CORPORATE SOCIAL RESPONSIBILITY AND INNOVATION IN EUROPEAN COMPANIES. AN EMPIRICAL RESEARCH

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Abstract

A growing number of European corporations now realize that their corporate goals are compatible with sustainability. Each corporation must strengthen corporate governance on condition that they focus on corporate social responsibility (CSR). These may constitute a strategic instrument, focused on improving the corporate reputation and image, or be aimed at the better management of available resources, among other possibilities. The latter aspect is examined in the present study. Adopting CSR principles involves taking into account environmental, economic and social factors, from an ethical viewpoint. In this paper, we suggest that such questions should be addressed with innovation in mind. CSR practices can require investments in innovation, and we examine whether the adoption of responsibility-oriented policies constitutes a strategic decision that may explain investment in research and development. The sample obtained is made up of data from 95 European corporations examined for the period 1998-2006. We identify a relation between R&D expenditure and practices of CSR.

KEYWORDS: Corporate governance, Corporate Social Responsibility, Innovation, R&D Expenditure, Resource Based View, Strategy

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Introduction

In recent decades, the scope of corporate goals has expanded. Among other factors, this is due to the increased acceptance of the concept of sustainable development[1] in business culture. Sustainability now forms part of corporates' goals, and resources are increasingly managed in accordance with standards of social responsibility. For some, the field of sustainable development represents the greatest range of business opportunities currently available. This concept involves and promotes economic success, environmental quality and social responsibility (Hedstrom et al., 1998; Bansal, 2005). A greater recognition of a direct and inescapable relationship between sustainable development, corporate governance and corporate responsibility is also emerging, with mainstream investors showing increased interest in socially responsible business (Ingley, 2008).

Corporate governance is a system designed to ensure sustained corporate growth and development, proper decision-making on management policies based on the implementation of more efficient and better management, and the appropriate supervision, evaluation and motivation of corporate executives in the execution of their businesses (Japan Association of Corporate Executives, 2003:50). There are two requirements that must be met if a corporation is to

fulfill its social responsibility while also improving its competitive position. Each corporation has to strengthen corporate governance on condition that they focus on corporate social responsibility (CSR). Corporate governance today is regarded as a system designed to promote CSR and to ensure sustained corporate growth and development (Kurihama, 2007:111). It is important that each corporation establishes the system of corporate governance designed to ensure the implementation of CSR which function effectively regardless of the style of corporate governance structure. CSR and corporate governance are related and have acquired an important place in the hierarchy of business and society concepts (Fassin and Van Rossem, 2009).

The incorporation of CSR criteria as a value-creating element represents a change of philosophy within corporations. In the present study, we examine the concept of CSR in the sense of the kind of behaviour and ethical practices adopted by a corporation in response to market forces or legal constraints and arising from its ethical sensibility (Carroll, 1999). We understand CSR as embodying a series of processes (Wartick and Cochran, 1985) that may be studied at the organizational level (Wood, 1991), and by which corporations are responsible for outcomes related to their primary and secondary areas of involvement with society, that is, in relation to their activity and to the impact it has. The present study is

oriented towards measuring the effects of initiatives taken in the field of CSR (Carroll, 1999). We consider the adoption of CSR policies to be a cultural and philosophical change in a corporate culture, involving the introduction of ethical criteria that will have an effect on its business practices and policies.

In this case, activities, organizational structures, processes and products must be suited to the CSR philosophy, and so the implementation of CSR policies might mean that innovation is required (Castelo and Lima, 2006:121; Slowinski et al., 1997). The term innovation, in this context, refers to changes made in the technology applied. These concepts suppose strategic decisions and usually depend of the board.

The innovation carried out by firms has been studied from diverse standpoints, and may be driven by different business goals. Earlier studies have implicitly considered that investment in innovation is related to CSR (Lopez et al., 2007b; McWilliams and Siegel, 2001) but no in-depth analysis of this question has yet been made. The general domains of CSR and innovation are frequently overlapped. However, linking the overall concept of CSR with the overall concept of innovation is not easy (MacGregor and Fontradona, 2008). In this paper we aim to establish a relation between these concepts. We can find some prior studies that studies this issue from different standpoints (Pavelin and Porter, 2007; Halme and Laurila, 2008). Thus, it is a fact the importance and novelty of this issue but the nature of the relationship and its influence over competitiveness is unclear (Mackey et al., 2007; Van De Ven and Jeurissen, 2005). We think the resource-based view is an adequate approach of study of this issue. At present, many corporations are making great efforts in the field of innovation. This could be a 'blind' innovation, i.e. one seeking exclusively immediate utility and profit, in response to demand conditions, growth or with a view to controlling the market. However, for corporations which have adopted CSR strategies, the innovation developed might take CSR priorities into consideration. It is this possibility that is studied in the present paper. The present study describes an empirical implementation, in which we analyze an intangible resource, innovation, to which CSR strategies could be applied. Generally no explanation is attempted to the relation between CSR and this concept of innovation; nevertheless, we believe this aspect is highly important, and that it requires an in-depth study, as is made in the present paper.

