Identifying Variables Affecting the Proactive Environmental Orientation of Firms: An Empirical Study

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Abstract

Environmental proactivity is actually a key aspect concerning business strategy and corporate positioning, and generates both tangible and intangible benefits. In this paper, the effect of agents' pressures, firms' objectives, firms' actions, and management concerns about the environmental proactive performances of companies are studied. An empirical analysis of a sample of 135 Spanish companies shows that managerial concern about environmental aspects positively influences the environmental orientation of the firm while the perception of environmental managerial obstacles and Government influence in environmental issues are highly influential in reducing the odds of being environmentally oriented.

Introduction

Even though it seems to be commonly accepted that proactive environmental strategies are related to higher economic performance [1], the question that still arises is: Why are only some firms environmentally oriented? What is our main objective in this paper? What attitudes, characteristics and decisions should firms act on if they want to improve their environmental orientation in an effective way?

Economic growth and environmental aspects are interrelated variables [2, 3] and, although the industrial sector has been considered as that most directly responsible for environmental degradation, this influence has been minimized in the last decade, thanks to rising environmental concerns and the implementation of laws and regulations by governments to control pollution [4-8]. These regulation changes have led firms to change their attitude in imple-

menting their environmental strategies, from that of environmental response to environmental proactivity [9-11].

Actually, sustainable development-related aspects, such as environmental attitude, eco-innovation, or environmental management, are considered key variables at a strategic level [12]. So, understanding which variables push companies to be more environmentally proactive becomes crucial [13].

In recent years, some authors also have studied the combination of resource-based theory (RBV) [14] with the adoption of environmental strategies, analyzing the relationship between environmental strategies, and the development of a company's specific environmental capabilities [1, 4, 14, 15].

In the same line of study but influenced by the seminal works of Banerjee [9, 16], some studies have been developed to try to identify which factors affect the environmental orientation adopted by companies, such as those of González-Benito and González-Benito [10]

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studying internal factors such as size, the firm's internationalization level, the firm's position in the value chain, and the managers' attitudes; Mitchell et al. [17], focusing on the influence of corporate and marketing strategies; Peiro-Signes et al. [18] analyzing the technological industry's characteristics; Burciu et al. [19], Chappin et al.[20] or Kranjac et al. [21] discussing the influence of environmental policies; or Cainelli et al. [22], Becker et al. [23], and Abbaspour et al. [12], who developed research regarding the influence that firms' strategies, managers' practices, and stakeholders' attitudes have on environmental attitudes.

In the situation of economic crisis, where companies have to accurately decide which decisions to implement, the question that arises is whether or not we know what may be affecting the environmental orientation of firms. What are the odds of changing the environmental orientation of firms we act on one or another of these previously studied factors?

So, with the objective of analyzing which company actions are susceptible to changing the environmental orientation of companies, we set our research questions:

RQ1 – Do firms' internal environmental actions affect their environmental proactivity?

RQ2 – Do managers' implications affect firms' environmental proactivity?

RQ3 – Do related-agent pressures affect the environmental proactivity of firms?

RQ4 – Does a company's willingness to achieve its objectives affect its environmental orientation?

Regarding Research Question 1

Although several studies have analyzed different factors influencing the environmental orientation of firms, there are still some different approaches regarding the effect of a firm's internal actions and their implications on a firm's proactivity. Actions that have been considered as internal actions when evaluating environmental assessment are information provision [24], the development of pollution prevention technologies [25], and training [26]. Several authors have studied the relation between internal actions and a more proactive pollution preventive attitude [27]. Results have shown that higher accomplishment of the regulatory structure is achieved when investing in internal information, training, or in reducing waste but, in general, this did not mean a better overall performance and, although such investment has been found to reinforce the absorptive capacity of firms (as defined by Cohen and Levinthal [28]), there still is a research gap in understanding how these actions may affect the proactive orientation of firms.

This leads to the following hypotheses:

H1:   Environmental information actions improve firms' environmental orientations.

H2:   Environmental pollution preventive actions improve firms' environmental orientations.

H3:   Environmental training actions improve firms' environmental orientations.

Regarding Research Question 2

There is academic consensus regarding the importance of managerial environmental implications in better firm performance [11, 29]. Moreover, until now the odds of changing the proactive orientation of firms, with regard to management concerns or awareness, have not been deeply studied, leading us to propose these hypotheses:

H4:   Management concerns improve firms' environmental orientations.

H5:   Management's previous negative environment awareness affects firms' environmental orientations.

H6:   Environmental management systems improve firms' environmental orientations.

