

## Research model of the environmental management in hotel firms

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**Abstract:** The current work aims to develop a instrument to measure the impact of firms' environmental protection activities on their economic performance. This tool is specifically designed for the tourism sector, which is rarely analysed from this perspective despite its considerable relevance due to its strong interaction with the environment. The work empirically tests the model on a sample of hotels in Canary Islands (Spain). It uses structural equation modelling to analyse the information. The findings show that the proposed model fits the underlying reality well, and its constituent components satisfy validity and reliability criteria. Thus, they make an important contribution to knowledge about the determinants and implications of sustainability in tourism-sector firms.

**Keywords:** Environmental protection; Business performance; Research model.

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**Resumen:** El presente trabajo tiene como finalidad el desarrollo de una herramienta para la medición del impacto generado por las actividades de protección medioambiental desarrolladas por la empresa sobre el rendimiento económico de la misma. Dicha herramienta se diseña específicamente para adaptarse a las particularidades de un sector escasamente analizado desde esta perspectiva y especialmente relevante debido a su considerable interacción con el medio como es el hotelero. El trabajo empírico se desarrolla sobre una muestra de establecimientos hoteleros de Canarias y la información se analiza a través de modelos de ecuaciones estructurales. Los resultados obtenidos revelan la idoneidad del modelo planteado en términos de ajuste a la realidad subyacente así como a la validez y fiabilidad de los constructos que lo componen.

**Palabras clave:** Protección medioambiental; Rendimiento económico; Modelo de medida

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## Introduction

In the tourism industry it is essential that firms reconcile the use of natural resources with their conservation. A feedback mechanism operates in which excessive use now will have a negative impact on tourism consumption in the future (González and León, 2001). Thus, environmental management is intrinsically linked to the quality parameters of the tourism product, and is consequently a critical factor in the competitiveness of hotel firms. Despite this, environmental management is relatively undeveloped at the present time (Skalpe and Sandvik, 2002).

Authors have been engaged in an intense debate in recent decades about the determinants behind firms' inclusion of the environmental variable in their strategic planning, and the implications of this development. The experts coincide that there is a lack of consistent and comparable information about environmental management published in secondary sources, which means primary research is necessary to collect such information.

All this, together with the need to study environmental management in the services sector (Foster et al., 2000; Starik and Marcus, 2000), justifies the current work. This article proposes an instrument to measure the impact of environmental protection on firm performance in the hotel industry, which has been the object of few studies to date from this perspective. To validate the model, the empirical study examines a particularly important area for the tourism industry in Spain: the province of Santa Cruz de Tenerife (Canary Islands).

## The problem of measuring environmental protection and its strategic implications

Firms' relationship with their natural environment is becoming increasingly important, so there is a need to analyse the environment as a strategic variable through which firms can take the initiative and hence achieve sustainable competitive advantages (Macaulay, 1999). Firms, which are subject to increasingly important competitive challenges, must start integrating the natural environment into their strategies, not as passive agents that are the object of the strategy, which they try to resist, but rather as active agents that must elaborate their own strategies of environmental conservation. The firms' new strategy consists of conceiving the natural environment as a responsibility that is part of their corporate obligations. This proactive position

could provide firms with a competitive advantage when, as is expected, the minimum legal requirements are raised (Henriques and Sadorsky, 1999).

Thus, the firm's environmental strategy should optimally involve all the functional areas and become one of the components of its global strategy (Klassen and McLaughlin, 1996).

Hotels can make environmental management operational using a wide range of measures designed to minimise the firm's impact on the environment. According to González and León (2001), this would include modifying processes in the hotel's services production system (e.g., the consumption of natural resources, the use of renewable energy resources, and the technical processes of materials transformation), as well as taking account of the volume and type of waste generated, and its potential danger.

