

ENVIRONMENTAL MANAGEMENT AND STRATEGIC POSITIONING OF SPANISH MANUFACTURING INDUSTRIES



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This work is based on data collected from a survey of environmental managers in 277 Spanish manufacturing industries with the objective of analysing the attitudes of companies towards the environment. The analysis determined the main indicators of these companies' environmental strategy and classified them into strategic clusters according to the accumulative or progressive scale suggested theoretically in the existing economic literature. Copyright © 2004 John Wiley & Sons, Ltd and ERP Environment.

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INTRODUCTION

Strategic management is concerned with laying down the course of action to take in order to achieve a set objective in the long term, taking into account the milieu in which it finds itself. Since topics related to the natural environment are fundamental in this situation, strategic management cannot avoid taking it into consideration and studying it. The adoption of specific policies and measures related to the environment is clearly insufficient in many cases and needs to be integrated into company strategy. (Hutchinson, 1996; Hoffman, 2000).

First of all, the environment often influences the profitability of a specific economic activity in a decisive way, which will in turn condition corporate strategic decisions. Likewise, competitive strategies should strive to integrate the environment to discover new threats and opportunities and to combine them conveniently with company strengths and weaknesses in this matter. Doing so, a company would be able to achieve sustained competitive advantages (Buzzelli, 1991; Hart, 1995; Roome, 1992; Shrivastava, 1995). In this sense, success will be conditioned by the company potential to develop certain environmental capacities. These do not have to be uniformly



distributed among the companies in the sector and must be hard to imitate.

ENVIRONMENTAL STRATEGIC OPTIONS

While the stances usually adopted by companies in the field of strategic management have been classified according to well known methods (Miles and Snow, 1978; Porter, 1985), no existing typology of environmental strategies has been widely accepted. However, it is possible to find a large number of classifications in the literature. Recently Kolk and Mauser (2002) compiled these models and analysed their main strengths and weaknesses. The most relevant ones from the theoretical point of view and the options which each of them raises will be mentioned in a schematic way, and grouped in two categories, according to their nature (Hass, 1996): models based on generic positioning and models based on a continuous perspective.

Models based on generic positioning

Environmental positioning of companies will be classified in categories without considering progression from one into another. Table 1 includes models that start with two variables and two possible values to create a matrix where the four combinations determine different generic positioning. The main difference between them derives from the fact that Steger (1993) opted for including external variables in his analysis, Hass (1996) chose internal variables and Vastag *et al.* (1996) and Rodríguez and Ricart (1998) decided to use a combination of the two.

Models based on a progressive or continuous perspective

In all classifications included under this heading, companies are positioned along a scale according to their attitudes or response to specific environmental issues. Classification

proposals differ basically in two matters: the evaluation criteria used and the number of stages resulting from the scale of progression. Among these are the works of Hunt and Auster (1990), Greeno (1991), Ford (1992), Roome (1992), Schot (1992), Newman (1993) and Berry and Rondinelli (1998), whose characteristics are shown in Table 2.

Since the object of this study was to know the degree of commitment to the environment of Spanish manufacturing industries, rather than to determine how this issue was used as a competitive weapon, models based on a progressive perspective were considered. However, it was predicted that operational difficulties would arise in allocating companies to specific clusters in linear continuum models (Kolk and Mauser, 2002). Therefore, it will be assumed there are two types of company cluster at the extremes: one cluster characterized by being less committed to the environment, the other formed by companies highly ranked in this matter. Between them there may be several clusters that adopt intermediate positions, characterized by specific values adopted in each variable considered. It is foreseeable that, with time, organizations pursue a logical or incremental approach to environmental management (Berry and Rondinelli, 1998), but this does not have to be the case in all situations (Ghobadian *et al.*, 1998).