H7:   Technology management systems improve firms' environmental orientations.

Regarding Research Question 3

When studying the influence that internal, external, primary, and secondary stakeholders have on determining a company's environmental proactivity, González-Benito and González-Benito [10] found it to be a key factor, while other authors, such as Buysse and Verbeke [30], did not find a relationship between environmental proactivity and the higher pressure of external primary stakeholders, confirming Murillo-Luna et al. [31] findings regarding stakeholders' pressure, that is that it may differ depending on the particular type of stakeholder. In order to confirm the general statement that stakeholder pressure improves firms' environmental orientations when studying industrial heterogeneous companies, the hypotheses we want to check are:

H8:   Related actors' (such as business associations, technology institutes (RTO), value chains to which companies belong, competitors, and employees) actions affect firms' environmental orientations.

H9:   Government actions affect firms' environmental orientations.

H10: Stakeholder pressure improves firms' environmental orientations.

Regarding Research Question 4

On a Spanish level, Aragón-Correa et al. [32] found that in the automotive repair sector, the economic performance of companies with more proactive practices improved. In the work performed by Martín-Tapia et al. [33], the food industry was studied and a correlation between advanced environmental strategies and the export level of small and medium enterprises (SMEs) was determined. There is a need to analyze the actual inclusion of environmental proactivity, in the global strategy of organizations, as a differentiating element, and hence the creator of competitive advantages, by analyzing the extent to which environmental factors form part of the business strategy. Related to these implications, we state the following hypotheses:

H11: New market opportunities (the search for) improve firms' environmental orientations.

H12: Economic benefits (the search for) improve firms' environmental orientations.

H13: Avoiding penalties (the intention to) improves firms' environmental orientations.

Experimental Procedures

Sample and Data Collection

A total of 135 industrial companies (23 with more than 250 employees, 32 with 50-250 employees and 80 with less than 50 employees) were surveyed and their managers/directors interviewed. The information collected includes the companies' managers/directors' assessments of the effects of the implementation of environmental measures and the integration of environmental proactivity on business strategy. The study was conducted on companies located in the Valencia region (Spain), all of them engaged in industrial activities.

The interviews were conducted in person following a guided structure, including a questionnaire consisting of a total of 42 questions. Before its final use, the questionnaire was subjected to a test to verify and discuss the appropriateness of the issues. The interviews were conducted with directors or managers of companies personally and questions were rated using a Likert scale of five levels so that the answers could be analyzed using quantitative methods.

Quantitative Methodology

A two-step cluster analysis [34, 35] was run to identify homogeneous subgroups of cases in which we intend to both minimize within-group variation and maximize between-group variation. Two-step clustering is chosen when categorical variables with three or more levels are involved and it creates pre-clusters, then it clusters the pre-clusters using hierarchical methods [36]. In order to determine which characteristics determine the environmental proactivity of the firms, questions were grouped according to theoretical implications: agents' implications, firm goals, firm actions and firm management.

For each group, a factor analysis (Varimax method) was run to uncover the latent structure of each set of questions and, finally, a binary logistic regression was used to predict the environmental orientation of a firm (dependent variable) on the basis of independent variables extracted beforehand and to determine the effect size of the independent variables on the dependent. The suitability of this technique is derived from the nature of the dependent (dichotomic) variable, being the underlying regression model referred to in equation (1):

$$Z = B_0 + B_1F_1 + B_2F_2 + \ldots + B_{13}F_{13} + e \quad (1)$$

...where B are the estimated coefficients, e is a normally distributed error term [37], and Z is the dependent variable,

environmental orientation of the firm, that is the dichotomic variable that assumes a value 1 if the environmental orientation of the company is high or medium and 0 if it is low or not oriented. The model was adjusted according to the maximum likelihood method.

In order to classify firms according to their environmental proactivity, we analyzed the following items (the variable's order in the questionnaire in brackets):

1) My company identifies environmental issues as an opportunity to innovate and improve (V27).
2) My company uses environmental management and prevention systems (V28).
3) My company responds to environmental obligations and makes decisions to meet current regulations (V29).
4) In my company it is hard to adopt the necessary measures and there is no commitment to the environment (V30).
5) In my company environmental concern is a threat that hinders performance (V31).

Results

Considering that the five variables discriminate between firms with high/medium environmental orientation and those with low/no environmental orientation, a clustering technique was applied. A two-step algorithm determined the number of clusters automatically as two. In order to identify which cases where classified into each cluster, a one-way ANOVA [38] was carried out.