Nevertheless, one of the most important concerns in the literature currently is the potential impact of environmental protection on organisational performance. Thus, implementing a coherent environmental strategy means that the firm must respect a number of constraints to its behaviour that could condition the most economic way to carry out each activity. From this perspective, these constraints could have a negative effect on firm performance (Williams et al., 1993; Walley and Whitehead, 1994; Worrell et al., 1995; Cordeiro and Sarkis, 1997). Other authors, however, argue that environmental protection activities are closely interrelated with the firm's other strategies and can modify the contribution of these to profits, since they can potentially influence revenues as well as costs (Hart, 1995; Porter and Van der Linde, 1995; Hart and Ahuja, 1996; Klassen and McLaughlin, 1996; Russo and Fouts, 1997; Judge and Douglas, 1998; Sharma and Vredenburg, 1998). This favourable position is based on a consideration of factors such as consumers' perception of the firm's environmental behaviour and of the superior quality of its products and services, and how society in general perceives the firm. All this conceivably has a positive impact on the firm's image, know-how and legitimacy. The firm could hence consolidate environmental strategies that help achieve sustainable competitive advantages by opening up access to new markets and distribution channels, product differentiation, and so on.

In the particular case of the sector of interest here, and following González and León (2001), strategic opportunities are

available to hotel firms that have effective environmental management. The relationship between the hotel and its natural environment is influenced by the wide range of complementary activities that firms from this sector offer, and by the consumers' sensitivity towards numerous factors. Thus, the results of their empirical study of the hotel industry on the island of Gran Canaria show that despite the costs, firms have a commercial incentive to adopt environmental protection measures: the chance to increase their profits. The firm will still have these incentives even if the necessary innovation raises operational and investment costs, as long as it can be assumed that the demand will react positively to the improvement in the product's environmental attributes.

Given the lack of consensus in the literature, Burgos and Céspedes (2001) point out that the wide variety of results obtained may be explained by the characteristics of the research (use of samples of firms from different industrial sectors; use of different indicators; inclusion or not in the different models estimated of aspects of the organisation's internal and external environment that influence environmental protection directly or indirectly, etc.), but especially by the failure to differentiate between the concepts of environmental management and environmental performance. On the other hand, Barbera and McConnell (1990), Klassen and McLaughlin, (1996), Handfield et al. (1997), Tilt (1997), Flannery and May (2000) and Sharma (2000) show that in the study of environmental protection the results obtained vary significantly depending on the sector. Sectors with a productive activity that is closely linked to the natural environment will conceivably have a greater environmental impact, and hence the influence of environmental questions on performance is likely to be stronger, while this relation may not be statistically significant in sectors that have weaker links to the environment (Henriques and Sadorsky, 1996). Likewise, the relation between environmental protection and performance is conceivably stronger in firms that are consumer oriented, since their environmental reputation is more likely to affect their sales (Tilt, 1997).

In this context, Wagner (2001) considers that the research on the influence of environmental protection on firm strategy is in its early stages, and requires additional empirical studies that include all these methodological considerations. This would help settle the controversy about whether environmental protection has a positive or

negative influence on the firm's economic performance.

In view of all the above, the main objective of the current research is to develop a measurement model of environmental protection specifically designed for a sector closely linked to its environment and its consumers – the hotel industry – and that is capable of accurately capturing the impact of environmental protection on these firms' economic performance.

## **Determinants of environmental protection**

The model (see Figure 1) based on Judge and Douglas' (1998) proposed the causal relations between the firm's capability of integrating environmental issues into the strategic planning process – which can be considered a proxy for environmental management – and economic performance and environmental performance. According to this model, the antecedents of this integration are the resources provided by the firm and the coverage given from the different functional areas.

The formulation of the relations and definition of the model constructs, is based on an extensive and rigorous review of the relevant literature in the area of interest, with a number of adaptations being made for the hotel sector.

### **Environmental management**

Environmental management is represents the firm's efforts to protect the environment and constitutes the set of technical and organisational activities the firm carries out to reduce the potentially negative impact of its operations on the environment (Cramer, 1998). From this perspective, environmental management goes beyond mere compliance with the regulatory framework to take in activities that evaluate the firm's proactiveness with respect to the environment (Judge and Douglas, 1998). The literature distinguishes two fundamental types of activity in environmental management: "technical", which refers to the use of techniques or technologies that limit the physical impact of operational activities; and "organisational", which refers to the incorporation of environmental issues in the firm's values, objectives, organisational structure and systems. With regard to this second type of activity, and for the particular case of the hotel sector, Kirk (1995) stresses that formalising the firm's environmental management by designing an environmental policy is one the most important tools for ensuring a successful environmental management.

