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Environmental Protection Expenditure for Companies: A Spanish Regional Analysis

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ABSTRACT: Environmental protection has become one of the main concerns in developed economies, which is why an increasing degree of commitment in the field is required from all public and private bodies. Environmental protection in firms must cease to be a secondary, barely profitable objective, involving the performance of sporadic remedial actions, and become just one more element of their organization which, though it may require investment, may also provide a firm with major opportunities and cost reductions. This paper looks at the latest trends in expenditure on environmental protection by industrial firms. The information available is from the Spanish National Statistical Institute (INE), provided for the Spanish regions. Then, using shift-share analysis, we will seek to ascertain whether there are competitive advantages and each region's degree of specialization in the main lines of expenditure.

Key words: Environmental protection, Spanish, Shift-share and industries

INTRODUCTION

Firms currently face a clear and growing demand from society for the environment to be protected. In this context, firms must be receptive to such demands and obligations. Any one that is not, and that has visibly negative environmental impacts, will be seriously compromising its future. The environment affects every company regardless of its size, and today it is a fact that the environment is a key requirement in achieving long-term corporate success (Burnett & Hansen, 2008).

For companies, in terms of reputation and achieving a competitive advantage, this involves assuming and internalizing a portion of social costs on their balance sheets (Porter & Kramer, 2002). But it needs to be recognized that the incorporation of environmental criteria must be from a strategic and integrating perspective (Fuentes, 2006). This factor is also considered by consumers, with a positive perception of a "socially responsible" company, making them more likely to consume its products in equal cost conditions (Bigné *et al.*, 2005).

Combating pollution, both inside and outside industrial plants and complexes, requires systematic environmental management in companies. In Spain this task requires a major assignment of technical and economic resources, in order to achieve the desirable level within the European Union. Appropriate environmental management in an industrial firm involves foreseeing contingencies associated with corporate finances as regards cleanup techniques, staff organization and company psychology (Hidalgo, 1998).

In this respect, companies have undergone a major environmental transformation, taking the form of a set of practices designed to prevent and correct the environmental impact of their activities (González & González, 2007). Thus we have gone from a reactive attitude to environmental transformation, confined to a minimal implementation of environmental practices forced upon firms by legislative requirements or the need to yield to the requirements of various pressure groups (such as public administration, environmental organizations or the media), to a proactive approach, as has been highlighted by numerous studies (González & González, 2007; Hunt & Auster, 1990; Winsemius & Guntram, 1992; Aragon, 1998; Buysse & Verbeke, 2003).

On one hand, environmental practices may entail savings in manufacturing or distribution costs arising

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from the rational use of resources, the reduction of defects or the reuse of materials (Porter & Van der Linde, 1995). On the other, environmental practices constitute an attribute of firms' offerings that is increasingly appreciated by consumers, and so may help create a differentiated image that is attractive to the market (Reinhardt, 1998). Despite the previous spatial transformations, Spain began the early 80s with one of the best-preserved natural heritages in the Mediterranean and European areas. From a socioeconomic perspective, the 80s began with a political transition and Spain's economy embarked on a period of growth, without any strong pressure on its ecosystems and with a productive system that in many cases remained extensive (Lomas *et al.*, 2008).

In order to establish environmental objectives and goals, below we list the main impacts of industry:

- Emissions to the air
- Controlled and uncontrolled discharges
- Waste generated
- Contamination of soil
- Noise, dust and other noxious elements
- Effects on ecosystems

In this connection we may ask how Spanish firms are going to tackle this decade and the future. Spain's accession to the European Union, with the acceptance of all of its environmental regulations, and the strong pressure from society in the field, requires a huge effort to implement measures enabling firms to cater for increasing environmental requirements. The situation of Spanish industry with regard to the environment shows a certain lag relative to that in the other Member States. Solutions must necessarily be based on shared responsibilities assumed by legislators, regional authorities, industrialists, traders and, finally, end consumers.

