CSR firm profiles and innovation:
An empirical exploration with survey data

1257

ABSTRACT

This paper explores the relationship between Corporate Social Responsibility (CSR) and innovation from the strategic management perspective. Matching Community Innovation Survey (CIS) data and specific data collected on CSR behavior of Luxembourg firms, we found two types of firms as far as CSR practices are concerned. Cluster 1 firms adopted CSR practices to achieve economic goals without resorting to the formalization of these practices. In contrast, cluster 2 firms "learn CSR by doing" and by establishing CSR procedures and tools. We then estimated probit models to explain the different types of innovation (product, process, organizational). Firms in Cluster 2 are more innovative in terms of product once we control for firm characteristics and innovation drivers while firms in cluster 1 tend to reject organizational innovation. These results, which show the link between the CSR practices and different innovation types, have important consequences in terms of managerial recommendations and public policy support for innovation.

KEY WORDS: Corporate Social Responsibility, Innovation, Organizational, Practices, Product, Process

1.INTRODUCTION

Corporate Social Responsibility (CSR) has received greater attention in the past decade. The many recent special issues dedicated to the subject attest to the fact that CSR has become an important phenomenon at the firm level. The literature has focused on various dimensions (and measurement criteria) of CSR: the determinants of CSR engagement, the specificities of CSR in SMEs, the link between CSR and company performance or value creation. Our objective in this study is to explore the relationship between CSR and innovation. Prior research has identified a potentially strong relationship between CSR and innovation (McWilliams and Siegel, 2000). Several authors have highlighted its bi-directional nature (Moore and Spence, 2006; Husted and Allen, 2007a, 2007b). However, this relationship remains to be explored as theoretical and empirical researches remain scarce. When empirical research exists, it remains of qualitative nature because of the lack of databases on CSR.

We here merged an original CSR firm-level database with CIS data. These two databases are related to Luxembourg firms. We address the following questions: what practices of CSR do companies adopt and what are the potential links between these distinct practices of CSR and the different types of innovation (product, process, organization)[1]?

We thus aim at partially filling this gap and contribute to a better understanding of the complex relationship between innovation and CSR. We propose an empirical methodology in order to classify firms according to their CSR practices. The characterization of firms' practices is inherited from a strategic approach of CSR that clearly introduces the link between CSR and innovation. As far as CSR practices are concerned, our cluster analysis shows that two CSR firm profiles (CSR cluster thereafter) emerge. The aim of the paper is to test whether the belonging to a CSR cluster is a key determinant of a firm's (type of) innovation. Results show that firms that attempt to endorse socially responsible business practices are not automatically more engaged in product, process or organizational innovations, in line with Le Bas *et al*. (2010). And the type of CSR firms are engaged in is related to the type of innovation the firm is engaged in.

[1] These different types of innovation do not have the same economic consequences in terms of market share and/or profit rate, and clearly induce different levels of economic performance. Research findings have demonstrated the positive effects of product innovation on a firm's growth, while process innovation may have more ambiguous effects, in particular because of its cost-cutting nature (see Fagerberg 2005).

The paper is organized as follows. Section 2 provides an analytical framework related to CSR practices and their potential link with innovation. Section 3 sets out the data and the sample. Section 4 provides the cluster analysis and Section 5, the results stemming from the estimated probit models. The final section concludes, and presents the limitations of the study and some avenues for further research.

2. CSR PROFILES: A FRAMEWORK

On an academic ground, the relationship between CSR and innovation has still not been evidenced. The literature on CSR provides an understanding of the process by which "*companies integrate social and environmental concerns to their business operations and in their interactions with stakeholders on a voluntary basis*" (Commission of the European Communities, 2001: 6). The stakeholder theory identifies CSR practices and addresses the link between CSR and "conventional" firm performance (profitability, stability, growth). Donaldson and Preston (1995: 67) noted that "*it establishes a framework for examining the connections, if any, between the practice of stakeholder management and the achievement of various corporate performance goals*". However, these approaches do not explicitly address innovation performance. The extension by the strategic management literature offers an interesting theoretical perspective for reconciling CSR and innovation, but without detailing CSR practices. Combining both streams of literature, we explore the link between these CSR practices and firm innovation performance.