The one-way ANOVA found significant differences between the results for each cluster in all the variables considered. This shows that firms belonging to Cluster 1 are more environmentally oriented than firms in Cluster 0, as they see environmental issues as an opportunity to innovate and to improve instead of as a threat, they apply environmental management systems and they accomplish environmental regulation. In addition, there is company commitment to environmental issues and diligence in taking the necessary environmentally related actions. Table 1 provides details of the items, means, and standard deviations.

Therefore, as the two groups evaluated showed significant differences in their environmental orientation, we renamed the groups as high/medium environmental orientation and low/no environmental orientation, according to the statistical descriptors of each group for the classification variables considered. It can be seen that firms in Cluster 1 (high/medium environmental orientation) achieved higher marks in questions V28, V29, and V30, but lower marks in questions V31 and V32.

In order to summarize the original information on factors for prospective purposes [39] a principal component analysis was carried out, in order to minimize the problem of multiple measurements or similar constructs by identifying the latent variables. In our study, the former 92 variables were synthesized into 17 factors classified by firms' actions, management implications, agents' implications, and firms' objectives, as shown in Tables 2-5.

Table 1. ANOVA'S test comparing two cluster results.

		Number of cases	Mean	Std. Desviation	F	Sig.
V28	1	78	3.77	0.925	89.172	0.000
	0	54	1.96	1.273		
	Total	132	3.03	1.398		
V29	1	78	4.36	0.755	94.031	0.000
	0	54	2.52	1.411		
	Total	132	3.61	1.402		
V30	1	78	4.68	0.570	37.736	0.000
	0	54	3.80	1.071		
	Total	132	4.32	0.919		
V31	1	78	0.47	0.639	122.093	0.000
	0	54	2.35	1.291		
	Total	132	1.24	1.331		
V32	1	78	0.38	0.608	78.060	0.000
	0	54	1.94	1.379		
	Total	132	1.02	1.257		

All statistical analyses were carried out using SPSS for Windows, version 18.0. Barlett's test of sphericity was calculated with the Kaiser-Meyer-Olkin statistic, to verify the suitability of the analysis. These factors were subjected to Varimax rotation, which reduced the moderate factor loadings and increased those loadings that were already high, providing clear factor loadings.

Following Hair et al. [38], loadings above 0.6 were considered 'high' and those below 0.4 'low'. Then, in any

Table 2. Factor loadings of variables related to a firm's actions.

	Factor loadings		
	F1	F2	F3
V15	0.466	*0.600*	-0.016
V16	0.121	*0.785*	0.134
V17	0.229	*0.748*	0.188
V18	0.186	0.085	*0.826*
V19	-0.125	0.517	*0.519*
V20	0.498	0.238	*0.607*
V21	*0.639*	0.415	0.008
V22	*0.528*	0.043	0.313
V23	*0.813*	0.230	-0.007
V24	*0.827*	0.046	0.343

73.86% variance explained -KMO 0.765- Sig 0.000

Table 3. Factor loadings of variables related to management implications.

	Factor loadings			
	F4	F5	F6	F7
V44	-0.317	*0.771*	0.253	0.093
V45	0.012	*0.799*	0.067	-0.041
V46	-0.097	*0.789*	-0.152	0.022
V47	-0.030	*0.729*	-0.260	-0.001
V48	0.197	*0.756*	-0.083	-0.085
V88	*0.800*	-0.097	0.272	0.103
V89	*0.901*	-0.057	0.162	0.076
V90	*0.730*	0.095	0.093	0.091
V91	*0.879*	-0.069	0.215	0.107
V92	*0.758*	-0.042	0.275	0.311
V74	*0.667*	-0.047	0.110	0.432
V13	0.184	-0.142	*0.837*	0.159
V25	0.270	0.013	*0.799*	-0.048
V26	0.328	-0.095	*0.838*	0.189
V75	0.170	-0.094	0.016	*0.865*
V76	0.317	0.101	0.212	*0.708*

71.59% variance explained -KMO 0.821- Sig 0.000

event, factor loadings were interpreted in the light of theory, setting up the cut-off levels as shown in the tables (bold numbers). Therefore, interpreting factor loadings from the results of the Varimax rotation allowed the labeling factors as shown in Table 6.

Factor scores were extracted to be used as variables in subsequent modeling. Table 7 shows the values of the logit regression coefficients (B) with their significance levels, standard error (SE), the odds ratio (Exp(B)), the chi-square for the model, and the percentage of correct prediction. To evaluate the suitability of the model tested, chi-square was analyzed for the set of variables included in the equation. The log-likelihood ratio test produced a chi-square value of 93.314 with 13 degrees of freedom (p=0.000), indicating that these variables are useful in classifying the firms and that the model has high explanatory power. Also, the chi-square test of goodness of fit is considered more robust than the traditional chi-square test [39], particularly if continuous covariates are in the model or the sample size is small or shows non-significance, indicating that the model prediction is not significantly different from the observed values.

