

The Environmental Industry in Asturias, Spain

Jesús Ángel del Brío
Beatriz Junquera

Environmental degradation has become one of the most controversial subjects in Europe. Restrictive laws now regulate the environmental impacts of business activities. The European Union recognizes that the position of European industry in the world market will depend on the challenges of both competitiveness and environmental considerations (Ruesga and Durán, 1995). Nevertheless, environmental regulations have made it more difficult for businesses to compete. This has encouraged the development of new organizations that offer environmental goods and services. These enterprises provide expertise to help businesses identify and manage their environmental impacts, comply with laws, and gain competitive advantages through management of environmental impacts.

This new environmental industry has great opportunities. Its markets are growing very quickly and its prospects are good. (Baselga, 1990; Grau, 1990; Huidobro, 1990; Isla, 1990; Panizo, 1990; Ruesga and Durán, 1995). Because it may become a sector for economic growth in a great number of European regions, the characteristics of the environmental industry are an interesting subject of study. This article considers the situation in the Principado of Asturias, a region on the north coast of Spain, where mining, iron, and steel industries have historically had enormous importance in the economy. In our study of the environmental industry in Asturias, undertaken in 1997, we investigated several characteristics of the firms, and learned about their competitive strategies, their levels of technological innovation, and the probable future of the sector. The growing environmental in-

dustry may be of benefit to the overall economic development of this region.

Although there have been a number of attempts to describe the environmental industry in Spain, information about its structure has focused on national and international rather than regional studies (Entrecanales, 1990; Isla, 1990; Panizo, 1990; Comisión de las Comunidades Europeas, 1990, 1997; Miró, 1990; Aranda, 1992; OECD, 1992). The Spanish environmental industry is very young—most of the firms began their activities during the 1980s. The firms are small or medium-sized. The industry is also very heterogeneous. In our study, and in keeping with earlier studies (Entrecanales, 1990; Fundación Mapfre, 1994; Hernández, 1997), we classified the firms among more internally homogenous groups according to their business activities: goods and equipment manufacturers, consultants' offices, water treatment, and waste treatment (Brío, 1997).

According to the Instituto de Fomento Regional (IFR), in 1997 there were 38 firms in Asturias that dedicated some of their activities to producing environmental goods and services. We mailed a questionnaire to the general managers of these firms. A questionnaire sent by mail has important advantages: it is flexible, affordable, and it considerably reduces the time required to obtain the information. On the down side, mailed questionnaires generally have a very low response rate, and they usually reflect more of the ideal work of the firms rather than real practices (McDaniel and Kolari, 1987). Nevertheless, a well-designed questionnaire combined with good analysis can provide important information (Rooks and Weinroth, 1993; Tomaskovic-Devey et al., 1994).

Tomaskovic-Devy et al. (1994) have established some guidelines about correct design for questionnaires. They consider the fol-

lowing components to be very important: the position of the polled individual, his/her motivation and ability, keeping the questions non-threatening, and allowing the possibility of delegating answers. In designing our questionnaire, we paid heed to these recommendations. While we addressed them to general managers, the questions could also easily be answered by other people in the firm. We asked only eight questions, and made them short and straightforward. In addition, we included a letter explaining the scarcity of data and the importance of the answers, and we promised to provide the conclusions of our work to the polled firms.

In order to achieve a high rate of response, we included return envelopes with the questionnaires. Then, we telephoned to check that the firms had received the mailings. We found that three of the businesses had disappeared, so our sample frame consisted of 35 firms. After the time period allotted for the responses, we sent another questionnaire to those firms that had not answered the first time. In total, we obtained 22 completed questionnaires, giving us a response rate of 22/35, or 62.85%. We think this is very good, especially given that the average response rate for mailed questionnaires is about 20–40% (Ortega, 1990).