### Functional coverage

Judge and Douglas (1998) use this construct to measure the extent to which the firm's environmental department coordinates its activities with each of the functional areas. This construct is important because the more integrated environmental issues are in the different functional areas of the firm, the greater their integration will be in the firm's strategic planning process (which represents the hotel's environmental management in the current model). The "Functional Coverage" construct needs to be adapted to the particular characteristics of the sector of interest here. Judge and Douglas' (1998) original model refers to the environmental "department" of the firm. But environmental management is not well developed in the Canary Islands' hotel sector, and most hotels lack formally established departments in which the functions relating to environmental management can be developed. Thus the current work considers the "environmental manager", or manager responsible for the environment function, rather than the environmental department.

### Resources allocated to environmental protection

Judge and Douglas (1998), starting from the resource-based view applied to the natural environment (Hart, 1995), as well as the literature on strategic planning, argue that the level of resources provided is a key determinant of the firm's ability to generate a competitive advantage through the strategic management of the environment. Thus the level of resources provided for environmental issues within the strategic planning process is a critical antecedent of that process. These authors argue that when the resources are dedicated specifically to environmental issues, the firm is more likely to be able to integrate those aspects into its planning system successfully, while a low investment in resources will limit the level of integration into the planning process and consequently the firm's ability to generate competitive advantages. In other words, the firm will be able to expect an appropriate return on its investment of resources in environmental issues by integrating them into the strategic planning process.

### Firm Size

Bowen (2000) considers that a number of organisational characteristics can favour environmental management activities, among them size. Aragón et al. (2008) find that size is an important but not determinant factor in the development of a

more proactive environmental strategy, which contradicts the traditional view that limited resources prevent small and medium-sized firms developing this type of strategy. Small and large firms can in this view generate a set of particular capabilities based on their differential characteristics, and hence can design equally competitive strategies.

## Empirical analysis

### Methodology

The model proposed in this work (Figure 1) takes Judge and Douglas (1998)' proposal as its starting-point. Their model established a series of causal relations between firms' ability to integrate the environmental variable into their strategic planning process and their economic and environmental performance (henceforth, Original Model). This model also considers the antecedents of that integration: the resources allocated by the firm and the coverage given from the different functional areas. This capability of integrating the natural environment into the strategic planning process can, according to Burgos and Céspedes (2001), be considered a proxy for environmental management.

Subsequently, the variant proposed by Burgos and Céspedes (2001) is considered. These authors complement the original model with the direct relation between environmental performance and economic performance (henceforth, Rival Model I). The current work uses the competitive modelling strategy to compare the results and the validity of both models.

The current study then takes Judge and Douglas (1998)' original model one step further by adding the relation between firm size and environmental management. This relation is founded on theory, and is tested here using a second rival model (henceforth, Rival Model II). Both Judge and Douglas (1998) and Burgos and Céspedes (2001) consider the direct effect of size on environmental performance and economic performance. But size can also have an indirect effect on those constructs via environmental management, since according to Bowen (2000), a larger firm size favours environmental management. These alternative models are tested and compared in order to determine their validity as measurement instruments of the relations between the determinants and implications of environmental protection in hotels.