2.1 CSR AND STAKEHOLDER THEORY

The stakeholder theory is generally viewed as the conventional theory for CSR. It places economic objectives in the foreground when incorporating stakeholders' objectives into business. Stakeholders are the central parts of this approach, which can prove useful in order to explain and guide companies' operations (Donaldson and Preston, 1995). The CSR approach is not only the final result of a process, it is also a process in itself that must be considered in all decision-making and must be evaluated and measured. The stakeholder theory thus stresses the necessity to formalize CSR processes. CSR formalization implies the availability of written documents describing CSR practices, especially in relation with the various stakeholders, codified processes, establishment of CSR targets and objectives, etc.

The main criticism of this approach, addressed by researches (e.g. Porter and Kramer, 2006) in the strategic management field, lies in the fact that it views external stakeholders as applying constraints on the firm, rather than as acting as a lever for innovation. At best, innovation is considered as a by-product. Indeed, its objective is not to view CSR as a potential value creating strategy from which the full integration of stakeholders is considered as a key determinant of innovation.

2.2 STRATEGIC MANAGEMENT LITERATURE

In contrast, the strategic management literature explicitly incorporates innovation and views it as an endogenous force that drives new resource combinations in order to sustain a competitive advantage. Porter and Kramer (2006) "*have asserted that CSR can provide opportunities for innovation*" (Husted and Allen, 2007a: 597). CSR and strategic processes are mutually reinforcing. Engaging in social, societal or environmental programs appears to provide valuable resources for the firm (Sharma and Vredenburg, 1998) and to foster innovation (Husted and Allen, 2007b). Employee involvement seems to play a key role in environmental strategy for instance, as it enhances process innovation (Sharma and Vredenburg, 1998). Nidumolu et al. (2009) stated that CSR and sustainability are now considered as "*key drivers for innovation*" (p. 57). These (mainly theoretical) studies therefore explicitly indicate that CSR can lead to innovation.

Some authors distinguish different types of CSR strategies and levels. For Porter and Kramer (2006), for instance, CSR is seen either as a response ("responsive CSR") or as a strategic lever ("strategic CSR"). Responsive CSR corresponds to the "0 level" of CSR, "*acting as a good corporate citizen, attuned to the evolving social concerns of stakeholders, and mitigating existing or anticipated adverse effects from business activities*" (Porter and Kramer, 2006: 85). Through the implementation of best practices, responsive CSR creates goodwill, improves relations with stakeholders, and allows to identify the social and environmental impacts of the unit's activities throughout the value chain. CSR practices are reflected primarily in organizational innovation. However, effects are quite limited in terms of (incremental) innovation. On the other hand, strategic CSR goes beyond the implementation of best practices. It is based on the exploitation of complementarities between inside-out and outside-in linkages in order to achieve a unique and distinctive position as compared to competitors ('lower cost, better service'). From this point of view, the relationship between CSR and process and product innovations is well established:

strategic CSR based on a symbiotic relation between society and a companies' own competitiveness appears to be a main determinant for (radical) innovation.

Porter and Kramer (2006) characterize the various levels according to the firm's "strategic intent" (Hamel, 2001). They then establish the link between each type of CSR and firm innovation performance. However, nothing is said on the CSR practices and their characteristics. We therefore aim to complete this framework by a better characterization of CSR profiles.

In order to achieve that, we relied on the strategic approach of Burke and Logsdon (1996), who proposed five CSR dimensions that may affect a firm's ability to create value (including through product, process innovation and organizational innovations). To our knowledge, no other study has characterized strategic CSR. Their model introduces the following key dimensions (Burke and Logsdon, 1996: 497) to characterize CSR practices as key determinants of innovation:

- centrality: "*closeness of fit to the company's mission and objectives*";
- proactivity: "*degree to which the program is planned in anticipation of emerging social trends and in the absence of crisis*;
- voluntarism: "*the scope for discretionary decision-making and the lack of externally imposed compliance requirements*";
- visibility: "*observable, recognizable credit by internal and/or external stakeholders for the company*";
- specificity: "*ability to capture private benefits by the company*".

Although this latter dimension seems to close to the dependent variable, i.e. "value creation" ("*identifiable, measurable economic benefits that the firm expects to receive*", Burke and Logsdon, 1996: 497), we included it in order to apprehend whether firms have an asserted economic objective for their CSR involvement.