CORPORATE SOCIAL RESPONSIBILITY AND R&D EXPENDITURE

CSR has been studied from numerous theoretical standpoints (McWilliams et al., 2006); for example, from the perspective of stakeholders, we abandon the narrow view of classical economic theory[2] and develop corporate strategies that include objectives that go beyond maximizing shareholders' returns (Freeman, 1984). CSR can also be observed in terms

of the theory of legitimation (Lindblom, 1994) or via the resource-based view (Wernerfelt, 1984). According to the latter, it is foreseeable that CSR criteria will influence boards' decisions and actions. Therefore, the concept of CSR provides a useful standpoint from which to study business decision-making. From a resource-based view, we analyze whether the adoption of a given strategy option influences the use made of resources (Castelo and Lima, 2006), referring in the present case to R&D expenditure.

The adoption of CSR practices contributes to generating opportunities of various types, and includes avoiding the threats to growth caused by operational restrictions, and achieving greater success by means of new products and new technologies (Hedstrom et al., 1998). Costs may be reduced, risks diminished, sales expanded or market share increased, by means of product innovation (Hart and Milstein, 2003) and by ensuring that customers are fully aware of CSR characteristics (McWilliams and Siegel, 2001). McWilliams and Siegel (2001), from a theoretical point of view, established that differentiation achieved via CSR may require investment in R&D. Thus, analysis of corporation innovation can be studied in the light of CSR-oriented practices. Usually the concept of innovation relates to CSR has been put special emphasis on developing new business models for solving social and environmental problems (Halme and Laurila, 2008) but the idea of innovation in this paper refers to changes in the technology applied.

R&D expenditure and CSR may be related because, according to Bansal (2005), firms must apply principles of corporate responsibility to their products, productive processes and practices that require changes in the technology applied, which may involve expenditure on R&D. The philosophy of CSR may mean that firms can evolve from the adoption of measures for self protection, in an initial stage, to redesigning their activities and implementing new technologies in subsequent phases (Bansal, 2002). The measures adopted may lead to more efficient energy use and to a reduction in the consumption of materials (Bansal, 2002). Actions taken in accordance with CSR criteria may involve changes in products, for safety reasons, or improvements in the materials utilized and the type of product, especially if they are perceived to be harmful, or in processes, for example, by reducing environmental impact, influencing safety and promoting recycling. CSR can sometimes even lead to a redirectioning of the corporation's whole lines of activity in order to adapt it to a new form of business culture. Subsequently, some firms evolve further and implement radical changes, going so far as to totally reorient their activities.

Most of previous papers on CSR in which the question of innovation has been addressed have used the case study method, analyzing the specific way in which one or more firms base their differentiation strategies on CSR policies (Bansal, 2002; Holliday, 2001; Hedstrom et al., 1998). McWilliams and Siegel

(2000), in their study based on a worldwide sample, analyzed the relation between CSR and financial performance and introduced R&D expenditure as an explicative variable. As their study was focused on performance, no explanation was attempted of the relation between CSR and R&D. Therefore, the present paper is oriented towards a study of the above relation.

The various types of innovation (Schumpeter, 1934) can be matched to four main thematic areas in CSR: the environment, employment, the community and customers (Gray et al., 1995). Research into corporate responsibility has mainly focused on the environment (Lockett et al., 2006), on analysing the information disclosed regarding environmental issues (Ingram and Frazler, 1980; Wiseman, 1982; Panapanaan et al., 2003) or on studying specific practices in the field of CSR that require innovation (Chen and Metcalf, 1980). The resources that firms devote to environmental policies are integrated into the course of their productive activities, forming part of their overall corporate strategy (Christmann, 2000). McWilliams et al. (2006) reviewed the studies that have concentrated on environmental social responsibility. From this standpoint the adoption of a sustainability-oriented perspective would have effects on innovation, mainly caused by environment-related necessities. We think that CSR strategies should be studied, in relation to R&D expenditure, in a broader sense, and not one that is limited to environmental aspects. The requirements of customers or the improvement of labour conditions can require innovations (Hart and Milstein, 2003). We think to be innovative, companies must consider the social and environmental impact of their processes, stimulate employees to be creative, and collaborate with their customers, suppliers and other business partners in designing and developing new products and services (MacGregor and Fontrodona, 2008). Innovation and CSR are complex and multidimensional concepts but the assumption of compatibility and synergy may be reasonable (Midttun, 2007). There is a necessary link between the improvements its social performance and the innovation of new technologies (Phillimore, 2001).