SAMPLE, MEASURES AND DESCRIPTIVE ANALYSIS

A questionnaire was sent to companies chosen from *Duns 50.000 Principal Spanish Companies – 2001*, a directory of companies with a minimum annual turnover of 2 million €. After a random sampling stratified by industrial activity was carried out, 2120 were selected from the 15 087 existing manufacturing companies. The questionnaire was filled out by managers in charge of environmental issues. The data collected resulted in 277 valid surveys with a $\pm 5.95\%$ sampling error and a 95% reliability level.



Table 1. Strategic options based on generic positioning

Steger (1993) Market opportunities through environmental protection	Big	Offensive	Innovator
	Small	Indifferent	Defensive
		Low	High
Environmental risks			
Hass (1996) Implementation of environmental actions	Successful	System scarcely developed and successful implementation	Developed system and successful implementation
	Difficult	System scarcely developed and difficult implementation	Developed system and difficult implementation
		Not developed	Developed
Structure of the environmental managing system			
Vastag <i>et al.</i> (1996) Endogenous environmental risks	Big	Proactive	Strategic
	Small	Reactive	Prevention of crisis
		Small	Big
Exogenous environmental risks			
Rodríguez and Ricart (1998) Stakeholders' requirements and needs	High	Real competitive disadvantage	Real competitive advantage
	Low	Potential competitive disadvantage	Potential competitive advantage
		Low	High
Environmental capacities			

As stated earlier, models with a progressive perspective were used to measure corporate environmental strategies. Thus, the indicators and definitions from various studies (Henriques and Sadorsky, 1999; Álvarez *et al.*, 2001; Aragón, 1998; Rivera and Molero, 2001) were adapted to draw up a list of 12 variables included in the questionnaire. These variables ranged from one to five, where one meant absence of present or future actions regarding environmental issues and five implied the maximum.

The variables tried to assess the following matters: top management participation in corporate environmental actions (*top_manag*); importance given to environmental management in strategic planning (*strat_planning*); employee training in environmental matters (*training*); availability of specialists in environmental matters with decision taking power (*specialization*); hiring external consulting services for environmental decision taking and belonging to business associations that promote collective environmental actions

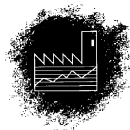


Table 2. Strategic options based on a progression/continuum

Author						
Hunt and Auster (1990)	Criteria	<ul style="list-style-type: none"> Degree to which the programme reduces environmental risk. Company commitment: importance conceded to the environment, resources dedicated and support from top managers. Design of environmental action programmes: objectives, integration within the company, reports to top managers, information systems, relation with legal advice, public relations, product design and process design. 				
	Stages/positions	Beginner	Fire fighter citizen	Concerned	Pragmatist	Proactivist
Greeno (1991)	Criteria	<ul style="list-style-type: none"> Main purpose: solution of immediate problems, coordination of efforts to carry out obligations and to solve common problems, progressive management of risks and opportunities. Main motivations: elimination of burdensome cost, efficient use of resources, protection of internal resources and of the environment. Vulnerability: surprising outcomes with a real impact, more attention given to fulfil actual obligations than future responsibilities. 				
	Stages/positions	Problem-solving	Managing for compliance		Managing for assurance	
Ford (1992)	Criteria	<ul style="list-style-type: none"> Priority given to the environment in a strategic context. Consideration given to deep changes derived from environmental management. Anticipation or reaction with regard to normative and requisites demanded by the consumers. 				
	Stages/positions	Inactive	Reactive	Proactive	Hyperactive	
Roome (1992)	Criteria	<ul style="list-style-type: none"> Fulfilling legal demands and response to social pressures. Consideration of environmental management. 				
	Stages/positions	Non-compliance	Compliance plus	Compliance	Commercial and environmental excellence	Leading edge
Schot (1992)	Criteria	<ul style="list-style-type: none"> Attitude and response to environmental laws. Support to environmental policies and their implementation given by top managers. Ways of approaching environmental problems. 				
	Stages/positions	Dependent		Defensive	Offensive	Innovative
		Niche				
Newman (1993)	Criteria	<ul style="list-style-type: none"> Perspective of the risk. Perspective of the opportunities. 				
	Stages/positions	Reactive		Proactive	Innovative	
Berry and Rondinelli (1998)	Criteria	<ul style="list-style-type: none"> Fulfilling legal demands. Waste minimization and pollution prevention. Demand-side management. Product stewardship. Full-cost (environmental) accounting. 				
	Stages/positions	Unprepared (crisis mode)		Reactive (Cost mode)	Proactive (Sustainable business mode)	