We should keep in mind that the relationship between environmental protection, economics and employment has been interestingly addressed by the literature. Analysts and politicians seem to agree from all perspectives that there is a strong relationship between environmental protection and employment.Many studies have been conducted in the past two decades with the aim of estimating the economic and employment effects of environmental protection. These studies may be grouped into three types: (i) theoretical analyses and case studies, (ii) econometric simulations of political alternatives, and (iii) empirical studies, with estimations based on historical data (Bezdek, Wendling & DiPerna, 2008). Expenditure in the various regions in environmental matters has been studied from various viewpoints, but no useful studies have been made of expenditure in firms (Aguado & Echevarría, 2003). Finally, the concept of sustainable development has emerged to correlate the need to keep raising standards of living and that for environmental protection. In the industrial sphere, things have moved more quickly. Thus, for example, many companies use waste as fuel, and have been the first to recognize its environmental significance. There should be a direct relationship between expenditure and the environment; the trend to assign increasing amounts to environmental protection should make the environment cleaner and less polluted (Duran *et al.*, 2009).

Environmental protection from the business perspective has traditionally been associated with expenditure, costs or losses for the firm. Some studies consider two components of environmental expenditure: one arising from regulation, and a voluntary component (Johnston, 2005). The former, referred to as regulatory expenditures, constitute a significant part of environmental expenditure and include the considerable costs related to compliance with environmental legislation (Hamner & Stinson, 1995).

Voluntary environmental expenses are those incurred by a company as part of an effort to improve its corporate image or to enhance its environmental performance (examples of this are expenses incurred in making environmental studies, audits or voluntary emission reductions, implementing recycling programs, preparing annual environmental reports, or taking part in voluntary programs). Environmental management accounting represents a combined approach involving a transition of data from financial accounts, cost accounts and balance sheets so as to improve materials efficiency reduce environmental impacts and risks, and lower environmental protection costs. Such studies are conducted by private or public companies and have a financial component and also a physical one (Jasch, 2003). Management accounting constitutes a vital tool for internal management decisions, such as setting product prices, and is not regulated by law. Such an internal information system seeks to answer two questions: what are the production costs of the firms' various products, and what should those products' sale price be? The main figures concerned in cost accounting are various managerial post holders (e.g. executives, product and production managers).

The concern for environmental protection is steadily increasingly, as is the interest in environmental accounting (Beets & Souther, 1999; Deegan, 2002; Gray, Kouhy & Lavers, 1995; Mathews, 1997). The business community's response has been to gather more information about environmental activities for the interested parties.

MATERIALS & METHODS

This study is intended to make a specific but potentially useful examination of the trends in projections of future expenditure for reducing environmental impacts, like other similar studies in the literature (Cormier & Magnan, 1999, Cormier *et al.*, 2005; Patten, 2005), but by focusing on the case of the Spanish regions, according to the EU-regulated subdivisions set out in the Nomenclature of Territorial Units for Statistics (NUTS-II).

If we consider the three main expenditure items (from a total of 19) in the environmental protection expenditure survey (Spanish Statistical Institute, 2010), expressed in millions of Euros, representing 63% of total expenditure, we can see how the items have undergone growth from 20% in current expenditures up to more than 50% in equipment, highlighting the importance that companies accord to environmental protection (Fig. 1).

The trend for the last three years according to the available data reveals that one region has undergone a truly notable increase in investment: the Balearic Islands have seen corporate expenditure on environmental protection increase fourfold.

Moreover five Spanish regions (Aragón, Asturias, Cantabria, Castilla y León y La Rioja) saw such investment double in recent years.

On the negative side, such investment in the Basque Country was similar to that in the last period analyzed, while the Canary Islands and the Region of Murcia saw an appreciable decrease in firms' expenditure on environmental protection.

To further study industries' capacity for investment in the environmental field along with the spatial distribution thereof, we opted to make a shift-share analysis, a technique used in regional statistical analysis and which allows the effects associated with the different structure of the Spanish regions to be quantified (Vargas *et al.*, 2009).

Shift-share analysis was developed by Dunn (1960) as a method for calculating the components that explain the variations in economic magnitudes. According to Dunn (1960), "the essential component in this statistical technique is to calculate geographical changes in the evolution of the economy".