Characteristics of Environmental Firms in Asturias

The questionnaire included questions concerning the type, size, ownership and geographic scope of the firms. Using the categories established by the IFR study, the 35 environmental industry firms in Asturias were divided into four groups. There were 19 consultants' offices, nine durable equipment manufacturers, four water treatment firms, and three waste treatment firms. The 22 firms that responded to our questionnaire included 12 consultants' offices, four producers of durable goods and equip-

ment, two waste treatment firms, and four water treatment firms. These proportions are similar to the findings of an earlier, nation-wide study (Ministerio de Industria, Comercio y Turismo, 1992). In both cases, consultants' offices form the biggest group. This is due in part to the fact they do not need large capital investments to get started. Also, there is a broad range of consulting services to be offered—the group includes engineering firms as well as consultancies not limited to purely environmental concerns. It is noteworthy that, in Asturias, a larger percentage of firms perform work related to building infrastructures—that is, installation of purifying plants and air filters and building of incineration ovens—than was found by the nation-wide study. We believe this is a result of the strong presence of the mining and iron industries in Asturias. These heavy industries are major consumers of pollution control equipment.

We elected to use number of workers as a measure of the size of the firms. Of the 22 firms that answered the questionnaire, 17 of them provided information about the size of their workforce. These firms are all small and medium-sized: 11 have fewer than 50 workers, four have from 50 to 75 workers, and only two have more than 75 workers. We found that most of the small firms were consultants' offices: seven of the eight that responded to this question reported 50 workers or fewer. The eighth consultants' office reported between 50 and 75 employees.

All of these data support the study by Fundación Mapfre (1994) about the environmental industry in Spain. That study showed that the environmental industry is comprised of a large number of small firms with a median of 50 workers. It also showed that some of these small firms, primarily the ones having international activity, are related to larger parent firms. This trend has been reflected in Asturias, where several such daughter firms are located. An example is the S.A.E. de Depuración de Aguas Degremont, a water treatment firm. The daughter firm in Asturias has 54 workers, while the parent firm, located in France, has 4149 workers.

Very few of the environmental firms in Asturias are active in international markets. Of the 22 firms that we studied, one of them works in a strictly local field within the province. Eight are active throughout the province. Nine operate in the wider national arena. Only three have some activities in the European Union, and just one has gone beyond Europe, into the South American market. This finding is related to the fact that the Asturias firms are small or medium in size, and have limited resources. Also, we believe Hernández (1997) is correct in saying that Spain is at a disadvantage in comparison to the northern European countries—the environmental firms in northern Europe are fairly well-established, while those in southern Europe, Spain included, are still new, and are working to adapt themselves to the needs in their regions and environments.

We did not find any notable differences among the 22 firms in terms of the relationship between geographic extent and activity category. In fact, we were surprised to find that a high number of the consultants' offices operate at a national level. Given their small size and the IFR data indicating their limited resources, we expected this group would have difficulties competing outside of Asturias. We believe this discrepancy is due to the fact that Asturian consultants' offices have a better reputation outside of their home province, an impression supported by the fact that many of them have clients in other nearby regions.

In the Asturian environmental sector, there are two types of firm ownership: public and private (Cuervo, 1994). Of the 22 firms that responded to our questionnaire, only three of them are in public ownership. The other 19 are private. These data are consistent with Hernández (1997), who found that private firms generally provide the bulk of the supply of environmental goods and services. The three publicly-owned firms are COGERSA (waste treatment), EMULSA (water treatment) and Ingenieros Asesores (consultants' office).

Factors for Success

In accordance with Porter (1982), we asked about the relative importance of several al-

ternatives for carrying out two competitive strategies: differentiation and cost leadership (Table 1). Some of the total counts in Table 1 are higher than the total number of responding firms because the respondents were allowed to select more than one option.

As shown in Table 1, the most popular alternatives for achieving differentiation are the introduction of new processes to improve the quality of products, and the introduction of new products. Hernández (1997) considers it necessary to obtain a higher level of quality in the environmental market, which was the main aim expressed by most of the firms that chose the new processes alternative. We were surprised by the generally low priority given to speed of delivery. It may be that this is simply an assumed requirement for successful competition. It is also surprising that the use of high quality raw materials received a low ranking. However, because a great number of the responding firms provide services rather than goods and equipment, we consider this result to be consistent with our expectations. Goods and equipment firms did indicate that speed of delivery, assistance with installation, repair and maintenance, and warranty are quite important.