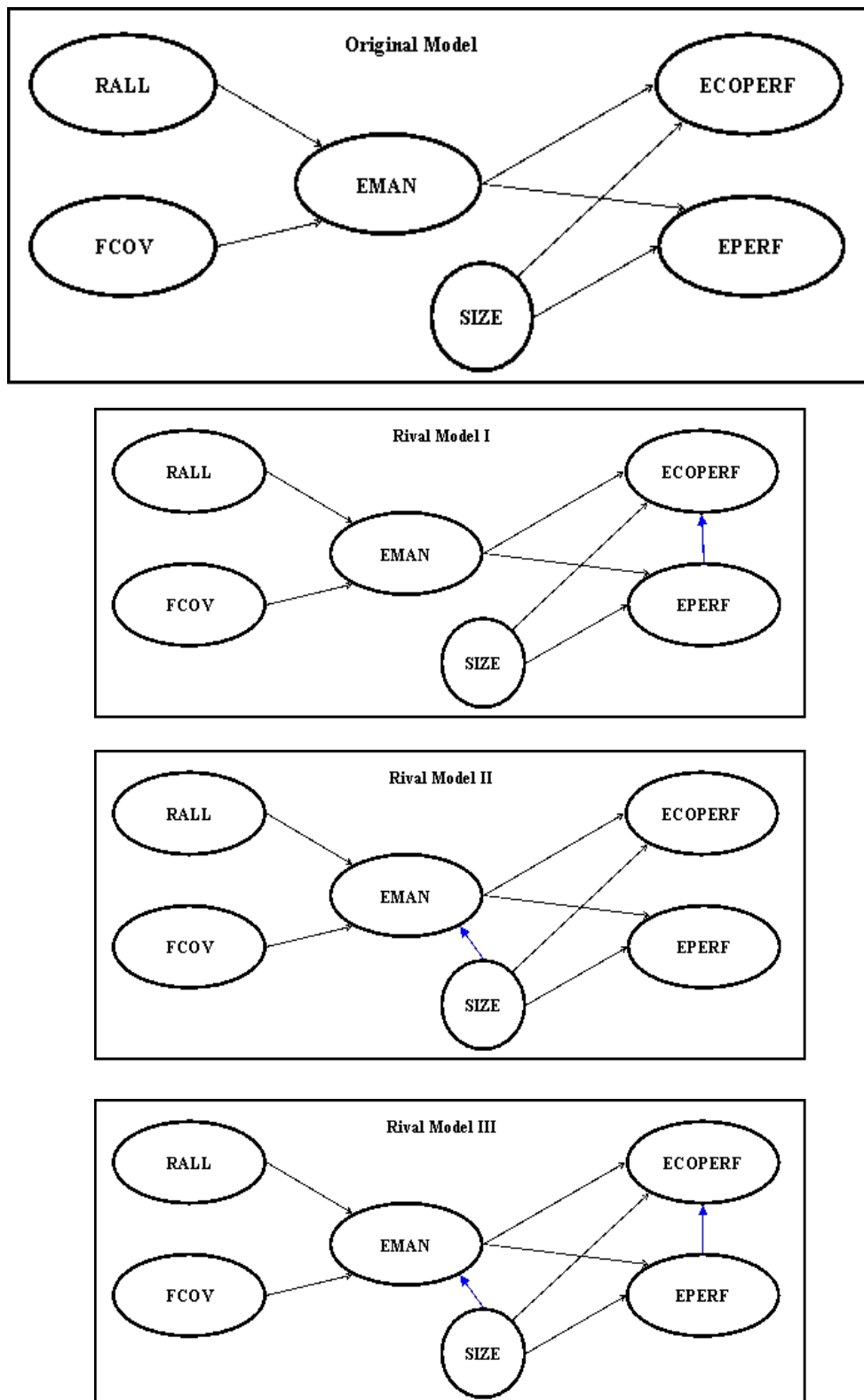


Figure 1: Proposed analysis for current research. Source: The Author.

The current work defines the constructs of the model after an extensive literature review and taking into account the characteristics of the hotel sector (Ullman, 1985; Hunt and Auster, 1990; Boyd, 1991; Kleiner, 1991; Greenberg and Unger, 1992; North, 1992; Schmidheiny, 1992; IHEI, 1993; Welford and Gouldson, 1993; Azzone and Manzini, 1994; Greeno, 1994; James, 1994; Miller and Cardinal, 1994; Peattie and Ringler, 1994; Walley and Whitehead, 1994; Wight, 1994; Hunter and Green, 1995; Kirk, 1995; Kirk, 1998; Porter and Van der Linde, 1995; Powell, 1995; Welford, 1995; Lober, 1996; Nehrt, 1996; Tyteca, 1996; Russo and Fouts, 1997; Wolters, et al., 1997; Aragón-Correa, 1998; Cramer, 1998; Ilinitch et al., 1998; Mendelson and Piasecki, 1999; Christmann, 2000; Álvarez et al., 2001; Tyteca et al., 2002; King and Lenox, 2002; Kolk and Mauser, 2002; Global Reporting Initiative, 2002; Claver, et al., 2004; González-Benito and González-Benito, 2005).