Most firms conceptualize CSR primarily as a tool to reduce risks and operational cost. Only a minority of firms is actually using CSR as a means to drive innovation (Hockerts and Morsing, 2008). We aim to contrast this idea. Accordingly, in this study we set out to examine, from an empirical standpoint, the relation between R&D expenditure and the adoption of CSR strategies, studying the phenomenon on the basis of European corporations. In the latter case, the disclosure of CSR practices, as recommended in guidelines of sustainability, is a relatively recent introduction, and thus the analysis of CSR is still at an embryonic stage (McWilliams et al., 2006). Hence, we shall analyse the impact of a phenomenon that is in its early years and examine the consequences of CSR on R&D during this period[3].

In principle, and in accordance with the above-cited papers, one would expect the relation between R&D expenditure and the adoption of CSR practices to be a positive one. Therefore, our first hypothesis is:

H₁: The adoption of CSR strategies by corporations has a positive influence on their R&D expenditure

Another aspect that may affect investment in R&D is that of the sector in which the corporation carried out its activities. Various studies have shown how the level of importance granted to innovation varies from one industry sector to another (Jaruzelski et al. 2005). There are industries in which R&D tends to be extensive and significant (Argyres and Silverman, 2004). Waddock and Graves (1997) commented on the existence of different levels of R&D investment in different industries. There are aspects related to the sector in question that may influence the type of research and the priority given to it, for example, the situation in the life cycle of the industry in question. In the embryonic and growth stages of the industry cycle, there is little product differentiation. In more developed industries, however, with highly differentiated products, there is likely to be greater investment in R&D in order to achieve this objective (McWilliams and Siegel, 2001).

In the present study, we propose to determine whether variations in R&D expenditure are related to the sector on which the corporation carries out its activities. This question was addressed in the form of hypothesis H₂. The sign of this relation depends on the values assigned to the sectors; because the variable is a categorical one, the sectors need to be defined.

H₂: Different industry sectors have different degrees of influence on R&D expenditure

A certain period of time is normally necessary for corporations to make plans and obtain fresh funding for new lines of research. Initially, the allocation of funds for new investment depends on the existence of surplus resources (McGuire et al., 1988; Orlitzky et al., 2003:406), or on the possibility of reallocating resources that *a priori* had been intended for other purposes. In turn, innovation policies require a period of 2-3 years for economic benefits to become apparent (Lin and Chen, 2005:159; Christmann, 2000:672). In addition, policies in the field of corporate responsibility need time to become consolidated and to bear fruit (Lee et al., 1996; Brown and Svenson, 1998; Souitaris, 2002). Therefore, in this study we examine whether a period of time must elapse before we can relate CSR practices and the innovation carried out by corporations. For this purpose, we shall examine hypothesis H₃.

H₃: A certain period of time must pass before CSR has a bearing on the innovation carried out by corporations.

In addition, we determine whether R&D investment by cororations is affected by other variables. The size of the corporation may affect its technological situation and the effort it makes with respect to innovation (Argyres and Silverman, 2004;

Coccia, 2001; Freeman and Soete, 1997). Similarly, expenditure on R&D could increase with the size of the corporation (Lin and Chen, 2005; Cohen and Levin, 1989; Cohen and Keppler, 1992).

Large corporations possess a greater volume of resources and so can dedicate greater financial resources to innovation. Such corporations, together with those operating in the most innovative sectors of the economy, are more likely to innovate (Hipp et al., 2000). Smaller companies, on the other hand, have fewer resources and more limited financing, which leads them to concentrate on applied research activities rather than basic ones, and thus they invest less in R&D. Their resources must be reserved for growth and survival (Christensen and Bower, 1996).

METHODOLOGY

We shall now discuss the sample selected, define the variables used and detail the statistical tests to be applied in this study.

