ENVIRONMENTAL STRATEGY AND ECONOMIC PERFORMANCE: THE MEDIATING ROLE OF COMPETITIVE ADVANTAGE AND FIRM RESOURCES

ABSTRACT

The aim of this paper is to clarify the relationship between environmental management and firm performance through the incorporation of the main limitations and the most relevant contributions made from various fields of study. The research is carried out using a mixed method research design in two phases: qualitative and quantitative. The first phase includes comparative case studies. The findings lead to establish propositions which are integrated in a model that depicts all the variables related to the link between environmental strategy and performance. In a second phase, we conduct a survey among firms affected by the IPPC law in Spain to test the proposed model using a structural equation analysis. Findings show that a direct link exists between the proactive environmental strategy, environmental performance, competitive advantage and economic performance.

Keywords: proactive environmental strategy, environmental performance, competitive advantages, economic performance.

INTRODUCTION

Different theoretical arguments have been pointed out to explain the relationship between environmental strategy and firm performance and competitiveness (Russo & Fouts, 1997; Judge & Douglas, 1998; Gilley et al., 2000; Pagell et al., 2004; González-Benito & González-Benito, 2005). Thus, the influence of environmental management on firm performance may result from the positive impact on firm costs and differentiation (Christmann, 2000; Karagozoglu & Lindell, 2000; Giménez et al., 2003; Wagner & Schaltegger, 2004). Therefore, through pollution prevention, firms can reach a *win-win* situation (Zhu & Sarkis, 2004), i.e. one from which both the firm and the environment will benefit. Nevertheless, this view coexists with a more traditional position that refers to the existence of a trade-off between natural environment and firm profitability, in such a way that the improvement in the environmental impact caused by a firm will lower its profitability (Cliff & Wright, 2000). Despite the anecdotal evidence according to which profits make up for the cost of environmental measures, quantitative empirical studies provide inconclusive results.

The motivation to the research is that there are an important number of studies devoted to examining the relationship between environmental strategies and performance, considering only a few related variables at a time. For instance, Russo & Fouts´ study (1997) has been confined to the relationship between environmental and financial performance, whereas Sharma and Vredenburg´s work (1998) has focused on the relationship between environmental strategies and capabilities, and between capabilities and competitive benefits. As such, an integrative model that depicts all the variables jointly should be developed. To create this model, the aim of this paper is to answer the general question: how does a firm's environmental strategy influence its performance? To answer this question, firstly, we review studies that have examined the link between environmental strategy and firm performance. We consider a number of issues like the measurement of environmental and performance variables, the methodology and the most important findings. Secondly, we use a qualitative approach for deep understanding, local contextualization, and exposing the points of view of the managers under study (Miles & Huberman, 1994). Then, we propose to integrate into a model all the aspects found in the literature review and the qualitative research that could justify the diffuse results obtained in previous works, because they have not been taken into account or have been treated only to a limited extent. This implies studying the effect that proactive environmental management has on performance, the latter being measured in terms of environmental performance, competitive advantage and economic performance. Moreover, we incorporate mediating variables that affect this relationship such as the development of new environmental resources and capabilities (Hart, 1995; Christmann, 2000; Bansal, 2005), as well as the advantages derived from the adoption of a pioneering entry strategy (Lee *et al.*, 2000). We also conduct a survey among firms operating in Spain to test the proposed model using a structural equation analysis. This study should provide academics and practitioners with a better understanding of the factors that influence and mediate in the adoption of environmental strategies, and the benefits that can be generated from this adoption.

We have structured the present paper as follows. We will firstly carry out a literature review of the relationship between environmental strategies and firm performance. Then we will present the research development in two phases: qualitative and quantitative. We will end with some conclusions.

BACKGROUND

This section will provide a critical review of various empirical studies that have examined the link between environment and performance, considering a number of issues like measurement of environmental and performance variables, natural resource-based theory and pioneering entry strategies.