If K_{ij} is used to denote the initial expected capital corresponding to measure i $(i=1,\ldots,s)$ for the county j $(j=1,\ldots,r)$ in the initial instance and K'_{ij} the capital committed in this measure and county in the final instance, then the variation recorded (degree of financial implementation) may be expressed by the following equation (Mayor and López, 2005):

$$K'_{ij} - K_{ij} = \Delta K_{ij} = K_{ij}\gamma + K_{ij}(\gamma_i - \gamma) + K_{ij}(\gamma_{ij} - \gamma_i)$$

where:

$$\gamma = \frac{\Sigma_i^s = 1 \Sigma_j^r = 1 (K'_{ij} - K_{ij})}{\Sigma_i^s = 1 \Sigma_j^r = 1 K_{ij}}$$

$$\gamma_i = \frac{\Sigma_i^{\gamma} = 1 (K'_{ij} - K_{ij})}{\Sigma_i^{\gamma} = 1 K_{ij}}$$

$$\gamma_{ij} = \frac{K'_{ij} - K_{ij}}{K_{ij}}$$

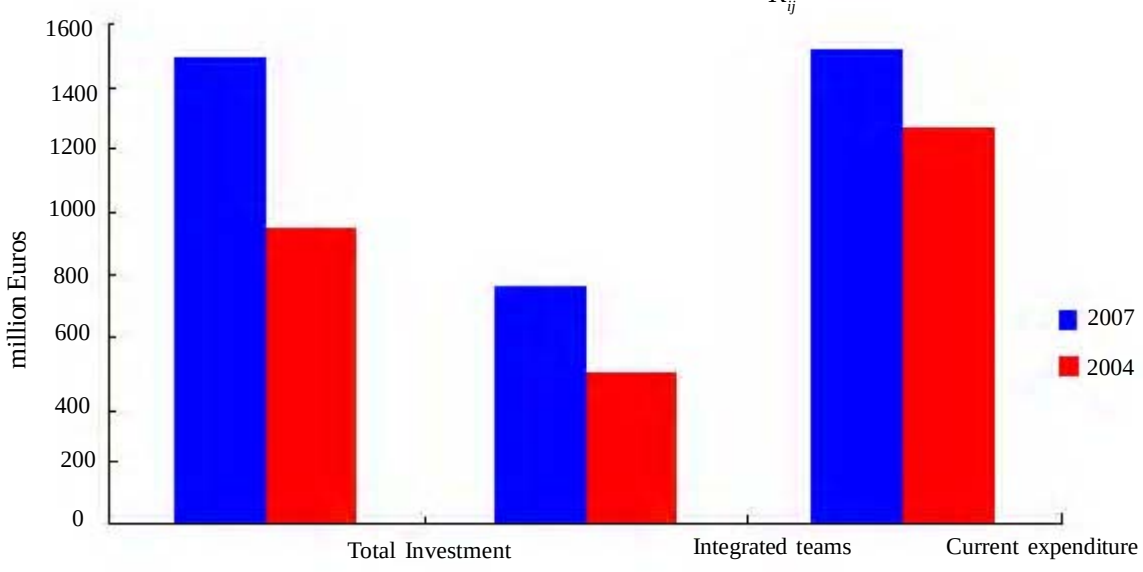

Fig. 1. Survey of business spending on environmental protection in Spain

and the three addends into which the global variation of the magnitude under study may be broken down receive the names:

Global Effect $EG_{ij} = K_{ij}r$

Structural Effect $EE_{ij} = K_{ij}(r_i - r)$

Competitive Effect $EC_{ij} = K_{ij}(r_{ij} - r)$

Using this technique we will obtain the overall effect and the competitive effect, normally called net effect, showing a region's particular dynamism relative to the national level in each expenditure item, and therefore forming a measure of the region's "success" in investment in environmental protection.

RESULTS & DISCUSSION

Environmental practices are a source of competitive advantages, and taking a proactive position in the field involves going beyond the functional areas comprising a company and integrating environmental criteria into the definition of corporate competitive strategy (Barnejee, 2001) and generating diverse motivations (Bansal & Roth, 2000). The classic dichotomy between cost strategy and differentiation strategy serves to identify two generic sources of competitive advantage potentially associated with environmental pro-activity.