Environmental Management (EMAN) is understood not just as managing the firm's relationship with its natural environment, but also its relationship with its socio-economic and cultural environment, which the firm undoubtedly influences significantly. EMAN is defined as the set of planning, prevention, control, training and communication actions that the firm carries out to reduce the negative impact of its operations on the environment. This definition shows the multi-dimensional nature that the literature attributes to this construct.

Environmental Performance (EPERF)

measures the impact of the hotel's activities on the natural environment and how the social agents perceive and evaluate these activities. EPERF and its dimensions are assumed to measure the results obtained from applying the environmental management practices.

Economic Performance (ECOPERF) is defined as the increase that the hotel has experienced relative to its sector in four aspects concerning the commercial and financial dimensions of that performance: the profitability of the investment, the profits, the sales and the market share.

Functional Coverage (FCOV) evaluates the extent to which the environmental department coordinates its activities with each of the firm's functional areas.

The construct Resources Allocated to Environmental Protection (RALL) not only measures the quantity of economic, human and technical resources that the firm commits to this area, but also their adequacy, as well as the firm's investment in environmental management.

Finally, to measure size (SIZE), studies in the hotel sector recommend using operational indicators such as the number of rooms or beds. The current work uses the number of beds, and takes the natural log of that value to counteract the fact that the beneficial effects of strategic planning are more evident in larger organisations.

Table 1 summarises the most important methodological characteristics of the empirical study carried out in this work.

Universe	Individual medium-high category hotels (3-5 star hotels and 3-5 key holiday apartments)
Geographic scope	of ()
Population	274
Data collection method	Survey of environmental managers of hotels using structured, self-administered questionnaire
Type of contact	E-mail; telephone; internet; fax
Type of variables used in scales	Ordinal, nominal and metric
Sample unit	Individual hotel or apartment complex
Sample size	187
Response rate	68%
Sample error	4.05%
Confidence level	95% $Z=1.96$ $p=q=0.5$
Sampling procedure	Census study of all population members
Fieldwork	Pretest (March 2005); Survey (1 April - 20 June 2005)
Data handling	Statistics packages SPSS for Windows (version 13.0) and AMOS (version 6.0).

Table 1: Technical specifications of empirical study. Source: The Author.

There are no published secondary sources offering consistent and comparable information on hotels' environmental protection activities, and considering that the abstract nature of the constructs makes measurement more difficult, the current work obtains its information from primary sources. Specifically, the work uses a questionnaire designed to adapt the starting model to the particular objectives and sector characteristics of the current research.

Churchill (1979)'s methodology was followed to build the measurement scales.

Thus, from the definition of the phenomenon to study and its clear differentiation via the theoretical review, a series of items was generated to measure each of the model's constructs (Table 2). This was complemented by information from in-depth interviews with experts – both academic and professional – in environmental management and in the hotel sector.

Construct	Items
EMAN	3.1 – Implementation Environmental Management System 3.2 – Implementation Code of Good Practice 3.3 – Environmental criteria in investments/purchases 3.4 – Prevention and control environmental risks 3.5 – Prevention socio-cultural impact 3.6 – Control of regulations 3.7 – Control of development and results of environmental management applied 3.8 – Training and motivation of staff in environmental objectives 3.9 – Communication of environmental management to stakeholders 3.10 – Information and education in favourable environmental behaviour to customers, workers and suppliers
EPERF	5.1 – Reduction of risks for health of customers and employees 5.2 – Promotion and collaboration in conservation of culture and socio-economic development of area 5.3 – Environmentally responsible purchases and contracting. 5.4 – Saving natural resources and preserving their quality 5.5 – Reduction of waste and use of polluting and/or dangerous substances 5.6 – Adequate management of waste and dangerous substances 5.7 – Reduction of visual impact and noise 5.8 – Contribution to improving environmental problems of area 5.9 – Promotion of environmental education and support for local initiatives 5.10 – Personnel amply qualified in environmental aspects 5.11 – Adoption of ecological attitudes among customers, workers and suppliers 5.12 – Stakeholders aware of and value hotel's environmental efforts 5.13 – Improvement in environmental behaviour of firms related to hotel
ECOPERF	4.1 – Growth of revenues / profits 4.2 – Growth of sales 4.3 – Growth of market share 4.4 – Growth of economic profitability (profitability of investment)
RALL	2.1 – Level of prior planning of resource needs for environmental management 2.2 – Volume of resources currently allocated to environmental management 2.3 – Adequacy of resources currently allocated 2.4 – Importance of investments in environmental management
FCOV	1.1 – Extent to which environmental department / manager (where appropriate) coordinates with hotel manager 1.2 - Extent to which environmental department / manager (where appropriate) coordinates with Administration/ Accounts/ Finance 1.3 - Extent to which environmental department / manager (where appropriate) coordinates with Human Resources 1.4 - Extent to which environmental department / manager (where appropriate) coordinates with Marketing/ Public Relations/ Sales 1.5 - Extent to which environmental department / manager (where appropriate) coordinates with Operations
SIZE	6 – Number of beds in hotel <sup>(1)</sup>