In relation to environmental variables, the operationalization of the variable 'environmental management' has been one of the main difficulties detected in the empirical studies analysed. Some works use their own environmental management indicators, e.g. environmental policy, planning, control, communication and the level of commitment of members and other agents envolved, to examine this relationship (Russo & Fouts, 1997; Judge & Douglas, 1998; Christmann, 2000; González-Benito & González-Benito, 2005). Others focus on aspects specifically associated with environmental performance (Wagner *et al.*, 2002; Wagner & Schaltegger, 2004) like the reduction of materials and the environmental impact caused by the firm. Besides, there are studies which identify in the environmental variable aspects that are specific to environmental management and performance, although they do not deal with these variables separately (Sharma & Vredenburg, 1998).

Considering performance variables, most studies focus on analysing the link between environmental management and economic performance (Judge & Douglas, 1998; Gilley *et al.*, 2000; Al-Tuwaijiri *et al.*, 2004). Other works deal with the relationship between environmental management and competitive advantage (Sharma & Vredenburg, 1998; Christmann, 2000; Zhu & Sarkis, 2004).

In this context, it would be interesting to incorporate the link between environmental management and economic performance into the variable 'competitive advantage' (Karagozoglu & Lindell, 2000). In this way, the firm's economic performance resulting from its environmental activity is measured using not only the indicators traditionally employed to measure short-term profitability (ROA, ROE, ROS, etc.) but also the competitive advantage, thanks to which we can isolate the effect of environmental practices on the improvement in economic performance. According to the natural resource-based literature, firms with different resource profiles are likely to exhibit different degrees of effectiveness in adopting environmental strategies (Hart, 1995). Firms that possess greater firm-specific resources are more likely to develop organizational capabilities and to adopt environmental strategies (Chan, 2005). A few studies have analyzed empirically the resources and capabilities in the relationship between environmental strategies and performance. In fact, Sharma & Vredenburg (1998) focus on examining the relationship among environmental strategies, organizational capabilities and competitive benefits, but without any investigation of resources. Russo & Fouts (1997) involve a similar omission. Judge & Douglas (1998) take resources into consideration in their structural equation analysis, but they use only one item to measure the construct of resources.

Firms could also obtain some advantages derived from the adoption of a pioneering entry strategy (Lee et al., 2000). Resources and capabilities may facilitate the firm's operation in a sector without competition during a specific period of time, and give it a temporary advantage that enables it to obtain competitive advantages and influence market development to ensure that these advantages are sustainable (Christmann, 2000; Aragón-Correa & Sharma, 2003). Nevertheless, the firm must analyse market conditions before making a decision about the entry time (Russo & Fouts, 1997) anticipating the key factors in the activity sector (Shepherd & Shanley, 1998); it must estimate the resources and capabilities available to implement the entry strategy (Christmann, 2000); and also pay attention to the formation of consumer preferences and behaviour (Zhang & Markman, 1998).

After highlighting the main limitations and the most relevant contributions made from various field of research, integrating into the study all these above-mentioned aspects jointly is an important step in attempting to understand the relationship between environmental strategies and firm performance. This implies studying the effect that proactive environmental management has on performance, the latter being measured in terms of environmental performance, competitive advantage and economic performance. Moreover, we incorporate mediating variables that affect this relationship such as the development of new environmental resources and capabilities (Hart, 1995; Christmann, 2000; Bansal, 2005), as well as the advantages derived from the adoption of a pioneering entry strategy (Lee *et al.*, 2000). In the next section, we use a mixed method design (qualitative and quantitative) to examine these aspects.

METHODOLOGY

The research was carried out in two phases. We adopted a mixed method research design. A mixed method study involves the collection or analysis of both quantitative and/or qualitative data in a single study in which the data are collected concurrently or sequentially, are given a priority, and involve the integration of the data at one or more stages in the process of research (Tashakkori & Teddlie, 1998). According to Creswell (2003) and Tashakkori & Teddlie (1998), our strategy is QUAL/QUAN, i.e. the study is sequential and its qualitative and quantitative parts have similar importance.

Qualitative study

Sample.- The sampling of the case studies is crucial, as the choice of sample influences the results of a study (Miles & Huberman, 1994). We selected different cases to have a sample that provides many possibilities for comparison (Strauss & Corbin, 1990). We intended to contrast firms that were different in terms of their environmental pollution through comparative case studies. We selected three environmental leaders firms belonging to secondary sector (Table 1). Service firms were not considered in the study because they differ from firms of secondary sector in terms of investment rationale, institutional treatment, and performance measurements (Luo et al., 2001). As top management usually plays a vital role in the design of environmental policy (Banerjee, 1998), mail questionnaires were sent to the senior managers.