Selection of the sample

This study is focused on European corporations, where the degree of disclosure of CSR strategies is fairly homogeneous, as corporations normally follow standard guidelines and indexes in drawing up their reports (Doh and Guay, 2006).

To analyse the hypotheses, we drew up a questionnaire of 20 items, grouped into two blocks. The first of these was aimed at revealing the corporate's attitude toward CSR and the second block was focused on the relation between CSR and innovation practices. The full questionnaire is provided in Annexe I[4]. Our intention with this questionnaire was to obtain data on business attitudes towards these aspects and thus contribute to explaining the results obtained from the model we propose. The items in the questionnaire were measured on a 5-point Likert scale (5 (highest) 1 (lowest), and the population was comprised of European corporations listed on the Dow Jones World Index, specifically the Dow Jones General Index (DJGI)[5]. The Dow Jones Sustainability Index (DJSI) is calculated from data on corporations that participate in the DJGI. The DJSI is made up of corporations that are leaders in sustainability practices and are among the top 10% of the firms in the DJGI.

The DJSI is a multi-dimensional construct intended to enable the measurement of CSR practices; it is based on economic, social and environmental indicators, and enjoys broad social backing. Although some studies have employed other multi-dimensional measures (McWilliams and Siegel, 2000; Wenzel and Thiewes, 1999; Griffin and Mahon, 1997; Stanwick and Stanwick, 1998), we selected the DJSI because its requirements concerning sustainability are more comprehensive[6] than those applied by other indexes of sustainability[7] (SustAinability, 2004) and are similar to those proposed in the CSR guides - the Global Reporting Initiative (GRI) and the Global Compact[8]. The DJSI includes innovation among the parameters

considered and it was initiated in 1999, on the basis of firms that had met the requirements of the index during 1998. This index is prior to that of the other indexes developed in Europe[9], thus enabling us to observe data referring to a longer period. Moreover, the DJSI takes into account the adoption of business practices based on sustainability as a strategic decision capable of influencing the corporation's profitability (Husted and Salazar, 2006).

This study covers the period 1998-2006. We sent the questionnaire to all the European corporations quoted on the DJSI and the DJGI: 113 European corporations belonging to the DJSI (these corporations follow and disclose CSR practices and observe the economic, environmental and social criteria required by the Sustainable Asset Management Group (SAM)), and 1084 European corporations included within the DJGI in the period of our study. These corporations are non-financial firms; for the firms belonging to the DJSI we examined the corporations that had been included in this index from its constitution.

We sent the questionnaire by e-mail, addressed to the Chair of the Board. The first such mailing took place in October 2006, followed later by a reminder. Reception of replies was closed at the end of March 2007. The CSR outlook of the corporations examined is supplemented with a review of the information disclosed on the subject of CSR, in the form of CSR reports or the Annual Reports. The final sample[10] was made up of 95 corporations, 42 of which form part of the DJSI, while 53 belong to the DJGI. The response rates were 37% for the DJSI corporations and 5% for DJGI corporations. The response rate for DJSI was higher than that for the DJGI corporations, which could be an indicator of the interest among the former corporations in disclosing the effort they make with respect to CSR. The response rate of the subsamples is very different, but we think the response rate for DJGI is representative of the population to the extent that the results agree to expectations.

The variables selected and techniques employed

Several studies that analyse innovation use R&D expenditure as a yardstick (Argyres and Silverman, 2004; Bublitz and Ettredge, 1989; Coff, 2003; Lee et al., 1996; Souitaris, 2002). This variable is considered appropriate because R&D expenditure reflects the corporate intentions to obtain scientific or technical knowledge in order to improve their products and processes, and thus reinforce their competitive advantage. However, the number of patents taken out is also used; this method has the advantage that it comprises an objective element (Griliches, 1990; Ernst, 2001; Haggedoorn and Cloodt, 2003)[11].

We have adopted R&D expenditure as an indicator of innovation because this measure is widely used in this type of study and because corporations, in general, publish information on their R&D expenditure. Besides, there is a correlation between R&D and the number of patents taken out[12] (Table 1).

The data on this latter parameter were taken from the international database on patents maintained by the World Intellectual Property Organization.