(1) Data collected by item 6 (Number of beds in hotel) subsequently converted to natural logs.

Table 2: Items in definitive questionnaire. Source: The Author.

## Results

The data are analysed using multivariate analysis techniques such as structural equation modelling, with the following results:

After verifying the basic assumptions of multivariate analysis and the specific assumptions of structural equation models concerning treatment of missing data, linearity of the relations, atypical data, randomness of the sample, normality and kurtosis, and sample size, the first step is an exploratory factor analysis (EFA). The results indicate that the scales built for the constructs EMAN and EPERF are valid, with all the items significant and with factor loadings exceeding 0.5. This analysis also reveals the structure of dimensions or factors of both constructs (Table 3), and the reliability analysis supports internal consistency, with a Cronbach Alpha exceeding 0.8 in both constructs and in their factors. At the same time, all scales comply with the statistical requisite of unidimensionality.

The evaluation of the global measurement model provides some acceptable goodness-of-fit values, which means the measurement model is valid. Thus, the next step is to analyse the validity and reliability of the scales using a confirmatory factor analysis (CFA).

With regard to the reliability, this work first uses the criteria proposed by Jöreskog and Sörbon (1993) to analyse the items individually, specifically the weak convergence ( $CR > 1.96$ ), standardised coefficient ( $\lambda > 0.5$ ) and individual reliability (squared multiple correlation coefficient  $R^2 > 0.3$ ). The value of these indicators in all the model items confirms their individual reliability. Consequently, no items are eliminated (Table 4).

The composite reliability of all the scales is confirmed since the composite reliability coefficient comfortably exceeds the minimum value of 0.7. The evaluation of the measurement model concludes with

the analysis of the validity.

The content validity is confirmed since the methodological process followed complies with the criteria recommended in the scientific literature in the field of management. Likewise, there is a strong convergent validity between the items measuring the same construct according to the average variance extracted (AVE), for which the literature recommends values exceeding 0.5.

Finally, in order to evaluate the discrepancy between the model constructs, the confidence interval is calculated for the variance of the pairs of factors. The results confirm the existence of discriminant validity, and in the case of the second-order factors EMAN and EPERF, the discriminant validity test also validates their multi-dimensionality, which the exploratory analysis suggested.

After verifying the validity and reliability of the scales, the next step is to evaluate the global model. This process involves the competitive modelling strategy. Three rival models are proposed, each including relations not considered in the original model (Table 5).

The results show that the original model has exactly the same goodness of fit as Rival Model I, and that Rival Model II also has the same goodness of fit as Rival Model III. Consequently, the authors opted to focus on the original model to test the causal relations specified in it. This model complies with the requisites laid down by the scientific methodology in the field of management, and is based on a solid theoretical and empirical starting foundation.

On the other hand, Rival Model III, which considers both the additional causal relations, obtains a goodness of fit at least as acceptable as the original model, so its results in terms of these relations ( $EPERF \rightarrow ECOPERF$ ;  $SIZE \rightarrow EMAN$ ) can be accepted, bearing in mind that the choice of this model is not only based on

Construct	Dimensions	Name
EMAN	EMAN1	“Control of environmental impact”
	EMAN2	“Environmental communication and training”
	EMAN3	“Prevention of environmental impact”
	EMAN4	“Integration of environmental variable in strategic planning process”
EPERF	EPERF1	“Result of control of environmental impact”
	EPERF2	“Result of environmental communication and training”
	EPERF3	“Socio-cultural performance”

Table 3: Multidimensional structure of constructs EMAN and EPERF. Source: The Author.