Table 1 - Case studies information

ENPLATER Founded in 1962 and located in Torroella de Montgrí (Girona), Envases Plásticos del Ter (Enplater) was born in the early stages of the food *packaging* revolution and has ever since focused its activity on the extrusion, impression and handling of flexible films, generally made of plastic, destined to be transformed into containers or wrapping. Enplater currently has a human working group of 180 employees, and had sales of 28,814,199 euros in 2003. At present, it has introduced a quality management system in accordance with the ISO 9001 norm and an environmental management system that follows the ISO 14001 norm and the EMAS regulation.
AZNAR TEXTIL Aznar Textil, a Valencian Community-based firm founded in 1881, manufactures and markets fabrics for home decoration and upholstered furniture. It currently has 108 employees and its 2003 sales amounted to 17,853,836 euros. Regarding the environmental field, Aznar Textil has obtained the Öko-Tex 100 certificate, the ecological label for the textile sector which guarantees that the textile products manufactured by a firm are not harmful for the consumer's health. Moreover, the weaving plant in Bocairente has become the first centre in the Valencian textile sector to certify its quality and environment management system according to the ISO 9001 and ISO 14001 norms.
CONSTRUCCIONES DECO Construcciones Deco, founded in 1967 and located in Barcelona, focuses its activity on the development of maintenance, alteration, improvement or rehabilitation works both in the public and the private sector. In the year 2003, this firm had 53 employees on average and turned over 14,209,473 euros. Construcciones Deco owns certifications for its integrated quality and environment system in accordance with the ISO 9001 and ISO 14001 norms; besides, it is the first Spanish building firm included in the EMAS Register.

Data collection.- Given the qualitative nature of most of the data sought, triangulation was one of the important means of increasing construct validity and substantiating findings (Denzin, 1978). Three data sources were used: (a) interviews with environmental managers, (b) direct observation (visit to the facilities and contacts with employees), and (c) access to internal documents (in-house information bulletins, environmental declarations, annual reports for the

1997-2003 period) as well as external ones (press, web pages, commercial registries, SABI database). This triangulation technique provides stronger validation of the results if they converge (Yin, 1994). The issue of internal validity was handled by conducting multiple iterations and follow-ups during the analyses. We addressed the problem of reliability by drawing up detailed case study protocols and by following the required documentation and transcriptions standards. External validity was increased by studying multiple firms and analyzing comparative findings.

Data analysis.- We used the extended case method (Burewoy, 1991) as a guide to data analysis. This methodology approach uses empirical data gathered through case study to reconceptualize and extend theory. The extended case method consists of two `running exchanges´: between literature review and data analysis, and between data analysis and data collection, represented as: literature review ↔ data analysis ↔ data collection.

Quantitative study

Sample.- In general the authors delimit their population in the literature from the National Classification of Economic Activities (NACE) or the Standard Industrial Classification Codes (SIC). However, we use an environmental classification through the NOSE-P Code (a nomenclature of emissions sources). It is related to the 16/2002 Act on Integrated Prevention and Pollution Control (IPPC Directive). The motivation to use this classification to delimit the study population is that environmental regulation has traditionally been the main driving force behind the adoption of environmental practices by firms (Madsen & Ulhoi, 2001). The IPPC Directive´ aim is preventing, reducing and as far as possible eliminating pollution by giving priority to intervention at source and ensuring prudent management of natural resources, in compliance with the `polluter pays´ principle and the principle of pollution prevention. This Directive is obligatory by Spanish firms since 2007, but they could voluntary obey it since 2002. So firms which have had a previous development of an environmental management policy can be favoured because they have a more rapid and easier access to all the documents required by the IPPC Directive, and an easier identification and incorporation of the best techniques available.