INSERT TABLE 1 ABOUT HERE

In our study, an initial assumption was that there are differences in adherence to CSR practices between corporations that belong to the DJSI and those that are part of the DJGI. The survey results related to CSR (items 1 to 13) in Table 2 show there are differences in the degree of commitment to CSR between DJSI and DJGI corporations. Nevertheless, in order to determine whether the classification made was appropriate, we performed a cluster analysis of the corporations that answered the questionnaire, grouping them into homogeneous sets. The k-mean non-hierarchic clustering method was applied to the CSR-related replies to the questionnaire. From the results obtained, two groups were created; one included all the DJSI firms sampled, and the other contained the other corporations sampled that belonged to the DJGI. The results of this cluster analysis confirm that the original classification of the firms was, in fact, appropriate. Thus, we shall refer to the firms in the first group as the DJSI corporations and to those in the second group as the DJGI corporations. Accordingly, the corporations examined in the present study are grouped within a dummy variable that is given a value of 1 if the corporation is part of the DJSI, and a value of 0 if it presents a lower degree of agreement with the disclosure of CSR practices (i.e. it belongs to the DJGI).

INSERT TABLE 2 ABOUT HERE

Also included in the present study is the question of the industry sector to which each corporation belongs. The activity sectors of the corporations were taken as a measure of the industry, determined by a 4-digit SIC (Lang and Lundholm, 1993; Sengupta, 1998). As control variables we took the size of the corporation, measured by its total asset value.

For the study period analysed (1998-2006), we propose a model that uses the variables shown in Table 3. R&D expenditure (R&D) is the dependent variable, while the independent variables are corporate social responsibility (CSR) and industry (IND). The total assets (ASS) is the control variable.

INSERT TABLE 3 ABOUT HERE

The proposed regression model is:
$$R\&D = b_1 + b_2 CSR + b_3 IND + b_4 ASS + e$$

RESULTS OBTAINED AND DISCUSSION

Table 4 shows the results of the regression analysis during the two periods analyzed, together with the results for the inverse regression. We believe it is necessary to examine whether the causal relationship could also be in the opposite direction, i.e., if CSR depends on R&D expenditure. As CSR is a categorical variable, a logistic regression was applied, as follows:
$$CSR = b_1 + b_2 R\&D$$

Model 1 considers the period from 1998 to 2000, while Model 2 gives the results for 2001-2006. Model 3 focuses on the relation between CSR and R&D for the entire period considered (1998-2006). Model 4 shows the inverse regression during the whole period under consideration (1998-2006).

The descriptive statistics for the period 1998-2006 are shown in Table 5.

INSERT TABLE 4 ABOUT HERE

INSERT TABLE 5 ABOUT HERE

As can be seen in Models 1 and 2 of the Table 4, after a certain time (in the period 2001-2006), R&D expenditure depends on the CSR practices implemented by the corporation ($p \leq 0.05$), and thus hypotheses H_1 and H_3 are accepted, assuming that a sufficiently long time period is allowed for CSR-oriented strategies to be put into effect as a specific practice i.e. as expenditure on R&D (Ortlitzky et al., 2003). The results show that R&D expenditure is affected positively by the adoption of CSR-oriented goals. In other words, the fact that the firm adopts CSR practices tends to be associated with greater R&D expenditure. In any case, the value of the adjusted R Square is small, which suggests that although CSR is an explicative factor of R&D expenditure, there must exist other factors of greater weight in determining investment in R&D. The model is more explanatory when the entire period is considered (1998-2006) (Model 3). These results are in accordance with those obtained in the survey (items 14 to 20), where the respondents stated that their corporate policy regarding innovation was linked to its CSR strategy. There are significant differences between the DJSI and the DJGI corporations for all the items except the last one (item 20). For the DJSI corporations, the adoption of CSR criteria led to a change in their policies on innovation (item 15), involving greater R&D expenditure (item 16) and changes in products and processes (items 17, 18 and 19). Table 2 shows the survey details and the level of significance of the difference between the scores of the DJSI and DJGI corporations.

As an initial notion, the adoption of CSR practices might be related to aspects that require stakeholders, for example, to counteract a negative impact on the environment, to improve the reputation and image of the firm or to reduce risks (Hockerts and Morsing, 2008). This was confirmed in our analysis of the survey data. The DJSI corporations tend to agree that the disclosure of CSR practices is related to stakeholders' requirements (item 8). On the contrary, the DJGI corporations presented a more neutral attitude on this question, and even some disagreement.

Nevertheless, these respondents, too, were of the opinion that the adoption of CSR practices produces added value for stakeholders (item 9).