Investigations of the CSR concept has been mainly based on qualitative case studies (e.g. Jenkins, 2006; Moore *et al*., 2009; Murillo and Lozano, 2006; Tencati *et al*., 2004, etc.). This type of methodology is well adapted to the description of CSR practices. However, a quantitative methodology is best suited to analyze the link between CSR and innovation – which remains unstudied as datasets on CSR remain rare. In this paper, we merged an original CSR firm-level dataset with CIS data.

3. DATA AND SAMPLING

We use an empirical procedure which consists of two steps. In Step 1, we realize a non-hierarchical cluster analysis to classify the firms in relation to their CSR practices. As predicted by Burke and Logdson (1996), these CSR profiles should be linked with firms' innovation. The database on CSR practices of Luxembourg firms, elaborated in 2006 by the Instead/CEPS of Luxembourg, comprises 1144 firms, which is representative of the Luxembourg firm population. On those, we retained those 209 firms having responded Yes=1 to the question: "*Is your firm active in the domain of CSR*"?

In Step 2, we focused on the link between CSR practices and the three types of innovation (product, process and organizational) since these types of innovation do not have the same effects in terms of economic performance. With respect to the determinants of types of firm innovation, some factors are common to the types of innovation but others are specific (Cabagnols and Le Bas, 2001). According to Porter and Kramer, we should find a positive effect of CSR profiles on technological innovation (product and / or process). The impact of strategic profiles on organizational innovation is more ambiguous. According to Porter and Kramer (2006), organizational innovation appears to be more related to a responsive profile (and not a strategic one). We used data from three main sources though their coverage is somehow different: the previously mentioned CSR survey, the 2006 Luxembourg CIS and a STATEC official database. For our cross-sectional analysis, the sample is restricted to firms with more than 19 employees operating in manufacturing and service sectors. After merging these three databases, we obtained a sample of 257 firms that have fulfilled both the CSR and CIS questionnaires. Appendix A presents a summary descriptive statistics for the main variables.

The firms may innovate (or not) in a particular type of innovation and implement (or not) CSR. We estimated probit models in order to analyze the possible relationship between CSR profiles and the three types of innovation. Such a distinction has important implications for the understanding of innovation determinants (for a review of this literature, see Damanpour, 2010). For our empirical study the data set up constraints. They are twofold. On the one hand we have not enough data on some factors that are considered as important determinants of a particular type of innovation, on the other the relatively small size of the firms sample do not enable us to put in our regressions a lot of variables. For these reasons we focus our approach on the main explanatory factors of firms' innovation.

4. A CLUSTER ANALYSIS FOR CSR PROFILES (STEP 1)

Our survey data describe CSR practices according to the five identified dimensions (Burke and Logsdon, 1996):

- centrality ("*closeness of fit to the company's mission and objectives*") has been measured by two binary variables: the existence or not of documents describing values and motivations in terms of social and environmental concerns (C1), and whether the firm describes – or not - its CSR practices in its annual report, in a dedicated report, or in the website (RSED);
- specificity ("*ability to capture private benefits by the firm*") is measured through 3 variables on a 4 item Likert scale ranging from 1 (no perceived benefits) to 4 (strong perceived benefits: to attract new clients (B8clt), to enhance the firm's image (B8Imagfg), differentiation from competition (B8comp);
- proactivity ("*degree to which the program is planned in anticipation of emerging social trends and in the absence of crisis*") is measured through two binary variables: existence or not of CSR action planning and agenda (C10, C16);
- voluntarism ("*the scope for discretionary decision-making and the lack of externally imposed compliance requirements*") is measured through the binary variable assessing whether the firm has identified – or not - the stakeholders for its CSR actions (C6);
- visibility ("*observable, recognizable credit by internal and/or external stakeholders for the company*") is measured through the binary variable assessing whether the firm has - or not - an either external or internal communication plan (RSEOU).

A principal component analysis[2] was conducted on these nine core variables that operationalize the CSR dimensions (C1; RSEOU; C10; C16; RSED; C6; B8CLT; B8IMAGF; B8COMP). The MSA test (Hair *et al*., 1998) showed that all the variables were good candidates for a PCA (MSA values>0.5). In addition, KMO and Bartlett's test of sphericity met common standards (KMO = 0.55 and $p < 0.001$). The PCA uncovered two factors giving a good summary of the theoretical dimensions (accounting for 49,8 % of the total variance).