	<b>STANDARDISED FACTOR LOADING (<math>\lambda_{ij}</math>) (1)</b>	<b>CR (2)</b>	<b>R<sup>2</sup> (3)</b>
RALL --- V2.1	0.859	14.429	0.738
RALL --- V2.2	0.890	15.292	0.792
RALL --- V2.3	0.909	15.860	0.827
RALL --- V2.4	0.728	11.271	0.530
FCOV --- V1.2	0.894	15.459	0.799
FCOV --- V1.3	0.916	16.115	0.839
FCOV --- V1.4	0.894	15.452	0.799
FCOV --- V1.5	0.792	12.749	0.627
EMAN --- EMAN1	0.923	12.441	0.853
EMAN --- EMAN2	0.939	13.307	0.882
EMAN --- EMAN3	0.985	13.878	0.971
EMAN --- EMAN4	0.928	11.777	0.860
EMAN1 --- V3.4	0.835	*	0.698
EMAN1 --- V3.6	0.841	13.754	0.707
EMAN1 --- V3.7	0.881	15.035	0.777
EMAN2 --- V3.8	0.873	*	0.762
EMAN2 --- V3.9	0.895	16.550	0.801
EMAN2 --- V3.10	0.837	14.738	0.701
EMAN3 --- V3.3	0.849	*	0.721
EMAN3 --- V3.5	0.836	14.367	0.699
EMAN4 --- V3.1	0.806	*	0.650
EMAN4 --- V3.2	0.887	13.640	0.787
EPERF --- EPERF1	0.887	10.379	0.786
EPERF --- EPERF2	0.937	13.218	0.878
EPERF --- EPERF3	0.875	10.643	0.766
EPERF1 --- V5.1	0.748	*	0.559
EPERF1 --- V5.3	0.798	11.171	0.637
EPERF1 --- V5.4	0.846	11.933	0.716
EPERF1 --- V5.5	0.909	12.860	0.826
EPERF1 --- V5.6	0.761	10.751	0.579
EPERF1 --- V5.7	0.818	11.609	0.669
EPERF2 --- V5.10	0.870	*	0.757
EPERF2 --- V5.11	0.866	15.893	0.750
EPERF2 --- V5.12	0.854	15.188	0.729
EPERF2 --- V5.13	0.766	12.666	0.586
EPERF3 --- V5.2	0.778	*	0.606
EPERF3 --- V5.8	0.895	13.376	0.801
EPERF3 --- V5.9	0.878	12.846	0.771
ECOPERF --- V4.1	0.884	15.398	0.884
ECOPERF --- V4.2	0.985	18.666	0.985
ECOPERF --- V4.3	0.989	18.813	0.989
ECOPERF --- V4.4	0.899	15.834	0.899

(\*) To compare scales, it was necessary to set at least one factor loading to 1 (Hair et al., 1999)

Recommended values of indicators:

(1)  $\lambda_{ij} > 0.7$

(2)  $CR > 1.96$  for  $p=0.05$ ;  $CR > 2.58$  for  $p=0.01$ ;  $CR > 2.81$  for  $p=0.005$  (absolute values of CR).

(3)  $R^2 > 0.3$

Table 4: Factor loadings of global measurement model. Source: The Author.

INDEX	THRESHOLD <sup>(1)</sup>	STRUCTURAL MODEL			
		ORIGINAL	RIVAL I	RIVAL II	RIVAL III
<i>Absolute fit</i>					
$\chi^2$		426.292	462.292	422.699	422.699
df		160	160	159	159
p	>0.05	0.000	0.000	0.000	0.000
GFI	>0.9	0.819	0.819	0.821	0.821
RMSEA	0.05–0.08 and <0.1	0.095	0.095	0.094	0.094
<i>Incremental fit</i>					
CFI	>0.8	0.935	0.935	0.936	0.936
IFI	>0.8	0.936	0.936	0.936	0.936
TLI	>0.9	0.923	0.923	0.923	0.923
NFI	>0.9	0.901	0.901	0.901	0.901
AGFI	>0.9	0.762	0.762	0.764	0.764
<i>Parsimony fit</i>					
$\chi^2/df$	1-2 and <5	2.664	2.664	2.658	2.658
AIC	(2)	526.292	526.292	524.699	524.699
CAIC		737.848	737.848	740.486	740.486

(1): Hair et al. (1999)

(2): Used to compare alternative models; one with lowest value is preferred.