With cost leadership as the goal, the most popular alternatives were the reduction of costs because of the experience effect, and some economies of scope. Economies of scale were considered significant by seven of the firms, and five considered it important to obtain better access to production factors. Such factors include skilled workers for consultants' offices, and infrastructure and machinery for water and waste treatment companies.

We consider the differences between the significance accorded to obtaining scale economies and scope economies to be very important. The waste treatment firms consider economy of scale to be of little significance for successful competition. This result is surprising, because we supposed that transport costs would go down with increases in volume. Economies of scope, on the other hand, are considered unim-

Table 1. Factors for success

Goal of Competitive Strategy	Alternative to Achieve Goal	Type of Firm			
		Consultants' Office (n = 12)	Goods & Equipment (n = 4)	Water Treatment (n = 4)	Waste Treatment (n = 2)
Differentiation	New Products	5	3	2	0
	New Processes	7	3	3	1
	Quality of Raw Materials	2	0	0	0
	Speed of Delivery	1	3	1	1
	Installation/Maintenance	0	2	2	0
	Warranty or Guarantee	0	3	1	0
Cost Leadership	Economy of Scale	3	2	2	0
	Experience Effect	4	3	2	1
	Economy of Scope	5	0	3	2
	Access to Factors of Production	3	2	0	0

Note: Column totals do not necessarily equal the total number of firms (n). Respondents were allowed to choose more than one alternative.

portant by the goods and equipment manufacturers, because their activities differ from firm to firm.

For each of the four business activity categories, we wanted to know the required level of technological innovation, the necessary degree of qualification for workers, and the activity's future prospects. Answers to these questions, of course, depended on the individual firm, so we left the questions open-ended. After analysing all of the responses, we found that the environmental sector in Asturias requires an intermediate to high level of technological innovation, and a high degree of qualification for its workers. This is especially true for the goods and equipment firms and the waste treatment firms, whose activities require high technology and, as a result, whose workers must be highly educated. The other activities also need a highly competent workforce, and are also active in technological innovation. For instance, water treatment workers must know chemistry, and the firms are developing new and improved techniques for treating and purifying water. They are also researching new ways to mitigate droughts in scarce rainfall zones—reverse osmosis, for example. Finally, the consultants' offices need computer-savvy workers with knowledge of law and biology, because the main innovations in this field are in adapting com-

puter applications to environmental consulting needs. While these results agree with those of Fundación Mapfre (1994), which show similarities between the environmental sector and other service sectors, it is notable that the environmental industry requires a high percentage of highly-qualified workers.

We found some differences between the firms when it came to the projected future of the environmental industry. In general, the firms think the environment is becoming increasingly important. Many of them feel the environmental industry is under-represented in Asturias. Nevertheless, they expect that, as governments become more active on this subject, new firms may enter the sector, which will grow accordingly. On the flip side, some of the firms consider the sector to be stagnant. We consider this surprising, because there are still unmet demands for environmental products and services. Given our results and observations, we anticipate a good future for the Asturian environmental sector.

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Address correspondence to Jesús Ángel del Brío González, Profesor Asociado de Organización de Empresas (Universidad de Oviedo), E.U.I.T.I. Avda. de Manuel Llaneza, núm 75, 33210, Gijón (ASTURIAS), ESPAÑA; (e-mail) delbrio@opalo.etsiig.uniovi.es.

**FOOD FOR THOUGHT:
The Efficacy of Environmental Regulation**

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- ◆ Some analysts advocate alternatives such as voluntary programs that allow for more flexibility in reaching environmental goals.
- ◆ Critics of these alternative programs attack the idea of looking to the regulated for answers—does it invite potential abuses?
- ◆ What about problems of enforcement for voluntary environmental programs?

The editors welcome articles that critically evaluate traditional modes of environmental regulation, possible alternatives and their limitations, and the implications for environmental professionals.