A non-hierarchical cluster analysis was then carried out based on the scores revealed by the factor analysis. In order to determine the final number of clusters, we used three usual criteria: (i) the statistical accuracy of the classification measured by the ratio of within cluster and between-clusters

[2] We do not present the results of the principal component analyses here as they are only preparatory stages for our cluster analyses. There are available on request.

variances (Fisher's test), (ii) the number of firms per cluster, and (iii) the economic significance of the clusters identified. According to these criteria, the version with two clusters of CSR practices is preferred[3]. To interpret these two clusters, we calculated the mean of each CSR indicator in each cluster (see Table 1).

The results may be interpreted by comparing the means in each cluster. The two CSR clusters are defined as follows:

-In Cluster 1 (114 firms), firms are very economic objective-oriented, and not inclined towards formalization. They have high economic objectives associated to CSR although they do not formalize their CSR practices. The CSR is meant for the firm's benefit only, and is less oriented towards the stakeholders' benefits. These are more a means than an end in this type of approach;

-In Cluster 2 (95 firms), firms "learn by doing" by establishing procedures and tools as far as CSR is concerned. They do not have any asserted economic objective, the main benefit they want to retain from their CSR involvement is the firm's image – which is still lower that the same objective for the other class of firms. However, they clearly identify their stakeholders and have formal documents where their CSR action is described. They want visibility, and "say what they do".

Table 1. CSR clusters

Cluster		C1	RSEOU	RSED	B8CLT	B8IMAFG	B8COMP	C10	C16	C6
1	Mean	1,70	1,6228	1,7788	**3,0187**	**3,8198**	**3,5273**	1,96	1,82	1,46
	N	114	114	113	107	111	110	113	110	114
2	Mean	**1,31**	**1,2737**	**1,4211**	2,5435	3,4787	2,9787	**1,51**	**1,51**	**1,13**
	N	95	95	95	92	94	94	95	91	95
Total	Mean	1,52	1,4641	1,6154	2,7990	3,6634	3,2745	1,75	1,68	1,31
	N	209	209	208	199	205	204	208	201	209

NB : The mean is in bold value when it is significantly higher in the considered cluster.

These preliminary results echo Porter and Kramer's (2006) distinction between firms with strategic and responsive CSR. Cluster 2 firms are in line with the strategic vision. Indeed, Porter and Kramer

[3] For all comparisons of variances, Fisher's test is significant at the 0.000 level and indicates a good differentiation between firms.

(2006) emphasize the fact that, for these firms, stakeholders are key and taken into account as strategic resources (and not as constraints). On the contrary, for Cluster 1 firms, expectations about private benefits from CSR are more important than "doing things". These responsive firms cannot exploit the complementarities between inside-out and outside-in linkages since stakeholders are not taken into account.

5. ESTIMATING THE RELATIONSHIP BETWEEN CSR FIRM PROFILES AND INNOVATION (STEP 2)

Our intent is to determine whether there is a relationship between the different CSR profiles (our two clusters) and the various types of innovation (product, process, organizational). We here present the definition of variables and the estimations.

5.1. VARIABLE DEFINITION

Dependent variables: three innovation types

The three dependent variables are product, process and organizational innovations, thus adapting Burke and Logsdon's model (1996) where the dependent variable is "value creation". We here focused on a more precise aspect of value creation, i.e. innovation, in line with Husted and Allen (2007a: 597) who assert that "*value creation is necessarily about innovation*".

The variables are those found in the 2006 Community Innovation Surveys. The questions for product and process innovations are the following: "*during the years 2004 to 2006, did your firm introduce a new or significantly improved product (good or service) or process for making or supplying them*", and "*during the years 2004 to 2006, did your firm introduce one or several of the following processes*". Process innovation includes significant changes in the way that goods or services are produced or provided, again differentiating between processes new to the business only or also new to the industry. The third variable relates to the introduction of a new of significantly improved organization. Organizational innovation encompasses four types of practices[4]: (a) New business practices for organizing work or procedures (i.e. supply chain management, business re-engineering, lean production, quality management, education/training systems, etc.); (b) new knowledge management systems designed to improve information use or exchange, knowledge and

[4] In the empirical literature, organizational innovation is increasingly considered as important. For instance, Polder *et al.* (2010) show that the strongest productivity effects are derived from organizational innovation.

skills within the enterprise or to collect and interpret information from outside the enterprise; (c) new methods of workplace organization for distributing responsibilities and decision-making (i.e. team work, decentralization, integration or de-integration of departments, etc.) and (d) new methods of organizing external relations with other firms or public institutions (i.e. first use of alliances, partnerships, outsourcing or sub-contracting, etc.) (OECD, 2005).