Orsato (2006) classifies environmental strategies in two dimensions: on one hand, an emphasis on lower costs over differentiation. On the other, an emphasis on organizational processes over a stress on product and service design. By calculating the effects of the classic shift-share model and aggregating them by region, we will obtain an estimate of overall and competitive effects, set out in Table 1.A proper interpretation of the data requires a detailed analysis of overall and competitive effects: thus the competitive effect has a negative value in nine of the seventeen Spanish regions. For its part, the structural effect –smaller than the competitive one in many regions– has a more heterogeneous result by region, not allowing behavior patterns to be inferred, though it is positive in all cases. The data show an especially notable overall effect –in excess of two hundred million Euros– in the region of Catalonia, highlighting the importance of this measure of investment in environmental protection Fig. 2.

Finally, if we group the regions according to whether they show competitive advantages or not, and also to whether they are specialized or not, we obtain a double-entry table (Alavi & Yasin, 2000), for each measure of environmental protection (Tables 2 to 4). in which we see the position of each region in the various measures (independent equipment and facilities over integrated protection equipment), classified by specialization and the existence of location advantages.

Table 1. Results by region of Shift-share analysis

Region	Global E.	Competitive E.
Andalucía	92.626.326	-40.345.821
Aragón	23.597.348	53.599.823
Asturias	35.797.151	78.686.102
Baleares	3.047.559	22.440.006
Canarias	16.675.885	-28.507.765
Cantabria	10.144.824	25.494.493
Castilla-León	65.651.636	14.023.392
Castilla-La Mancha	32.663.574	-11.506.711
Cataluña	206.216.152	-127.602.886
Comunidad Valenciana	76.200.808	-27.470.837
Extremadura	5.158.100	1.174.980
Galicia	52.719.404	109.847.108
Madrid	46.098.310	-5.731.404
Murcia	25.732.739	-26.157.198
Navarra	20.824.470	-8.754.114
País Vasco	70.439.602	-38.536.759
Rioja	5.946.426	9.347.591

Table 2. Advantage over specialization in independent equipment and facilities

		Location advantage	
		Positive	**Negative**
Specialization	**Positive**	Aragón Asturias Cantabria	Canarias Castilla-La Mancha Comunidad Valenciana Galicia Murcia La Rioja
	Negative	Baleares Castilla y León Extremadura	Andalucía Cataluña Madrid Navarra País Vasco

Tabla 3. Advantage over specialization in integrated equipment

		Location advantage	
		Positive	**Negative**
Specialization	**Positive**	Baleares	Andalucía Castilla y León Extremadura País Vasco
	Negative	Aragón Canarias Cantabria Galicia Navarra La Rioja	Asturias Castilla-La Mancha Cataluña Comunidad Valenciana Madrid Murcia

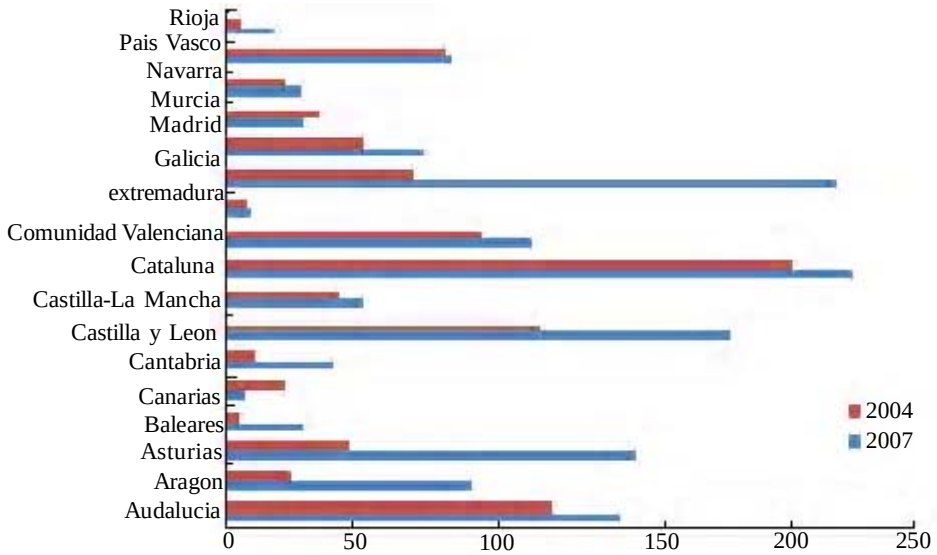

Fig. 2. Total investment in Spain region (Millions of Euros)