(*advising*); releasing information on the environmental reality of the company to be used in the decision taking process (*info_int*) and for external information purposes (*info_ext*); recycling activities (*recycling*); control of pollution produced by the company (*cont_pol*); insurance coverage for possible environmental damages (*insurance*); considering environmental impact in the product designing and production stages (energy and raw materials consumption, emissions and waste caused in manufacturing as well as in product distribution and consumption) (*lca*, life cycle analysis) and, finally, including natural environmental aspects in the quality improvement programmes developed by the company (*quality*).

Table 3 shows the mean values of all these variables. No indicator corresponded to a totally generalized or refused practice. According to the results emission control was the aspect most considered by the companies, and public information on the companies' environmental reality the least considered.

Using these 12 variables a factor analysis was carried out in order to sum up the original data with the least possible loss of information and to discover the existence of certain underlying factors that would summarize the companies' main environmental actions. Four factors identified explained 72% of the total variance, and can be interpreted according to the variable loadings (Table 4).

Table 3. Mean values of environmental actions

Variable	Mean	Variable	Mean
Top managers' participation	3.55	External information	2.35
Environment in strategic planning	3.24	Recycling	3.59
Staff training	2.81	Control of emissions	3.85
Specialized personnel	3.00	Insurance	3.06
Exterior consulting	3.06	Life cycle analysis	3.25
Internal information	3.04	Environment in quality programmes	3.18

Table 4. Factor analysis

Variables	Components				Communalities
	1. Env_principles	2. Knowledge	3. Correction	4. Prevention	
<i>Top_manag</i>	0.783	0.218	0.286	0.164	0.770
<i>Strat_planning</i>	0.806	0.248	0.079	0.279	0.795
<i>Training</i>	0.531	0.526	0.142	0.226	0.630
<i>Specialization</i>	0.435	0.627	0.286	0.104	0.675
<i>Advising</i>	0.130	0.841	0.193	0.078	0.767
<i>Info_int</i>	0.371	0.641	0.126	0.407	0.730
<i>Info_ext</i>	0.132	0.544	0.097	0.635	0.726
<i>Recycling</i>	0.436	0.056	0.673	0.069	0.651
<i>Cont_pol</i>	0.230	0.162	0.752	0.202	0.685
<i>Insurance</i>	0.067	0.301	0.730	0.253	0.693
<i>LCA</i>	0.244	0.031	0.351	0.783	0.797
<i>Quality</i>	0.465	0.320	0.235	0.588	0.720

Method of rotation: normalization varimax with Kaiser. The rotation converged after seven iterations.



In the case of the first factor, the most relevant variables were *top_manag* and *strat_planning*. These variables represent the company environmental commitment in the long run and are an implicit acknowledgement of its importance in their business management. This second factor we will call *env_principles* (environmental principles).

The second factor described is mainly influenced by the variables *advising*, *info_int* and *specialization*. The three variables refer to the company concern for knowing its situation with respect to the environment by generating precise external or internal information and hiring specialized staff. For these reasons it has been called the *knowledge* factor.

The third factor, according to the analysis, receives especially high loadings for *cont_pol*, *insurance* and *recycling*. These results coincide with those put forward by Aragón (1998) when he detected the existence of a factor characterized by the adoption of corrective environmental measures (end of pipe) rather than preventive measures. This factor will be referred to as *correction*.