Independent variables

In order to get the effects of each CSR profile, we introduced the two CSR profiles inherited from the classification procedure. These two variables are denoted cluster_1 and cluster_2. The probability to innovate also depends on a mix of firm-specific characteristics and sector configurations (Cohen, 1995). Our empirical model takes into account five main innovation drivers: technological (or innovative) opportunities, firm's capabilities, incentives to exploit technological opportunities, organizational arrangements and appropriability conditions:

-Firm's capabilities are acknowledged as crucial, in the dynamic capabilities' approach, for the firm's long term success (Teece and Pisano, 1994) and for their innovative performance in the evolutionary approach (Nelson and Winter; 1982). Having a strong knowledge base includes an R&D capacity and a well-trained workforce (Archibugi and Lundvall, 2001). As R&D expenditures are not mentioned in our databases (moreover, R&D expenditures do not always capture the innovation efforts, especially for small firms, see Mohnen and Mairesse, 2010), we considered the proportion of employees with higher education degree (EDUCATION) as a good proxy to estimate the level of the human capital dedicated to innovation;

-The incentives to exploit technological opportunities also are an important innovation driver. To control for competitive intensity, we have included two variables: the first (TECHCHAN) is a 3-item variable about how quickly production's technologies and the services are changing. The second (PRODPER) is also a 3-item variable and asks whether products and services are rapidly old-fashioned (outdated);

-The organizational arrangements and mechanisms through which technological advances are implemented (Dosi, 1997) is a large category which includes the own firm organization as well as the institutional industrial background. However, we have no good proxy for this factor;

-The two other drivers (technological opportunities and appropriability conditions) are crucial for generating and maintaining the rents stemming from leadership in technological activities. We encompassed such effects through sector (manufacturing and services, INDUS) and firm size (T1: from 10 to 49 employees, T2: from 50 to 249 employees, T3: more than 250 employees, according

to the European definition) variables. Indeed, it has been pointed out (on the effects on firm size, see Cohen, 1995) that large firms have the means for exploiting the opportunities coming from outside. And appropriability conditions are related to size: in general, large firms use the patent system. The conventional wisdom considers that firm size matters (while the topic is controversial). Large firms have enough resources to invest in technological activities. Small firms have more limited means but some are very innovative (in high-technology sectors in particular). All variables and their definition are provided in Table 2.

Table 2: List of variables

Variables	Description
INPDGD	**Product innovation : the firm introduces new or significantly improved goods**
INSPSPD	**Process innovation : the firm introduces new or significantly improved methods of manufacturing or producing goods or services**
INORG	**Organizational innovation: the firm introduces a new organizational method in their enterprise's business practices (including knowledge management), workplace organization or external relations that has not been previously used by your enterprise.**
CLUSTER_1	Firms are very economic objective-oriented, are not inclined towards formalization. They have high economic objectives associated to CSR although they do not formalize their CSR practices. The CSR is meant for the firm's benefit only, and is less oriented towards the benefits for stakeholders. The stakeholders are more a means than an end for this type of approach.
CLUSTER_2	Firms "learn by doing" by establishing procedures and tools as far as CSR is concerned. They do not have any asserted economic objective, the main benefit they want to retain from their CSR involvement is the firm's image – which is still lower that the same objective for the other class of firms. However, they clearly identify their stakeholders and have formal documents where their CSR action is described. They want visibility, and "say what they do".
PLAN_RSE	Plan to adopt CSR behavior
NO_RSE	Don't adopt and don't plan to adopt CSR behavior
T1	The enterprise's total number of employees is between 10 to 49
T2	The enterprise's total number of employees is between 50 to 249
T3	The enterprise's total number of employees is more than 249
INDUS	Belong to the manufacturing sector
EDUCATION	Percentage of employees with Higher education (include post-secondary college diplomas and university graduates)
TECHCHAN	The production's technologies and the services are changing quite quickly (High =3; Medium =2; Low = 1)
PRODPER	The products and services are rapidly old-fashioned (outdated) (High =3; Medium =2; Low = 1)

NB: In bold, the main dependent variables.