Data collection.- Data to test the propositions were collected using a mail survey among the managers of 4,187 Spanish firms affected by the IPPC Law in September 2004. We received responses from 208 firms affected by the IPPC law, with effective response rate of 4.97%. Considering the length of the questionnaire and the senior level of the managers targeted, the response rate achieved is in keeping with those obtained by other researchers who have studied similar organizational phenomena. In order to detect possible problems related to non-response error or bias, we draw a comparison between early respondents and late respondents within each population (Armstrong & Overton, 1977). The data obtained were divided into thirds within each population according to the number of working days gone by between the initial mailing to the firm and the reception of the questionnaire. The T-tests between the first and last third revealed no statistically significant differences ($p < 0.05$) in the mail responses for the constructs used. Hence, on an overall basis, non-response bias does not appear to be a problem in our study.

Measurements.- Most of the constructs were operationalised using 7-point Likert scales. Size (control variable) was measured from the neperian logarithm of the number of employees. On the other hand, the entry strategy was obtained from the combination of two variables referring to the time (month) during which a firm is involved in some environmental practice and the type of certification obtained. This research instrument was vetted by a group of university-based management researchers and industry experts, and then pre-tested among a group of eight managers of firms affected by the IPPC law.

Data analysis.- We followed a process of different steps (Hair et al., 1995) in order to model structural equations. Two first steps focused on the development of a model from the literature review and the exploratory research, as well as on the creation of a causal relations diagram. They had been already developed previously. Next, in third step we turned the path diagram in a set of structural relations. In fourth phase, we chosed the type of input matrix and we estimated the proposed model. With this aim, we used LISREL 8.5 program. We also used maximum likelihood (ML) with robust estimators (Satorra & Bentler, 1994) as method of estimation of the parameters, since the assumption of multivariate normal distribution was violated and the measurements of some variables were not continuous. In order to use that method our input matrix was the asymptotic variance-covariance matrix.

FINDINGS

Qualitative study

The results obtained in the qualitative study show that, in general, when firms adopt a proactive environmental management, this has a net positive effect on environmental performance (P1). If firms additionally adopt a pioneering entry strategy, they achieve a series of advantages (not shared by the rest of firms) related to firm capabilities and environmental conditions and generate or boost certain environmental resources and capabilities. The latter have a positive influence on the achievement or improvement of the competitive advantage in differentiation (P2b, P3b) and in terms of costs (P2a, P3a). For instance, being able to anticipate the regulations as well as the competitors are some of the capabilities that have become reinforced through the adoption of a pioneering strategy (P4). There is no doubt, though, that one of the resources most highly valued by firms is environmental reputation, not only before the customer, but also before the rest of stakeholders. This resource partly derives from the improved environmental performance (P5), which gives firms more leeway to develop their activity (P6). Finally, managers recognise that the improvement in environmental performance impacts positively on the achievement of a competitive advantage both in costs (P7a) and in differentiation (P7b), which in turn has a positive influence on the improvement in economic performance (P8a, P8b). We show the conceptual model and all these propositions in Figure 1.

Quantitative study

Structural equation modelling

Measurement model.- LISREL 8.5 was used (1) to evaluate convergent (Appendix A, Tables A1 and A2) and discriminant validity (Appendix A, Table A3), and concept reliability (Appendix A, Table A4); (2) to perform a confirmatory factor analysis meant to verify the validity of the causal concept configuration (dimensionality) proposed; and (3) to test the propositions formulated (Jöreskog & Sorbom, 1993). Scale unidimensionality tests were performed, and the results indicated that the scales were unidimensional, representing a single factor for each set of cogeneric items (Anderson & Gerbing, 1988). Following a conservative strategy, we did not change any factors or covariance paths to create the revised measurement model.