Finally, the fourth and last factor is chiefly represented by the variables *lca*, *info_ext* and *quality*. Again, as in the work by Aragón (1998), there seems to be a factor that indicates the adoption of preventive measures (first and third variables cited), to which we could add concern for keeping the external agents informed. This can also be interpreted as a preventive measure against these agents' possible actions in case they were not duly informed. Therefore, this factor was called *prevention*.

As can be seen, there is a variable with little or no influence on any of the above-mentioned factors: employees' training in environmental matters (*training*), which presents a similar influence in the *env_principles* factor (0.531) and in the *knowledge* factor (0.526). This seems logical, since allocating funds to this activity is a serious future stake in environmental matters. Besides, staff training will positively condition the generation of information for its internal use.

CORPORATE ENVIRONMENTAL POSITIONING

Using the variable loadings on the above-mentioned factors, a hierarchical cluster analysis was carried out to see whether it was possible to perceive the existence of a specific number of company clusters. Five different clusters were obtained. Then the 277 companies were classified into clusters and the factor mean value was obtained for each cluster. The resulting values were used as centres on a *k*-means cluster analysis. The final number of companies in each cluster and their mean values can be seen in Table 5.

Using the mean values presented in Table 6, the clusters can be interpreted in the following manner:

Cluster 2 includes a total of 52 companies with mean values in the 12 variables considered lower than the sample average. These companies are those that perceive the need for environmental management to a lesser degree,

Table 5. Centres and sizes of the business clusters

Factor	Cluster				
	1	2	3	4	5
<i>Env_principles</i>	0.78383	-1.15598	0.30131	0.09511	-0.25517
<i>Knowledge</i>	0.17385	-0.40142	-1.22333	0.70607	0.59499
<i>Correction</i>	-0.96527	-0.72268	0.59313	0.51143	0.74512
<i>Prevention</i>	-0.18197	-0.06483	0.11947	0.86808	-1.22514
Number of companies	62	52	52	69	42

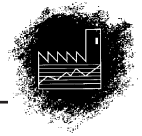


Table 6. Mean values of clusters

Variable	Cluster					Sample mean
	1	2	3	4	5	
<i>Top_manag</i>	3.89	2.21	3.79	4.13	3.45	3.55
<i>Strat_planning</i>	3.85	1.98	3.25	3.81	2.93	3.24
<i>Training</i>	3.10	1.92	2.42	3.57	2.71	2.81
<i>Specialization</i>	3.23	1.69	2.44	3.96	3.40	3.00
<i>Advising</i>	3.18	2.29	1.94	3.99	3.74	3.06
<i>Info_int</i>	3.29	2.10	2.35	4.06	3.02	3.04
<i>Info_ext</i>	2.31	1.69	1.79	3.65	1.81	2.35
<i>Recycling</i>	3.27	2.37	4.06	4.20	3.98	3.59
<i>Cont_pol</i>	3.27	2.92	4.23	4.55	4.24	3.85
<i>Insurance</i>	1.89	2.25	3.21	4.23	3.71	3.06
<i>LCA</i>	2.94	2.58	3.65	4.29	2.36	3.25
<i>Quality</i>	3.34	2.15	3.12	4.22	2.62	3.18

their resource commitment and management involvement in this matter being the minimum. Therefore, the information generated by companies regarding environmental decision taking is scarce in comparison with the rest of the clusters. Finally, the measures actually adopted to correct or prevent the effects of noxious environmental behaviour are those least developed.

Cluster 4 is formed by 69 companies and occupies the opposite position to number 2. It exceeds the sample and cluster mean value in all variables. Thus, these are the leading companies in environmental management: they take this matter into consideration in their strategic planning; top managers adopt environmental decisions; plenty of environmental information is generated and many preventive and corrective measures are adopted.

In this way, clusters 2 and 4 occupy the two extremes of a continuum where the other manufacturing companies' clusters are placed, depending on the development level reached in the variables used.