To the extent that CSR practices become accepted as part of business culture, they will lead to changes affecting product lines, technology and even the firm's activity, which could have repercussions on the way in which financing is obtained or on the corporation's sales figures. It might be said that sustainability-oriented policies would thus become integrated into corporate management and influence the technology or innovation strategy of the business, guiding the objectives to be achieved by means of R&D. This relation between CSR practices and those of R&D, for the corporations examined, and according to Bone and Saxon (2000), could give rise to competitive advantages. This relationship is confirmed in the results obtained in the present study. The DJSI corporations are in almost total agreement that CSR strategy is a key factor in the generation of competitive advantages (item 2) while the DJGI corporations were neutral as regards this question.

Respect to the inverse regression (Model 4), it is seen that the coefficient of the R&D is null but significant ($p \leq 0.10$). These results confirm that variations in R&D expenditure by firms are related to their CSR practices, for the corporations in our study groups. These results are expected because the variables are correlated. However, a greater R&D expenditure does not seem to be a determining factor in firms' adopting CSR practices. It can be thought that the corporations of the sample are pioneers and they are engaged in CSR and R&D practices at the same time. These strategic decisions can be the corporations' way of obtaining competitive advantages. The firms of the sample carry out an important innovation effort, although we can say there are differences between DJGI and DJSI corporations. Perhaps the concern for innovation is linked to CSR because of the demands of stakeholders.

With respect to the relation between the economic sector and R&D, we see that it is negative, but not significantly so. The present study shows that the activity sector does not affect R&D expenditure; in other words, research investment is not sector-dependent in the sample considered. R&D expenditure can be found in any sector (Hipp and Grupp, 2005). The negative sign of the coefficient of the 'sector' variable could be caused by the way in which the sectors were defined. The variable in question is awarded a value of 1 to 5. A score of 1 could correspond to sectors that present intensive R&D expenditure, while one of 5 would, *a priori*, reflect less intensive expenditure in this respect.

The results from this study show that R&D expenditure does not depend on the size of the corporation. For the companies included in the present study, R&D does not depend on total asset value. In our sample, some firms implement little innovation, while others make great efforts in this respect, and these circumstances are independent of their size. In

our study, in which both asset-intensive corporations and others not presenting this structure are included, the variable 'corporation size' was not expected to have a significant effect within the model. It might be considered that, whatever the composition of the sample, there could be a relation between the innovation carried out by a firm and its asset value. In the sample, there are corporates that make heavy investments in R&D, while others spend very little on this item. The relation between asset value and R&D expenditure would exist only in certain specific sectors.

CONCLUSIONS

Changes in the cultural dimensions of corporates arising from the introduction of CSR practices require them to innovate. This study shows that there is a relation between R&D expenditure and CSR-oriented practices. Innovation may respond to diverse corporate goals and strategies, but sustainability is shown to be an explicative variable of the phenomenon. There may be other underlying factors, but we highlight the importance of CSR in explaining the effort made by corporations in the field of innovation. It could be said that the adoption of CSR practices influences investment decisions, and especially those related to R&D. The development of a culture of sustainability is made tangible as greater innovation, which subsequently gives rise to new activities, products, processes and business styles that require R&D. The results of our research let linking the overall concept of CSR with the overall concept of innovation. We have found a sample of corporations is actually using CSR as a means to drive innovation (Hockerts and Morsing, 2008). CSR practices are used as a management tool. The study results show that a group of companies, which belong to the DJSI, take CSR into account in their business strategies, and that this has a consequent effect on the management of their investment in R&D. These DJSI corporations consider CSR strategies to be a fundamental element in obtaining competitive advantages. CSR influences policies that are crucial to long term growth, including innovation. CSR, as practised by these corporations, is not just in response to stakeholders' requirements or to the aim of improving the corporate image, or to reduce risks and operational cost, but also constitutes a strategic variable for the creation of future market options or for obtaining long term benefits.

From a theorical standpoint, a relationship between CSR and resources, including innovation, has been established (Castelo and Lima, 2006). This paper contributes to this line of research through an empirical application of the resource based view. This approach allows the introduction of a dynamic concept of CSR, not limited to the demands at present stakeholders or focused on reputation issues. This approach let consider the innovation related to CSR.

In the present study, we did not find the R&D expenditure of the firms examined to be affected by

the sector in which they are active. Although it might be expected that the sector would influence both R&D and CSR, given that some sectors require more innovation than others, and that activity in some sectors produces a greater impact than in others, this relation was not, in fact, observed among the sample of corporations in our analysis. However, this result might have arisen from the way in which the variable 'sector' was defined in our paper.