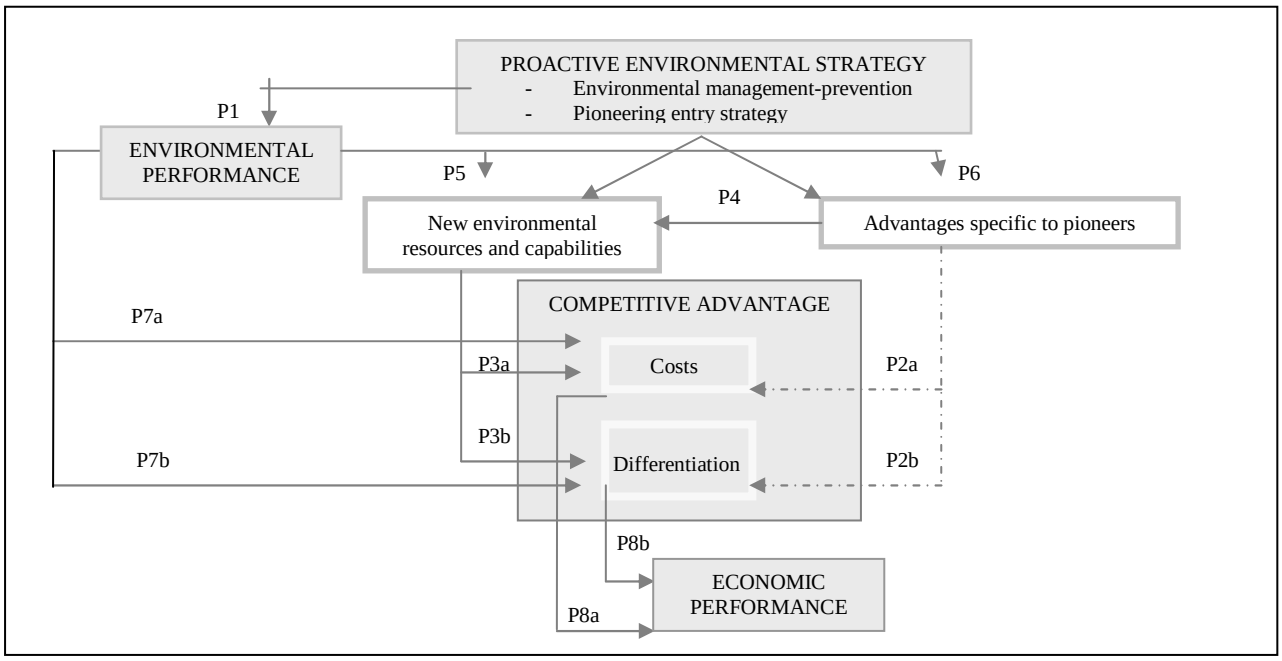

Figure 1 - Conceptual model and propositioned relationships

Structural model.- We added the observed independent variables (environmental management, entry strategy, new environmental resources and capabilities, pioneers' environmental advantages, competitive advantage in differentiation, competitive advantage in costs and economic performance) and the dependent variable (size) to the revised measurement model so as to create the full structural model using LISREL 8.5, ML. The full structural model produced a strong data fit (Appendix B, Table B1). The estimated standardised path coefficients between endogenous and exogenous variables are illustrated in Table 2.

Table 2 - Relationships between endogenous variables

MODEL	COEFFICIENTS (T-VALUE)	Reliability of structural equations (R^2)
SIZE* → ENTRS	0.33 (5.00)	0.108
ENTRS → EM**	0.37 (3.53)	0.177
SIZE→ EM	ns	
ENTRS → ENP	0.29 (4.36)	0.253
EM → ENP	0.31 (4.86)	
SIZE → ENP	ns	
ENP → NERAC	0.22 (3.33)	0.858
EM → NERAC	0.35 (5.44)	
ENTRS → NERAC	0.20 (4.09)	
ADVANTPION →NERAC	0.38 (3.98)	
EM → ADVANTPION	0.34 (5.43)	0.530
ENTRS → ADVANTPION	0.24 (3.53)	
ENP → ADVANTPION	0.35 (4.62)	
EM → CAC	ns	0.416
ENP → CAC	0.20 (2.32)	
NERAC → CAC	ns	
ADVANTPION → CAC	ns	
EM→ CAD	ns	0.530
ENP → CAD	ns	
NERAC → CAD	0.63 (2.81)	
ADVANTPION → CAD	ns	
EM → ECP	ns	0.545
ENP → ECP	ns	
NERAC → ECP	ns	
ADVANTPION → ECP	ns	
CAC → ECP	0.33 (4.78)	
CAD → ECP	0.23 (3.43)	
SIZE → ECP	ns	

* Control variable

** We have created added-variables of the indicators measurement model to reduce the number of parameters to be estimated and weakening the complexity of the structural model. EM, ENP, NERAC, ADVANTPION, CAC, CAD and ECP variables have been introduced in the model as a latent factor which is measured through a indicator resulting of the sum of all the indicators used in the measurement of each one of variables (Gribbons and Hocevar, 1998; Landis et al., 2000). Furthermore, since we had known the composite reliability of the different scales, we have calculated the measurement error variance of each one of these factors, which have been considered a fixed value in the model. In this way, we have borne in mind the existence of the measurement error in the valuations.

