the possible effect of diminishing returns on the productivity of this variable.

-Full-time permanent contract. This variable represents the percentage of workers with a full-time permanent contract in each establishment. As shown in Table 3, the average was 55.67% in the sample.

-Belonging to a hotel chain. The dummy variable (*Chain*) takes a value of 1 if the hotel belongs to a chain.

-A dummy variable, *subcontracted services*, is used to control for any subcontracted services.

-Family business. A dummy variable (*Family-owned*) is used that takes a value of 1 if the hotel is a family business. An establishment is considered a family business if most of the shares belong to the member or family members who founded the company or are owned by the person who has acquired the company's share capital or by their spouse, parents, children, or their direct heirs. In the case of listed companies, the establishment is considered a family business if the person who founded or acquired the company, or their relatives or descendants, own at least 25% of the share capital.

Table 3. Determinants of apparent labour productivity

	(1)	(2)	(3)	(4)
LnK	0.2452** (0.1039)	0.2426** (0.1046)	0.2541** (0.1096)	0.2725** (0.1112)
LnL	-0.3003** (0.1262)	-0.3027** (0.1270)	-0.2998** (0.1300)	-0.3072** (0.1317)
Age of establishment	0.0146** (0.0065)	0.0159** (0.0065)	0.0159** (0.0068)	0.0150** (0.0068)
Age of establishment squared	-0.0001 (0.0001)	-0.0002*** (0.0001)	-0.0002*** (0.0001)	-0.0002** (0.0001)
Full-time permanent contract	0.2471 (0.1751)	0.2527 (0.1766)	0.2691 (0.1807)	0.2648 (0.1813)
Chain	0.2155** (0.0938)	0.2351** (0.0972)	0.2432** (0.0972)	0.2478** (0.0960)
Subcontracted services	0.2628* (0.0952)	0.2624* (0.0940)	0.2510* (0.0959)	0.2519** (0.0969)
Family-owned	-0.0721 (0.0844)	-0.0545 (0.0849)	-0.0634 (0.0848)	-0.0742 (0.0870)
Env	0.0615*** (0.0358)	0.0683*** (0.0379)	0.0443 (0.0322)	0.0751** (0.0322)
Standard ISO-9000	-0.1459 (0.1048)	- -	- -	- -
Standard ISO-14000	- -	-0.1919 (0.1415)	- -	- -
Internal quality certification	- -	- -	-0.0026 (0.1325)	- -
"Q-quality"	- -	- -	- -	0.1718** (0.0926)
Cons	9.6641* (0.3756)	9.6349* (0.3699)	9.6042* (0.3832)	9.5494* (0.3871)
Obs.	106	174	106	106
R ² adjusted	0.2406	0.2409	0.2253	0.2565
F test	(10,95) 2.53*	(10,95) 2.71*	(10,95) 2.52*	(10,95) 2.93*
RSS	17.4269	17.4198	17.7790	17.1209
Wald Test for linear restrictions: H ₀ : $\alpha+\beta=1$	0.48 (0.4921)	0.54 (0.4624)	0.32 (0.5708)	0.18 (0.6759)

Notes: Significant at: * 1%, ** 5% and *** 10%. White-corrected standard errors are in parentheses.

Source: Quality, Productivity and Competitiveness in the Hospitality Industry Project [PO7/SEJ-02889].

As shown in Table 3, 55.66% of the sample can be considered family businesses.

Finally, as mentioned, we used variables that represent good environmental practices (with an average of almost three implemented measures per hotel establishment in the sample) and the four types

of quality certification (on average, between 14.15% and 16.98% of the hotels in the sample have obtained these certificates). The results of estimation are shown in Table 3. The estimate was conducted according to the functional form (equation 2) and variables described above, which may be potential

determinants of hotel productivity. Equations have been estimated for every quality certification introduced in the model. Firstly, the estimated value for the elasticities of output in relation to the productive factors considered (labour and physical capital) in all equations are in line with those obtained in previous studies (Brown & Dev, 2000). The elasticity α , in relation to capital as measured by the number of rooms, varies between 0.2426 and 0.2725. The elasticity β , in relation to labour as measured by the total number of full-time equivalent jobs, is between 0.7002 and 0.6928. The elasticities of the GVA in relation to the production factors suggest constant returns to scale in all equations estimated. In fact, when the model imposes the restriction of constant returns to scale, the result obtained by the corresponding Wald test for linear restrictions yields a value by which the null hypothesis ($H_0: \alpha + \beta = 1$) cannot be rejected for any equation.

Secondly, the estimated marginal effects of the age of establishment are derived as follows: $(\theta_1 + 2\theta_2 \overline{Age\ of\ establishment})$, where $\overline{Age\ of\ establishment}$ is the average level of this variable (12.9905) and θ_1 and θ_2 are the estimated coefficients for *Age of establishment* and *Age of establishment squared*, respectively. In the four estimations, this marginal value ranges between 1.06 and 1.46% of the increase in productivity for each additional year the hotel has been open. On the other hand, this increase will probably begin to reverse because of increasing returns to productive factors becoming negative. According to the estimate in equation (4), such increases would begin to be negative after 26.5 years have passed since the opening of the establishment (This value is obtained from expression $0.0106 - 2 * 0.0002 * Age\ of\ establishment = 0$, such that age of establishment H^* 26.5 years.).