We did not find concern for R&D expenditure within the firm to be related to its size. In the corporations examined in this study, R&D expenditure did not depend on total assets. This situation might result from the fact that our sample is made up of corporations with different policies on innovation, and it does not necessarily follow, in our case, that the corporations with the largest asset values assign most funds to R&D expenditure, or vice versa.

The results obtained are limited to some extent: the sample selected, as well as meeting CSR requirements, must also comply with the demands of the capital market in which it is listed, and such demands may not coincide with the goals of this study. Moreover, in addition to the explicative variables we consider, others might also be related to the volume of R&D expenditure, for example ROA and ROE.

As areas for future research, it would be interesting to analyse the effect of innovation on other management indicators, together with other factors of a qualitative nature, which would enable us to measure whether a corporate innovation-oriented policies lead to stakeholders' other goals being achieved. Having highlighted the relation between R&D and CSR, a subsequent step could be to analyse, among corporations that implement CSR practices, the type of innovation, product or process that is applied, to determine whether the research carried out is developmental or basic, and whether it is focused on environmental or social aspects, in order to ascertain which aspects would be most relevant to obtaining competitive advantages or to improving performance indicators.

NOTES

[1] Sustainability development can be defined as 'development that meets the needs of the present without compromising the ability of future generations to meet their own needs' (WCED, 1987, p. 8).
[2] According to this theory, companies should only respond to the interests of their shareholders, and thus their only social responsibility is that of maximising the value of the company. From this standpoint, any positive social action carried out by the company would involve costs that might reduce profits and prejudice shareholders; therefore, such an action should not be undertaken (Friedman, 1970).
[3] The trend to disclose information on practices of corporate social responsibility accelerated sharply in the early 2000s in response to the widespread

atmosphere of mistrust in the markets caused by the financial scandals of the 1990s.
[4] Table 2 also includes a table with the mean score, the standard deviation of the responses and the degree of significance of the t-values for the items on the questionnaire discussed in this paper.
[5] This index is now termed the Dow Jones Wilshire Global Index.
[6] The DJSI includes indicators on the following dimensions: corporate governance, investor relations, management, codes of conduct, customer relations, environmental policy and performance, labour practice, human capital development, talent attraction and retention, organizational learning, standards for suppliers, stakeholder engagement, corporate philanthropy and social reporting.
[7] Other indexes that have been created upon criteria of sustainability include the FTSE4Good and the Domini Social Index (KLD). These have been developed by organizations of acknowledged standing and have lent credibility to investment in companies that follow criteria of sustainability. More recent additions include the ASPI Eurozone Indexes, the Citizens Index and the KLD-Nasdaq Social Index.
[8] Global Reporting Initiative is a "Sustainability Reporting Guideline" for voluntary use by organisations reporting on the economic, environmental and social impacts. Sustainability reporting is the practice of measuring, disclosing, and being accountable to internal and external stakeholders for organizational performance towards the goal of sustainable development.
The Global Pact is a UN-sponsored international initiative. It is aimed at encouraging firms to make a voluntary commitment to social responsibility, via the adoption of the Ten Principles based on human, occupational and environmental rights and on the fight against corruption.
[9] Although the companies that comprise the DJSI Stoxx are European, this Index was set up in 2001 and so is not suitable for the purposes of the present study. The FTSE4GOOD database was created in 2002. The Domini Social Index was established in 1990 and is a reference point for investment in sustainability for US companies.
[10] The following European countries were taken into consideration in the sample: Belgium, Denmark, Finland, France, Germany, Ireland, Italy, Netherlands, Norway, Spain, Sweden, Switzerland and U.K.
[11] The European Patent Office estimates that 70% of the information contained in patent documents is not available anywhere else (Drucker, 2005).
[12] The correlations have also been calculated on the basis of non parametric techniques, namely Kendall's Tau-b method and Spearman's Rho method, which produce conclusions that are similar to those obtained with Pearson's coefficient. We only present the results obtained by the latter technique, as these give conclusions that are considered to be statistically more robust.