NOTE: ns = not significant at the 0.05 level. T values above 2.576 are significant at the 0.01 level.

Discussion

Based on the model structured and the data sampled, the adoption of preventive environmental practices has significantly contributed to reduce the impact that business activity generates on the natural environment. Judge & Douglas (1998) and Chan (2005) also suggest in their studies that the adoption of environmental strategies results in higher environmental performance.

Moreover, the adoption of an environmental proactive pioneering strategy has had a significant positive influence on the development of environmental resources and capabilities that have favoured the achievement of competitive advantages in differentiation. Dean & Brown (1995) told in their study that the presence of the advanced anti-pollution equipment and eco-friendly production system will, in turn, provide firms with more opportunities to enhance their internal routines, and eventually lead to deepened environmental knowledge and improved competence in addressing environmental issues, which reinforced the image of the firm in the market.

The firms which adopted an environmental proactive pioneering strategy have obtained significant advantages related to firm capabilities and environmental conditions. However, the repercussion of these advantages on the competitive advantage in costs and differentiation has not been relevant. The following justification can be found after a more in-depth analysis of the model. The achievement of pioneering advantages linked to firm capabilities and environmental conditions has a significant, positive influence on the development of new environmental resources and capabilities. Besides, these resources cause a strong impact on the competitive advantage in differentiation, which is why even if it does not happen in a direct way, it could indirectly be considered that the advantages typical of pioneers have affected the competitive advantage in differentiation. One of the advantages of pioneers that is most appreciated by firms has been the development of an environmental reputation, not only before the customer but also before the rest of stakeholders. This advantage has given them more leeway to develop their activity. Furthermore, this external recognition has helped to provide incentives for the members of firms to integrate themselves into the process of learning the environmental practices corresponding to their specific areas. In this field, some of the capabilities identified by managers have been the expansion of knowledge and the ability to continuously innovate and improve. Nevertheless, their indirect influence with respect to the competitive advantage in cost would have been non-significant anyway. In other words, the firms which adopt and develop their environmental management at an early stage obtain a number of advantages that can have a positive impact on aspects such as the improvement in process efficiency or various organizational aspects. However, these advantages do not have a direct influence on the competitive advantage in costs. Therefore, it would be of interest to study the way in which the firm benefits from the achievement of these advantages.

Another important idea is that the improvement in environmental performance helps to reinforce the development of new environmental resources and capabilities and to achieve pioneering advantages. Moreover, the link between environmental performance and competitive advantage is positive, but only significant in terms of cost. It was also shown in Sharma and Vredenburg´s study (1998). They demonstrated that the improvement in environmental performance will eventually lead to various competitive benefits for firms related to costs saving in disposal, transport, recycling, raw materials and energy. So, in the face of diminishing opportunities to develop value generating capabilities in today´s highly dynamic and competitive marketplace (Hart, 1995), protection of environment may represent one of the few alternatives available to sustain organizational growth.

Finally, the link between competitive advantage and economic performance has been positive and significant. Findings in Banerjee´s study (2001) are very similar. Both studies indicate that the improvement of environmental performance exerts a direct and positive influence on financial performance, which is attributed to the consequent reduction in production costs, and the improvement in process and product innovation through various corporate actions for ecologically sustainable development. Moreover, the green marketing will lead to enhanced goodwill, and consequently, higher sales (Russo & Fouts, 1997; Sharma & Vredenburg, 1998). In other words, if the firm can improve its environmental performance through pioneering and proactive environmental strategy adoption, its corporate image will be enhanced correspondingly. This improved corporate image will also be likely to result in higher levels of sales (Chan, 2005).