Table 5: Global measurement model: fit indices. Source: The Author.

empirical results but also on the theoretical arguments discussed above that support the possible significance of these causal relations. On the other hand, it is important to remember, as Hair et al. (1999) warn, that this model is acceptable only with reservations until additional constructs can be added, or more-refined measures, or causal relations re-specified on both theoretical and empirical bases.

## Discussion and conclusions

These findings provide additional empirical evidence in a developing field of study whose theoretical and empirical dimensions are still immature, its scales and models having yet to earn sufficient support to lay the foundations for the subsequent development of the field.

The current work has followed a rigorous methodological process for the construction of social science scales to develop a measurement instrument of the antecedents and implications of hotels' environmental protection actions. This study confirms the robustness of the model, since it complies with the fundamental requisites of a close fit to the underlying reality of the data, reliability and validity. This provides extra empirical evidence of the determination and measurement of the underlying dimensions of the constructs that define the integration of environmental questions in the firm (fundamentally, environmental

management and environmental performance). Various authors have stressed the need to research this question (Aragón-Correa, 1998; Klassen and Whybark, 1999).

Consequently the instrument is reliable and valid for measuring the constructs and testing the relations specified in the model. At the same time, its general character (Judge and Douglas apply their original model to a wide range of firms from different sectors) means that the model can be adapted to the particular reality of each sector being analysed, as well as to the particular characteristics of the population object of study. This characteristic makes this model more useful in future research in both the tourism sector and in other sectors, since researchers can easily adapt the model to the specific characteristics of each context.

On the other hand, the approach adopted for the data analysis is sufficiently integrative to permit analysis of both the constructs in isolation and their joint interaction, making use of structural equation modelling – a flexible and powerful tool. As the proposed model is defined, it permits analysis of various relations simultaneously, some involving multiple dependence, and the definition of latent variables offers the possibility of validating the scales proposed for measuring the constructs.

Another of the advantages of the pro-

posed model is that it incorporates Burgos and Céspedes (2001)' contribution into Judge and Douglas (1998)' original model, as well as the proposed relation between firm size and environmental management.

In short, the model developed in this research complies with the requirements of a satisfactory fit with the underlying reality of the data, validity and reliability required of a methodological instrument in the social sciences. These requisites were verified using a confirmatory factor analysis based on structural modelling.

This makes the tool useful for describing the relations between the main determinants of the firm's environmental behaviour and its performance. The tool is also appropriate for use in future research in this field.

This study has also validated the multi-dimensional character of the constructs Environmental Management and Environmental Performance, via an EFA. This analysis generated the following dimensions:

Environmental Management: Control of Environmental Impact; Environmental Communication and Training; Prevention of Environmental Impact; and Integration of Environmental Variable in Strategic Planning Process.

Environmental Performance: Result of Control of Environmental Impact; Result of Environmental Communication and Training; and Socio-cultural Performance.

Regarding the managerial implications of this report, it should be noted that the proposed model provides the hotel manager with a practical tool, able to evaluate the impact that the green strategies have on the company's earnings, which in turn allows the manager to select the actions with the biggest economic and green impact. On the other hand, this model helps managers to improve both the interdepartmental coordination and the allocation of human and economic resources necessary to ensure the highest efficiency of its green practices.

Using structural equation modelling, the results of the CFA (convergent and discriminant validity) and the application of a competitive modelling strategy confirm the multi-dimensional structure defined in the EFA for the constructs Environmental Management and Environmental Performance.

Finally, this research has its limitations, which will provide the basis for future research. Thus, future work could include a longitudinal analysis of the relations

proposed in this model, apply the model to different geographical areas where tourism is significant, and perfect the measurement of the variables by using objective indicators, the accessibility and availability of the information permitting.

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