Discussion of Results

According to the logistic regression results, managers' concerns, environmental management systems, stakeholders' and administration influence on and commitment to

Table 4. Factor loadings of variables related to agents' implications.

	Factor loadings		
	F8	F9	F10
V32+V49	0.113	0.205	*0.763*
V33+V50	0.199	0.210	*0.811*
V34+V51	0.315	0.193	*0.639*
V35+V52	0.142	*0.875*	0.311
V36+V53	0.169	*0.898*	0.291
V37+V54	0.217	*0.820*	0.173
V38+V55	*0.661*	0.467	0.007
V39+V56	*0.604*	0.507	0.174
V40+V57	0.438	0.273	*0.533*
V41+V58	*0.776*	0.166	0.220
V42+V59	*0.740*	0.083	0.430
V43 +V60	*0.836*	0.082	0.262

71.029% variance explained -KMO 0.851- Sig 0.000

environmental issues, and economic benefits are expected to be variables positively and significantly related to the environmental proactivity of firms, while managerial obstacles in facing environmental activities and government actions are highly negatively related. Therefore, the data support H4: management concerns improve firms' environmental orientations, H6: environmental management systems improve firms' environmental orientations, H10: stakeholder pressure improves firms' environmental orientations, and H12: economic benefits (the search for) improve firms' environmental orientations, and also clarifies that when managers consider sustainability as an issue to be aware of, the proactivity orientation of the firm is inversely related and that government regulations also are considered by firms to produce negative effects (H5: management's previous negative environmental awareness affects firms' environmental orientations and H9: government actions affect firms' environmental orientations).

The impact of predictor variables is usually explained in terms of odds ratios. The odds ratio is the factor by which the independent variable increases or, if negative, decreases the log odds of the dependent. For instance, the model shows that when the factor value of managers' concerns increases by one unit, the odds that the dependent is equal to 1, that is the probability of being classified as a medium or high environmentally oriented company, increases by a factor of 3.4, when other variables are controlled. In other words, as factor scores have a mean of 0 and a standard deviation of 1, if the score for managers' concerns for the firm is one standard deviation over the mean for the entire population, the probability of being environmentally oriented increases by more than three fold.

The results then show that managerial concern about environmental aspects, the aim for economic benefits in the long and short terms, the implications stakeholders, and the implementation of EMS positively influence the environmental orientation of the firm, while the perception of managerial obstacles to the firm's environmental development and high perception by companies of administration influence in environmental issues are highly influential in reducing the odds of being environmentally oriented.

The rest of the variables (extracted factors) evaluated do not have a significant impact on the odds of being environmentally oriented.

Therefore, none of the hypotheses related to firms' actions could be confirmed (H1: environmental information actions improve firms' environmental orientations, H2: environmental saving actions improve firms' environmental orientations, and H3: environmental training actions improve firms' environmental orientations).

The results also show that technology management systems do not affect the firm's environmental orientation, so H7 is not confirmed.

The data results also show that business associations, technology institutes (RTO), the value chain to which the company belongs (related industries, suppliers and clients), and competitors and employees' actions do not affect firms' environmental orientations, so H8 also cannot be demonstrated.

With respect to H11 and H13, the results appear to indicate that neither the search for new market opportunities (H11) nor the possibility of avoiding penalties can improve firms' environmental orientations.

Table 5. Factor loadings of variables related to firms' objectives.

	Factor loadings		
	F11	F12	F13
V61	0.495	*0.662*	-0.052
V62	0.327	*0.745*	0.048
V63	*0.600*	0.456	0.231
V64	*0.627*	0.514	0.065
V65	*0.746*	0.431	0.057
V66	*0.684*	0.509	0.018
V67	0.260	*0.849*	0.009
V68	0.175	*0.884*	0.076
V69	0.096	0.039	*0.983*
V70	*0.881*	0.228	-0.017
V71	*0.770*	0.188	0.179
V72	*0.872*	0.280	0.063
V73	*0.862*	0.229	0.001

75.50% variance explained -KMO 0.884- Sig 0.000

Table 6. Factors classification.