In addition, the existence of a significant percentage of workers with a permanent full-time contract and the fact of the hotel being family-owned have no apparent impact on labor productivity in the estimates made. However, there is a significant increase in productivity if the hotel belongs to a national or international chain (where all the estimates show increases in productivity of more than 24%) and if the hotel outsources services (reaching values higher than 28% in the four equations presented). It should be noted that for all model dummy variables we use Halvorsen and Palmquist's criterion (1980) to calculate the relative effect of variations in a dummy variable on the dependent variable.

The main contribution of this study has been to show how implementating environmental good practices and obtaining quality certifications in combination increase or decrease productivity in

hotels. The descriptive analysis suggests that the only measures that increase productivity are standards of quality specific to the hotel industry. The econometric analysis supports this result in the case of the Q-mark alone (equation 4), whereas all other quality certifications variables were non-significant. Thus, establishments with this certificate achieve an average 18.74% increase in productivity compared to hotels with similar characteristics but which do not have this certificate. On the other hand, according to equation 4, the implementation of good environmental practice also has a positive impact on apparent labor productivity, since it can increase such productivity by more than 7.51%.

CONCLUSION

The main aim of this study has been to quantify the combined impact of implementing environmental good practices and obtaining quality certifications on apparent labour productivity in a sample of 106 Andalusia hotels. To this end, a descriptive analysis and an econometric estimation of a production function were conducted based on data obtained from the Quality, Productivity and Competitiveness in the Hospitality Industry for Andalusia project.

With this aim, we extended the standard Cobb-Douglas production function, introducing an indicator of the implementation of good environmental practice by hotels and four different types of quality certifications as additional explanatory variables. In addition to a set of control variables, four econometric estimations were conducted, each of which included the indicator of good environmental practices developed in this work and a variable representing the different quality certifications considered.

The econometric analysis assessed the determinants of differences in productivity, showing that the age of the establishment, belonging to a chain, or outsourcing services has a positive impact on productivity. In addition, the key variables in this analysis show that, firstly, the implementation of additional environmental good practice increases labour productivity by between 6.15% and 7.51%; and, secondly, regarding quality certifications, the descriptive analysis suggests that the only measures that increase productivity are standards of quality specific to the hotel industry. The econometric analysis supports this result in the case of the Q-mark alone. The Q-mark improves hotel productivity by an average of 18.74%. Thus, the inclusion of both variables in the same model have a combined positive influence on apparent labour productivity. These results provide support for the Spanish Tourism Quality System

Annex 1. Variable names and definitions

<i>Dependent Variable: In productivity</i>	GVA/number of full-time equivalent filled jobs (at 2008 prices)
<i>Env</i>	Implementation of good environmental practice in the hotel based on the managers' replies to 7 questions: 1.- The establishment quantifies environmental costs and savings. 2.- The establishment provides employees with training on environmental issues. 3.- The establishment applies "green purchasing" policies. 4.- The variable environment is used in marketing strategies and campaigns. 5.- The establishment applies energy and water saving measures. 6.- The establishment recycles waste. 7.- The establishment encourages environmental awareness among employees through meetings and advice.
<i>Standard ISO-9000</i>	This dummy variable is equal to 1 if the establishment has ISO-9000 certification and 0 otherwise.
<i>Standard ISO-14000</i>	This dummy variable is equal to 1 if the establishment has ISO-14000 certification and 0 otherwise.
<i>Internal quality certification</i>	This dummy variable is equal to 1 if the establishment has an internal quality certification and 0 otherwise.
<i>Q-quality</i>	This dummy variable is equal to 1 if the establishment has Q-quality certification and 0 otherwise.
<i>Age of establishment</i>	Years since the opening of the establishment.
<i>Full-time and permanent contract</i>	The percentage of workers with full-time and permanent contract at each establishment.
<i>Chain</i>	This dummy variable is equal to 1 if the hotel belongs to a chain and 0 otherwise.
<i>Subcontracted services</i>	This dummy variable is equal to 1 if the establishment outsources some services that it uses or provides and 0 otherwise.
<i>Family-owned</i>	This dummy variable is equal to 1 if the establishment is a family business and 0 otherwise.

The Spanish Royal Decree 314/2006 (17th March) from the Housing Ministry passed the Building Technical Code and established the Planning Rules (Documento Básico HE de ahorro de energía, [HE Basic Document for energy saving]). According to these rules, from 2007 onwards, any building must comply with energy efficiency by including a minimum threshold of solar energy for the provision of hot water and photovoltaic energy for the electricity consumed. The rules also apply to renovated buildings, under certain conditions.

implemented by the Spanish Ministry of Tourism, which has attempted to improve the quality of tourism hotels to increase their competitiveness and performance. In this sense, the positive response of consumers towards improving environmental and quality measures may be an incentive to invest in these measures. Moreover, implementing good environmental practice and obtaining quality standards specific to the hotel industry improves hotel productivity, and consequently competitiveness, due

to their differentiating effect on the service together with the consumers' perception of a higher level of quality at these hotels. For this reason, consumers are willing to pay a premium price for the service provided.

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