5.2. MODEL AND ESTIMATION

The conventional modeling for testing if a set of variables as an impact on the decision to innovate is the probit model. It is standard in empirical works that deal with firm behavior. The logit model is also a good candidate but, in general, it does not give a better estimation (what we have checked). Consequently, we used a probit model for each type of innovation (product, process, organizational). The models account for the probability that a firm implements each type of innovation. The set of regressors are the same for each. The data are withdrawn from CIS 2006 (CSR Survey Luxembourg, STATEC data set, Luxembourg). The belonging to a cluster sets up our core variables. We added a dummy variable (PLAN_RSE) to take into account the fact that some firms expect to implement CSR in the not too distant future (as a consequence, they are not included in the dummy variables CLUSTER_1 and CLUSTER_2). The other control variables match the identified innovation drivers (Dosi, 1997). Table 3 below provides the coefficients estimates through their marginal effects on the probability to innovate. The percentage of concordance must be considered as the goodness-of-fit.

6. RESULTS

We here explain whether the belonging to one cluster has an impact on the probability to implement a specific type of innovation. Thus, when a coefficient (related to clusters) is not significant, it does not mean that the firms from this cluster do not implement this type of innovation. In fact, in general they do, but in a proportion that does not differ significantly from the proportion of innovating firms in the other cluster.

Results show that cluster 2 firms (relatively to cluster 1 firms) implement more product innovation whereas cluster 1 push away from organizational innovation. Consistent with the literature in strategic management, firms that consider stakeholders as resources (cluster 2) are more innovative. Unlike firms belonging to the cluster 1, the formalization of CSR practices permits them to exploit complementarities between these various sources in order to achieve a distinctive position as compared to competitors.

Interestingly, process innovation does not appear to be distinctive. This suggests that firms' competitive advantage (in our sample) linked to CSR is more geared towards product innovation (better quality or variety of goods) than towards the efficiency of production of particular goods (lower their prices).

All these results hold in the context of the probit model estimated here, with the set of our control variables. The fact that the dummy for industry is significant for two models out of three means that manufacturing firms, not surprisingly, innovate more in product and process than service firms (who are generally more into organizational innovation). It is also not surprising that the variable "Education" plays a significant role for all three types of innovation. Firm size is not significant suggesting that medium sized and small firms can compensate for small internal resources by being good at interacting with their external shareholders.

Table 3. Determinants of Innovation Behavior

	Probit Model Marginal effect (standard error)		
	INPDGD	INSPSPD	INORG
CLUSTER_1	-7,86519 (0.0891944)	10,84813 (0.1013245)	**-24,76407**** **(0.1105211)**
CLUSTER_2	**19,10098**** **(0.1039101)**	0,69423 (0.0762698)	13,15306 (0.1031418)
PLAN_RSE	-7,98079 (0.073976)	-2,23594 (0.0673386)	4,97714 (0.0935062)
NO_RSE	Réf.	Réf.	Réf.
T1	-4,01325 (0.0617552)	-3,23067 (0.05144)	-10,62464 (0.0704061)
T2	Réf.	Réf.	Réf.
T3	3,51169 (0.0889577)	10,86287 (0.0855836)	11,48912 (0.0992991)
INDUS	**28,16043**** **(0.0640326)**	**25,22174**** **(0.0572628)**	0,61935 (0.0691586)
EDUCATION	**32,62775**** **(0.1000774)**	**18,56082**** **(0.0834539)**	**42,21642**** **(0.1206219)**
TECHCHAN	-1,73934 (0.0337889)	-0,74343 (0.0285784)	-5,13533 (0.0375731)
PRODPER	1,15751 (0.0304032)	2,37413 (0.0254681)	3,68748 (0.0334393)
Sample size	257	257	257
-2 Log-likelihood	-132.36065	-109.47771	-158.63631
% of concordance	75.87	80.93	64.59

* coef. significant at a threshold of 10%, ** coef.: 5%, *** coef.: 1%.