We have finally examined the kind of link existing in the direct relationships between environmental performance and competitive advantages, environmental strategy and economic performance; environmental performance and economic performance; the new environmental resources and capabilities and economic performance; and the advantages typically associated with pioneers and economic performance. All these relationships turned out to be non-significant and it shows the need to formulate the model from the environmental strategy– environmental performance – competitive advantage –economic performance.

CONCLUSION

Throughout this paper, we have mainly tried to clarify the relationship existing between environmental management and economic performance through the incorporation of the main limitations and the most relevant contributions made from various fields of study (type, measurement and partial or isolated treatment of some variables).

The research was carried out using a mixed method research design in two phases: qualitative and quantitative. In the qualitative phase, the findings drawn from the exploratory study led to the formulation of propositions in which we highlighted the link between environmental strategy and business performance for the examination of the interrelations of these dimensions. During the quantitative phase, we tested these propositions. The findings show that a direct successive link exists between the degree of proactivity of the environmental strategy, environmental performance, competitive advantage and economic performance.

Finally, we would like to refer to some limitations and suggest some possible lines of research for the future. This study relies heavily on self-reported measurements provided by firm managers. This is a methodological weakness shared with many other research works dedicated to environmental issues. Nevertheless, future studies could add confidence in the results reported here by replicating this study with more direct objective measurements of theoretical constructs. Our findings are possibly limited to the sectors analysed in the Spanish context but the authors are currently engaged in replicating and extending the study to other European countries. Future studies may also extend the research to other industries in which environmental interpretations might differ from those found in the IPPC law sector.

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Appendix A

Table A1 - Standardised parameter estimates for the indicators of the eight latent variables in the model

	Standardised parameter		Standardised parameter
Environmental management λ_{Y11}	0.80	Advantages specific to pioneers λ_{Y14}	0.76
Environmental management λ_{Y21}	0.78	Advantages specific to pioneers λ_{Y24}	0.60
Environmental management λ_{Y31}	0.65	Advantages specific to pioneers λ_{Y34}	0.82
Environmental management λ_{Y41}	0.84	Advantages specific to pioneers λ_{Y44}	0.91
Environmental management λ_{Y51}	0.69	Advantages specific to pioneers λ_{Y54}	0.67
Environmental management λ_{Y61}	0.70	Competitive advantage in differentiation λ_{Y15}	0.65
Environmental performance λ_{Y12}	0.86	Competitive advantage in differentiation λ_{Y25}	0.82
Environmental performance λ_{Y22}	0.82	Competitive advantage in differentiation λ_{Y35}	0.60
Environmental performance λ_{Y32}	0.84	Competitive advantage in differentiation λ_{Y45}	0.74
Environmental performance λ_{Y42}	0.82	Competitive advantage in costs λ_{Y16}	0.83
Environmental performance λ_{Y52}	0.76	Competitive advantage in costs λ_{Y26}	0.71
Environmental performance λ_{Y62}	0.80	Competitive advantage in costs λ_{Y36}	0.80
New environmental resources and capabilities λ_{Y13}	0.66	Economic performance λ_{Y17}	0.88
New environmental resources and capabilities λ_{Y23}	0.72	Economic performance λ_{Y27}	0.90
New environmental resources and capabilities λ_{Y33}	0.77	Economic performance λ_{Y37}	0.90
New environmental resources and capabilities λ_{Y43}	0.86		
New environmental resources and capabilities λ_{Y53}	0.75		
New environmental resources and capabilities λ_{Y63}			

*Items that do not have information have not been considered in the model (for the analyzed sector) like measurement indicators, because they did not fulfill the requirements necessary to comprise of the measurement instrument. It confirms the necessity to validate the scales for each analyzed sample.

Table A2 - LISREL fit indices

	χ^2 *Satorra-Bentler (g.l) / p-value*	*GFI*	*Standardised RMR*	*BBNFI*	*BBNNFI*	*AGFI*	*NC* (χ^2*/g.l)*
EM	10.13 (7) / 0.181	0.98	0.028	0.98	0.98	0.94	1.45
ENP	13.41 (8) / 0.099	0.96	0.025	0.97	0.97	0.90	1.68
NERAC	7.10 (4) / 0.130	0.99	0.021	0.98	0.98	0.95	1.77
ADVANTPION	3.84 (3) / 0.279	0.99	0.025	0.99	0.99	0.95	1.28
CAD	3.02 (2) / 0.221	0.99	0.02	0.98	0.98	0.95	1.51
CAC	0 (1) / 1	1	0	1	1	1	--
ECP	0 (1) / 1	1	0	1	1	1	--