Table 4. Advantage over specialization in current expenditures

		Location advantage	
		Positive	**Negative**
Specialization	**Positive**	Aragón Cantabria Madrid País Vasco La Rioja	Cataluña Navarra
	Negative	Baleares Castilla-La Mancha Comunidad Valenciana Extremadura	Andalucía Asturias Canarias Castilla y León Galicia Murcia

CONCLUSION

The challenge for firms in the environmental field is to anticipate changes and identify the opportunities that they involve, and to act in line with this approach. To this end, they may act with their own resources or apply for State grants for environmental investment projects or fiscal subsidies, etc., and use other economic instruments that may arise from environmental needs themselves. In this context, firms should be receptive to these demands and obligations. Those which are not, and which harm the environment, are seriously compromising their future.

With the results obtained, we may observe a growing awareness, highlighting industries' commitment to respect for the environment, which has ceased to be a secondary factor and become a primary one that is part of most corporate operating strategies. We also see that the bigger the company, the more consideration there is for the environment.In this connection the relative importance for the regions of investment in environmental protection becomes clear: in 14 of the 17 regions, the increase experienced is positive. With regard to the uneven distribution of investment, it is true that the starting levels were not taken into account and the data used were not weighted (for example, by population), though the information used does allows us to broadly map profiles by region. This is one of the future lines of research arising from our study.To complete this overview, the application of shift-share analysis allows us to break down environmental investment into various effects:

- General effect, associated with the dynamism of firms as regards respect for the environment, as an average of the aggregates by region and line of expenditure
- Competitive effect, a reflection of differences in the attraction of investment in each region relative to the countrywide total

Finally, we should note that the analysis made in this study is based on 2007 data, relative to data for 2004. This information may be updated, or a more thorough analysis may be made, taking account of previous or later years, for we believe that the adaptation of many firms in the environmental sphere to EU directives may represent a sharp spur for investment in these environmental lines, which will doubtless provide more favorable scenarios and allow Spain to truly converge with other EU countries in the environmental field. This is another future line of research arising from our study.

REFERENCES

Aguado, I. and Echevarría, C. (2003). Medio ambiente & desarrollo sostenible en España. Boletín económico de ICE, **2786,** 21-30.

Alavi, J. and Yasin, M. M. (2000). A Systematic Approach to Tourism Policy. J. Business Res., **48,** 147-156.

Aragón, J. A. (1998). Strategic Proactivity and Firm Approach to the Natural Environment. Academy of Management Journal, **41(5),** 556-567.

Bansal, P. and Roth, K. (2000). Why Companies Go Green: A Model of Ecological Responsiveness. Academy of Management Journal, **43(4),** 717-736.

Barnejee, S. B. (2001). Corporate Environmental Strategies and Actions. Management Decision, **39(1),** 36-44.

Beets, S. D. and Souther, C. C. (1999). Corporate environmental reports: the need for standards and environmental assurance service. Accounting Horizons, **13,** 129-145.

Bezdek, R. H., Wendling, R. M. and DiPerna, P. (2008). Environmental protection, the economy, and jobs: National and regional analyses. J. Environ. Management, **86,** 63-79.

Bigné, E., Chumpitaz, R., Andreu, L. and Swaen, V. (2005). Percepción de la Responsabilidad Social Corporativa: un análisis Cross-cultural. Universia Business Review, **5,** 14-27.

Burnett, R. D. and Hansen, D. R. (2008). Ecoefficiency: Defining a role for environmental cost management. Accounting, Organizations and Society, **33,** 551-581.

Buysse, K. and Verbeke, A. (2003). Proactive Environmental Strategies: A Stakeholder Management Perspective. Strategic Management Journal, **24(5),** 453-470.