Actions	F1	Evironmental information actions
	F2	Enviromental saving actions
	F3	Environmental training actions
Management implications	F4	Managers concern
	F5	Managerial Obstacles
	F6	Environmental Management system
	F7	Technology Management system
Agent's implications	F8	Other actors
	F9	Administration
	F10	Stateholders
Objectives	F11	Market opportunities
	F12	Economic benefits
	F13	Avoid penalties

Source: self compilation

Conclusions

This approach clarifies which are the most important aspects to be considered while thinking of encouraging environmental orientation in firms. It seems that managerial concern about environmental aspects is permeating the firms' cultures, showing the importance of the firms' leaders in developing strategies.

The absence of the perception of obstacles to environmental actions and the objective of better economic results in the long and short terms evidences that environmental aspects are perceived as an opportunity for environmentally oriented firms. Also, the implementation and development of EMS is increasing the environmental proactivity of firms as the environmental aspects become integrated into everyday operations.

The negative impact on environmental orientation when high administration influences are perceived is remarkable. This might be explained by the administration focus on regulated activities during the last decade [21] that can result in the rejection of environmental issues and by the fact that proactive firms usually go ahead with administering regulations and, so, administration influence in these firms is low.

Finally, the bigger the influence of stakeholders (namely clients, stockholders and high level managers) on environmental decisions, the higher the environmental orientation of the firm, which fits with the research findings when evaluating other aspects, such as eco-innovation proactivity.

Although some aspects are not statistically significant, some conclusions can be drawn. Environmental information and training action act positively, but their influence is not enough to change environmental orientation. This might be because the information and formation do not focus on the proper aspects or persons and so they lose effectiveness.

On the other hand, environmental actions, such as energy or water saving, are influential in an unexpected way, having a negative impact on environmental orientation. As these aspects are highly influenced by economic interests, companies may take actions in energy and water saving regardless of the environmental orientation of the firm. The signs of the technology management systems and market opportunity variables are as expected but with no significant influence, which might be because few companies have already integrated environmental aspects into their innovation processes and because firms are not yet sufficiently convinced of the impact of environmental issues on firms' competitiveness.

Therefore, this study highlights the importance of managers' implications and visions in the proactivity attitude toward sustainability and the need to be open to change in the way of doing things through the implementation of EMS and in the way of thinking, seeing environmental aspects as an opportunity and not as a threat that will result in economic benefits in the short and long terms.

Our study also displays that, nowadays, public policy does not influence environmental proactivity, neither by promoting environmental actions nor with the threat of penalties imposed by environmental regulations. Maybe public policies have not focused on making managers realize the necessity of an environmental approach on all business levels and in product life cycles, from design to the end a product's life, to ensure competitiveness and, therefore, the firm's future and revenues. Our findings highlight that

Table 7. Logit regression coefficients.

	B	Standard Error	Exp(B)
F1	0.415	0.500	1.514
F2	-0.644	0.434	0.525
F3	0.553	0.381	1.739
F4	**1.226****	0.519	**3.407**
F5	**-1.787*****	0.486	**0.167**
F6	**0.663***	0.381	1.941
F7	0.227	0.361	1.255
F8	-0.309	0.442	0.734
F9	**-0.754***	0.393	**0.471**
F10	**0.873****	0.444	**2.395**
F11	0.563	0.526	1.756
F12	**0.915****	0.410	**2.496**
F13	-0.033	0.306	0.967
Constant	*1.066*	*0.340*	*2.902*

Value of the coefficients of the variable,$*p<0.1$, $**p<0.05$, $***p<0.01$.
Chi-square model = 93.314*** (13 d.o.f), Hosmer and Lemeshow chi-square test=8.966 (8 d.o.f, sig. 0.345)
Percentage correctly predicted= 87.1%, N=132

the cultural change needed to reach sustainable orientation in companies must be driven and promoted by high-level managers and that, at the same time, some kind of formal organization in relation to environmental aspects (like EMS) is needed to achieve this change.

Then, government policy makers must emphasize to directors the relevance of environmental issues as a driver of marketplace competitiveness and that it is essential to develop public support programs that aim correctly toward the aspects that have been proved to be more effective and efficient in increasing firms' environmental orientations. EMS promotion and an adequate information and training program are needed to avoid the threats and to review the opportunities of and the necessity for an environmental approach to business to assure competitiveness in the future.

Finally, some of the limitations of this article should be overcome with further research. First, our research should be improved by analyzing economic performance variables to see if there is any influence and to determine the proactivity orientation of the firms studied. This research should be seen as a first attempt to understand which variables are involved in the environmental orientation of industrial firms, but there are still many other variables to focus on, such as the relations between proactivity and eco-innovative activity.

Acknowledgements

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