Table A3 - Discriminant validity

	F1emorg	F2emorg	F3emorg	F4emtec	F5emtec	F6emtec	enp	nerac	pion	cad	cac	ecp
F1emorg	**0.920**											
F2emorg	.533**	**0.757**										
F3emorg	.618**	.553**	**0.794**									
F4emtec	.516**	.549**	.654**	**0.640**								
F5emtec	.534**	.336**	.582**	.542**	**0.660**							
F6emtec	.568**	.393**	.542**	.615**	.641**	**0.861**						
enp	.652**	.418**	.623**	.563**	.579**	.611**	**0.926**					
nerac	.810**	.702**	.730**	.589**	.639**	.655**	.728**	**0.868**				
pion	.619**	.481**	.585**	.515**	.518**	.483**	.606**	.645**	**0.870**			
cad	.539**	.379**	.606**	.555**	.622**	.615**	.659**	.628**	.615**	**0.800**		
cac	.602**	.292**	.613**	.551**	.646**	.635**	.717**	.623**	.522**	.672**	**0.820**	
ecp	.512**	.300**	.586**	.515**	.581**	.619**	.683**	.612**	.520**	.723**	.752**	**0.961**

*significant correlation at a 0.05 level (bilateral)
** significant correlation at a 0.01 level (bilateral)

Table A4 - Single and composite reliability

	Single	Composite		Single	Composite
Environmental management λ_{Y11}	0.64	0.88	Advantages specific to pioneers λ_{Y14}	0.58	0.87
Environmental management λ_{Y21}	0.61		Advantages specific to pioneers λ_{Y24}	0.37	
Environmental management λ_{Y31}	0.42		Advantages specific to pioneers λ_{Y34}	0.67	
Environmental management λ_{Y41}	0.71		Advantages specific to pioneers λ_{Y44}	0.83	
Environmental management λ_{Y51}	0.48		Advantages specific to pioneers λ_{Y54}	0.45	
Environmental management λ_{Y61}	0.48		Competitive advantage in differentiation λ_{Y15}	0.43	0.80
Environmental performance λ_{Y12}	0.74	0.92	Competitive advantage in differentiation λ_{Y25}	0.67	
Environmental performance λ_{Y22}	0.67		Competitive advantage in differentiation λ_{Y35}	0.36	
Environmental performance λ_{Y32}	0.70		Competitive advantage in differentiation λ_{Y45}	0.55	
Environmental performance λ_{Y42}	0.67		Competitive advantage in costs λ_{Y16}	0.69	0.82
Environmental performance λ_{Y52}	0.58		Competitive advantage in costs λ_{Y26}	0.50	
Environmental performance λ_{Y62}	0.64		Competitive advantage in costs λ_{Y36}	0.63	
New environmental resources and capabilities λ_{Y13}	0.43	0.86	Economic performance λ_{Y17}	0.77	0.95
New environmental resources and capabilities λ_{Y23}	0.52		Economic performance λ_{Y27}	0.92	
New environmental resources and capabilities λ_{Y33}	0.60		Economic performance λ_{Y37}	0.93	
New environmental resources and capabilities λ_{Y43}	0.74				
New environmental resources and capabilities λ_{Y53}	0.57				
New environmental resources and capabilities λ_{Y63}					

*Items that do not have information have not been considered in the model (for the analyzed sector) like measurement indicators, because they did not fulfill the requirements necessary to comprise of the measurement instrument. It confirms the necessity to validate the scales for each analyzed sample.

Appendix B

Table B1 - LISREL Fit Indices (full model)

	χ^2 *Satorra-Bentler (g.l) / p-value*	*GFI*	*Standardised RMR*	*BBNFI*	*BBNNFI*	*AGFI*	*NC* (χ^2*/g.l)*
PES (ENTRS + EM) ➔ ENP ➔ CA ➔ ECP	62.241 (55) / 0.234	0.954	0.034	0.951	0.982	0.912	1.13