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Appendices

Table 1. Parametric correlation of R&D expenditure and the number of patents taken out (Pearson's correlation coefficient)

	R&D	Patents
R&D	1	0.858**
Patents	0.858**	1

** The correlation is significant at 0.01

Table 2. Means and standard deviations of survey results

	DJSI Firms		DJGI Firms		T-test (p-value)
	Mean	Standard Deviation	Mean	Standard Deviation	
CSR					
1. CSR is a very important concern for your company	4.73	0.47	2.85	0.97	0.001**
2. In your company, the CSR strategy is a key factor in generating competitive advantages	4.64	0.67	2.90	1.00	0.000**
3. In your company, the CSR strategy is aimed at creating future business opportunities, such as opening up new market sectors	3.91	0.83	2.85	0.90	0.007**
4. In your company, the importance of CSR has increased in recent years	4.64	0.67	3.38	0.77	0.000**
5. The company follows a policy of disclosure with respect to its CSR practices	4.91	0.30	3.38	0.87	0.000**
6. The edition of CSR Guides has helped determine the aspects of CSR that are disclosed by your company	4.82	0.40	3.23	1.30	0.001**
7. The CSR strategy influences different functional areas of your company	4.82	0.40	2.77	0.83	0.000**
8. The disclosure of CSR practices in your company is related to the demands of stakeholders (investors, institutions, clients, etc.) in this respect	4.82	0.40	2.54	0.66	0.000**
9. The adoption of CSR practices in your company has a value added effect for stakeholders (profits, remuneration, working environment, product quality, etc.)	4.82	0.40	2.77	1.01	0.000**
10. The CSR strategy depends on or is supervised or drawn up by the Board of Directors	4.64	0.50	2.92	0.95	0.000**

Table 2. Means and standard deviations of survey results (**continuation**)

	DJSI Firms		DJGI Firms		
	Mean	Standard Deviation	Mean	Standard Deviation	T-test (p-value)
11. The CSR practices in your company are audited / certified / confirmed by external agencies	4.73	0.47	2.31	1.38	0.000**
12. The adoption of CSR practices in your company has a positive effect on the company's short-term results (reductions in costs, increases in sales, etc.)	4.00	0.77	2.15	0.38	0.000**
13. The adoption of CSR practices in your company has a positive effect on the company's long-term results (new market sectors, change of activity, etc.)	4.55	0.69	3.15	1.14	0.002**
CSR AND INNOVATION					
14. Your company's innovation policies are related to its strategies of sustainability	4.91	0.30	3.00	0.82	0.000**
15. The adoption of CSR criteria has led to a change in the company's policies regarding innovation	4.55	0.52	2.85	0.90	0.000**
16. The adoption of CSR criteria has led to increased expenditure on innovation	4.36	0.50	2.62	0.77	0.000**
17. The adoption of CSR criteria has led to technological changes in its production processes	4.73	0.47	3.08	1.04	0.000**
18. The adoption of CSR criteria has led to	4.91	0.30	3.38	0.87	0.000**

technological changes that affect the quality of its products (design, quality, etc.)					
19. The adoption of CSR criteria has led to technological changes that affect the range of products that are marketed	4.73	0.65	2.69	0.95	0.000**
20. The adoption of CSR criteria has led to technological variations that represent a radical change in the company's principal activity	1.82	0.60	1.38	0.87	0.178

** The correlation is significant at the level of 0.01

Table 3. Definition of variables in the regression equations

Variable: name	Variable: description
	Dependent Variable
R&D	Average R&D expenditure for period t
	Independent Variable
CSR	Dummy variable: 0 if the firm is not in the DJSI and 1 if it is
IND	Values of 1 to five according activity sector
	Control Variable
ASS	Average total assets for period t

Table 4. Regression coefficients and statistics for R&D

Dependent variable		R&D		CSR
Independent and control variables	1	2	3	4
Intercept				-0.284 (0.263)
CSR	0.165 (0.140)	0.228 (0.041) *	0.231 (0.013)*	
IND	-0.003 (0.981)	-0.161 (0.151)	- 0.048 (0.611)	
ASS	-0.182 (0.097)	-0.024 (0.833)	-0.070 (0.450)	
R&D				0.000 (0.064)***
Adjusted R Square	0.062	0.040	0.073	0.038
F-Statistic	6.272	4.334	7.100	4.020
Probability	0.014	0.041	0.009	0.049

* $p \le 0.05$
*** $p \le 0.10$

Table 5. Descriptive statistics and correlations

	Mean	Standard Deviation	R&D EXPENDITURE	CSR	ASSETS
R&D EXPEND.	464685.46	1006879.01	1		
CSR	0.49	0.5	0.237*	1	
ASSETS	21987002.61	34476095.94	-0.005	0.038	1
SECTOR	3.84	1.18	-0.154	-0.181	-0.069

** The correlation is significant at the level of 0.01
* The correlation is significant at the level of 0.05