Cormier, D. and Magnan, M., (1999). Corporate environmental disclosure strategies: determinants, costs and benefits. J. Accounting, Auditing & Finance, **14(3),** 429–451.

Cormier, D., Magnan, M. and Van Velthoven, B. (2005). Environmental disclosure quality: do firms respond to economic incentives,public pressures or institutional conditions?, European Accounting Review, **14(1),** 1–37.

Deegan, C. (2002). Introduction: the legitimizing effect of social and environmental disclosures – a theoretical foundation. Accounting, Auditing, and Accountability Journal, **15(3),** 282-311.

Dunn, E. (1960). A statistical and analytical technique for regional analysis. Papers of the Regional Science Association, **6,** 97-112.

Duran, D., Duran, I. and Diaconu, A. (2009). Issues on costs and investment for environmental protection. Environmental Engineering and Management Journal, **8(4),** 705-708.

Fuentes, E. (2006). La responsabilidad social corporativa. Su dimensión normativa: implicaciones para las empresas españolas. Pecvnia, **3,** 1-20.

González, O. and González, J. (2007). Enfoque de marketing & proactividad medioambiental. Mediterráneo económico, **11,** 129-146.

Gray, R., Kouhy, R., and Lavers, S. (1995). Corporate social and environmental reporting: a review of the literature and a longitudinal study of UK disclosure. Accounting, Auditing, and Accountability Journal, **8(2),** 47-77.

Hamner, B. and Stinson, C. H. (1995). Managerial accounting and environmental compliance costs. J. Cost Management, **9,** 4-10.

Hidalgo, M. C. (1998). Estrategias de las empresas españolas ante el medio ambiente y la Unión Europea. First Congreso de Ciencia Regional de Andalucía. Andalucía en el Umbral del Siglo XXI, 212-244.

Hunt, C. B. and Auster, E. P. (1990). Proactive Environmental Management: Avoiding the Toxic Trap. Sloan Management Review, **31(2),** 7-18.

Jasch, C. (2003). The use of Environmental Management Accounting (EMA) for identifying environmental costs. J.Cleaner Production, **11,** 667-676.

Johnston, D. (2005). An investigation of regulatory and voluntary environmental capital expenditures. J.Accounting and Public Policy, **24,** 175-206.

Lomas, P. L., Álvarez, S., Rodríguez, M. and Montes, C. (2008). Environmental accounting as a management tool in the Mediterranean context: The Spanish economy during the last 20 years. J. Environmental Management, **88,** 326-347.

Mathews, M. (1997). Twenty-five years of social and environmental research: is there a silver jubilee to celebrate? Accounting, Auditing, & Accountability J., **10(4),** 481-531.

Mayor, M. and López, A. J. (2005). The spatial Shift-share analysis: new developments and some findings for the Spanish case. Proceedings of the European Regional Science Association ERSA 2005, Amsterdam.

Orsato, R. J. (2006). Competitive Environmental Strategies: When Does It Pay to be Green?, California Management Review, **48(2),** 127-143.

Patten, D. (2005). The accuracy of financial report projections of future environmental capital expenditures: a research note. Accounting, Organizations and Society, **30,** 457-468.

Porter, M. E. and Kramer, M. R. (2002). The competitive advantage of Corporate Philanthropy. Harvard Business Review, **80,** 56-68.

Porter, M. E. and Van Der Linde, C. (1995). Green and Competitive. Harvard Business Review, **73(5),** 120-134.

Reinhardt, F. L. (1998). Environmental Product Differentiation: Implications for Corporate Strategy. California Management Review, **40(4),** 43-73.

Spanish Statistical Institute (2010). Survey on Company Expenditure on Environmental Protection. http://www.ine.es/en/welcome_en.htm Vargas, M., Mondéjar, J., Mondéjar, J. A. and Meseguer, M. L. (2009). European grants for investment in regional SMEs: The case of Castilla-La Mancha (Spain). International Business & Economics Res. J., **8(4),** 85-90.

Winsemius, P. and Guntram, U. (1992). Responding to the Environmental Challenge. Business Horizons, **35(2),** 12-20.