Cluster 5 is formed by 42 companies that give little importance to environmental management, even though they seem to acknowledge the need of a non-systematic intervention in specific situations that affect the company

directly. Relatively speaking, this cluster is interested in accessing information regarding the environmental reality and detecting possible risks, implementing recycling pollution control activities and taking environmental insurance, i.e., it is committed to actions that try to solve possible problems without dealing with their origin. On the other hand, the lack of a forward-looking approach in these companies in environmental matters makes the number of preventive measures taken (such as modifying the design of a product or the manufacturing process for environmental benefits) lower than average. Likewise, these companies do not regard environmental virtue as a relevant quality component valued by external agents.

In the 62 companies of cluster 1 and in the 52 of cluster 3 it can be seen that the environment is regarded as quite a relevant matter, which demands consideration at strategic levels and human and economic effort, and implies taking preventive rather than only corrective measures. In cluster 3 informative activities are clearly inferior to the average, while corrective measures are close to the environmental leaders. With the variables used, these two clusters present a more confusing and difficult to define attitude towards the environment.



In spite of the conclusions reached in other studies (Aragón, 1998; Reichert *et al.*, 2000), no statistically significant relations were found between the size of the companies and the environmental strategies in the clusters created. However, the average sales turnover of leading environmental companies was clearly superior to that of the companies that lagged behind in environmental issues (40.3 compared with 12.6 million €), and the same thing happened with the number of employees (161 compared with 98). The size of the companies in other clusters was between these values.

Regarding industrial sectors, it is worth noting that the number of environmental leading companies in the chemical and oil refining industries was clearly higher than what it would correspond to statistically (40 and 67% respectively compared with 25%). Also, in the publishing and textile manufacturing industries the number of reactive environmental companies was higher than expected (36 and 67% compared with 19%).

CONCLUSIONS

A company's attitude regarding the environment is an important element in its relative positioning. The position can be determined on the basis of the proactivity reached in environmental commitment, which will determine a progressive scale that starts with companies that adopt a reactive stance and progresses to companies in the leading position of environmental management in their sector. This type of business classification, unlike others based on generic positioning, permits one to know what place a specific company occupies and check whether it is in accordance with its desired environmental positioning.

This paper is based on the Spanish manufacturing industry with the objective of classifying its environmental strategies empirically. The variables used were characterized by means of a factor analysis, which indicated the

importance top management gave the environment, how it influenced corporate planning in the long run, the interest in having information about the company environmental situation and the corrective and preventive measures adopted. Defining all these factors allows for a simplification of the problem of environmental management because it limits the main corporate environmental policies. This way, leading companies are characterized by getting higher scores in the four identified factors. In this respect it must be pointed out that the adoption of preventive measures by some companies does not necessarily imply abandoning corrective or end of pipe measures; on the contrary, these companies are the ones that, to a greater degree, try to repair the damage caused. Obviously, it was observed how the adoption of preventive measures implied having to adopt fewer corrective measures in the specific reality of each company.

Different strategic clusters were specified on a hierarchical order based on their environmental strategies. Translating the results of this empirical analysis to the theoretical classifications of corporate environmental strategies as they appear in the literature is a complicated task. However, the selection of variables used allows companies to be placed on a continuum that goes from a reactive or slightly interested attitude to a proactive and leading position concerning the environment. As found in other studies carried out in Spain (Álvarez *et al.*, 2001; Aragón, 1998) the clusters found were of a similar size and did not show extreme attitudes, as happened, for instance, in the case of Canadian companies, according to Henriques and Sadorsky (1999).

The empirical work carried out allows understanding of how the Spanish manufacturing industry is dealing with environmental matters in a generic sense. In addition, the proposed methodology can be used by the companies themselves to find out their environmental positions and evaluate them. This information will be especially useful in



comparing the specific position of a company with respect to its closest competitors. Future research will determine the effective advantages derived from the different positions, which would be valuable in the management decision-taking process.

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