7. CONCLUSION

The objective of this paper was to assess whether firm CSR profiles and practices were related to particular types of innovation. The CIS data allowed us to retain the "classical" typology of innovation strategies: product, the process, and organizational. Our results show that firms in Cluster 2, those that formalize CSR and involve their stakeholders, thus having a strategic orientation to CSR, are more innovative in terms of product once we control for firm characteristics and innovation drivers (Dosi, 1997). This result is not surprising and tends to empirically validate Porter and Kramer's (2006) theoretical assumptions. The fact that process innovation does not appear to be significant could be explained by the fact that these firms are more oriented towards client satisfaction, thus towards an external usage of CSR practices – more than an internal one focused on cost reduction. Cluster 2 firms, by having a clear value creation strategy oriented towards the customer, tend to privilege product innovation over process innovation. Interestingly, and confirming this strong orientation towards formalization of Cluster 2 firms, the firms in Cluster 1 highly reject organizational innovation (which often entails formal procedures and practices). These results are in line with previous findings showing that firms implementing CSR practices are more inclined to proceed to technological innovation (Le Bas *et al*., 2010). We here have gone further in the analysis by considering the types of innovation carried out.

These results entail important implications for theory in two main directions. Our results tend to empirically confirm previous theoretical assumptions on the link between CSR practices and innovation, however looking much more carefully at this link. Indeed, in order to foster product innovation, firms should adopt formalized CSR practices and establish procedures and tools. Considered as having "strategic CSR" (Porter and Kramer, 2006), they clearly identify their stakeholders and are focused on that external visibility, "saying what they do" in formal documents where their CSR practices are well described. This finding also confirms the 2010 OECD report on "new nature of innovation": social concerns are increasingly drivers of innovation. A second theoretical implication of our results is that stakeholder theory and strategic management literature can usefully be combined as they appear to be more complements than substitutes. Indeed, strategic practices deal with value creation when firms are engaged in formal procedures and tools. Stakeholder theory insists on the importance of these formalized processes with stakeholders. Our results highlight the fact that these stakeholders are essentially external as far as value creation through innovation is concerned.

Our results are of considerable importance to managers who want to either use CSR practices to enhance technological (and especially product) innovation, or their technological innovation to introduce CSR practices. It has been seen that the strategic orientation is key in both areas. These entails major implications for public policy support to innovation and/or to CSR firm engagement, link which calls for further studies on complementarities (Mohnen and Roller, 2005) between CSR practices and innovation types. This would mean that packages of policies are needed to help firms to engage in either CSR or innovation processes.

Our paper is not exempt from some limitations. The main one relates to the specific economic structure of Luxembourg, thus of our sample, where service firms are mostly big and established firms such as in banking, while the manufacturing sector is composed mainly of SMEs. Future research should therefore replicate this study in countries where the two sectors have similar features, and/or deal with larger samples in order to conduct separate analyses on manufacturing and service industries – which was not possible here. Further work could also take into account the likely complementarities between the different types of innovation, in line with Polder et al. (2010) who show that product and process innovations have positive effects on productivity when combined with organizational innovation. They also find that organizational innovation is complementary to process innovation. As a consequence, it seems relevant to test for complementarity through trivariate probit models in order to account for the combined effect of product, process and organizational innovations. Finally, longitudinal and/or recursive data could help to determine the precise causality between CSR and innovation.

REFERENCES

Archibugi, D. and B. Lundvall (2001), *The Globalizing Learning Economy*. Oxford University Press: Oxford.

Burke, L. and M. Logsdon (1996), How Corporate Social Responsibility Pays Off, *Long Range Planning*, 29(4): 495-502.

Cabagnols, A. and C. Le Bas (2001), The Determinants of the Type of Innovative Behaviour at the Firm Level, in Kleinknecht, A and P. Mohnen (eds) *Innovation and Firm Performance: Econometric Explorations of Survey Data*, Palgrave.

Cohen, W. (1995), Empirical Studies of Innovative Activity, in Stoneman, P. *Handbook of the Economic of Innovation and Technological Change*, Blackwell.

Commission of the European Communities (2001), *Green Paper "Promoting a European Framework for Corporate Social Responsibility*", COM 366 final, Brussels.

Damanpour, F. (2010), An Integration of Research Findings of Effects of Firm Size and Market Competition on Product and Process Innovations, *British Journal of Management*, 21(4): 996-1010

Donaldson, T. and L.E Preston (1995), The stakeholder theory of the corporation: Concepts, Evidence, and Implications, *Academy of Management Review*, 20(1): 65-91.

Dosi, G. (1997), Opportunities, Incentives and the Collective Patterns of Technological Change, *Economic Journal, Royal Economic Society*, 107(444), 1530-1547.

Fagerberg, J. (2005), *Innovation, a guide to the literature*. In Fagerberg, J; D.D Mowery D.C and R.E Nelson (eds), *The Oxford Handbook of Innovation*. Oxford University Press: New York, 1-28

Husted, B.W. and D.B. Allen (2007a), Corporate Social Strategy in Multinational Enterprises: Antecedents and Value Creation, *Journal of Business Ethics*, 74: 34-361.

Husted, B.W and D.B Allen (2007b), Strategic Corporate Social Responsibility and Value Creation among Large Companies, *Long Range Planning*, 40: 594-610.

Jenkins, H. (2006), Small Business Champions for Corporate Social Responsibility, *Journal of Business Ethics*, 67: 241-256.

Le Bas, C. and N. Poussing N. and N. Haned (2010), Innovation, leadership technologique et comportements de responsabilité sociale. Une exploration sur données d'entreprises. *Economies et Sociétés*. N° 12, Série W, 1363-1386.

McWilliams, A. and D.S. Siegel (2000), Corporate social responsibility and financial performance: correlation or misspecification?, *Strategic Management Journal*, 21(5): 603-609.

Mohnen, P. and J. Mairesse (2010), Using innovations surveys for econometric analysis, *Working Paper 15857*, National Bureau of Economic Research, April.

Mohnen, P. and L. Roller (2005), Complementarities in innovation policy, *European Economic Review*, 49(6): 1431-1450.

Moore, G., and R. Slack and J. Gibbon (2009), Criteria for Responsible Business Practice in SMEs: An Exploratory Case of U.K. Fair Trade Organisations, *Journal of Business Ethics*, 89: 173-188.

Moore G and L. Spence (2006), Editorial: Responsibility and Small Business, *Journal of Business Ethics*, 67: 219-226.

Murillo, D. and J.M Lozano (2006), SMEs and CSR: An Approach to CSR in their Own Words, *Journal of Business Ethics*, 67: 227-240.

Nelson, R.R. and S.G Winter (1982), *An Evolutionary Theory of Economic Change*, Harvard University Press Cambridge Mass.

Nidumolu, R. and C.K Prahalad and M.R Rangaswami, (2009) Why sustainability is now the key driver of innovation, *Harvard Business Review*, September, 56-64.

Polder, M., and G. Van Leeuwen and P. Mohnen and W. Raymond (2010), Product, process and organizational innovation: drivers, complementarity and productivity effects, *UNU-MERIT Working Paper Series 035*, United Nations University, Maastricht Economic and social Research and training centre on Innovation and Technology

Porter, M.E. and M.R. Kramer (2006), Strategy and Society, *Harvard Business Review*, December, 77-92.

Sharma, S and H. Vredenburg (1998), Proactive Corporate Environmental Strategy and the Development of Competitively Valuable Organizational Capabilities, *Strategic Management Journal* 19.8: 729-753.

Teece, D. J.and G. Pisano (1994), The dynamic Capabilities of Firms: An Introduction, *Industrial and Corporate Change*, 3: 537-556.

Tencati, A. and F. Perrini and S. Pogutz (2004), New Tools to Foster Corporate Socially Responsible Behavior, *Journal of Business Ethics*, 53: 173-190.

Thompson, J.K. and H.L Smith (1991), Social responsibility and small business: suggestions for research, *Journal of Small Business Management*, January: 30-44.

Vilanova, M. and J.M Lozano and D. Arenas (2009), Exploring the Nature of the Relationship between CSR and Competitiveness, *Journal of Business Ethics*, 87: 57-69.

Appendix A. Statistical Description of the variables Used in the probit model

Variables	Min	Max	Mean	Standard error
INPDGD	0	1	0.27626459	0.44802175
INSPSPD	0	1	0.19066148	0.39358919
INORG	0	1	0.55642023	0.49777594
CLUSTER_1	0	1	0.09727626	0.2969118
CLUSTER_2	0	1	0.12840467	0.33519261
PLAN_RSE	0	1	0.15175097	0.3594794
NO_RSE	0	1	0.62256809	0.48569017
T1	0	1	0.44747082	0.49820324
T2	0	1	0.39299611	0.48936899
T3	0	1	0.15953307	0.36688695
INDUS	0	1	0.41634241	0.49391359
EDUCATION	0	1	0.26202192	0.31305747
TECHCHAN	1	3	1.79766537	1.07434318
PRODPER	1	3	1.77431907	1.19391443