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Influencing factors on carbon reporting: an empirical study in Spanish companies

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Abstract

Purpose – The Carbon Disclosure Project (CDP) has become an international instrument for carbon reporting of companies. The purpose of this paper is to analyze the influence of some factors of the institutional environment of organizations (regulatory pressure, sustainability normative demands and interconnectedness) on the evaluation obtained by Spanish companies in this project.

Design/methodology/approach – This paper has proceeded to make a multiple regression analysis in order to analyze the relationship between the dependent variable ("Carbon Disclosure" qualification) and independent variables (regulatory pressure, sustainability normative demands and interconnectedness) supported on the computer program *Statistical Package for the Social Sciences* (SPSS).

Findings – The results show that the interconnectedness of companies through their participation in associations that fight against climate change is the analyzed factor with a higher predictive power and statistical significance. Also, the regulatory pressure and normative demands from sustainability indexes, such as Dow Jones Sustainability Index, influence the carbon reporting of organizations participating in the CDP.

Research limitations/implications – The main limitation of this paper is the reduced number of Spanish companies participating in the CDP.

Originality/value – This paper highlights the importance of the role developed by the associations fighting against climate change, since they allow the members to belong to a network through which they share resources, norms and values that positively and significantly influence their behaviour related to carbon reporting.

Keywords Spain, Organizations, Climate change, Carbon, Information disclosure, Carbon reporting, Carbon disclosure project, Institutional theory, Spanish companies

Paper type Research paper

1. Introduction

Throughout the past decade, different stakeholders have significantly increased their demand for information on carbon emissions to the environment by large organisations, pressing them to elaborate emissions inventories, and the establishment of goals and strategies to mitigate and adapt to climate change (Pinkse and Kolk, 2009; Villiers and Staden, 2010). For this purpose, voluntary participation in the Carbon Disclosure Project[1] (CDP) is one of the measures used by organisations to develop their carbon reporting, which is increasingly extending on an international level (Kolk *et al.*, 2008; Stanny and Ely, 2008). In the case of Spain, the first CDP questionnaire was developed in 2008, and it has been performed annually since then. The last results published correspond to the year 2011.

The CDP aims to assess the transparency level of the techniques to measure emissions of the organisations and their subsequent public communication,

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standardising the data on climate change provided by organisations, with the ultimate intention of developing an international standard for the communication of carbon emissions (CDP, 2011). The questionnaire contemplates the following blocks of information in relation to the fight against climate change: corporate governance, strategic focus, goals and initiatives, risks and opportunities and emissions data. Depending on the information provided by the participating organisations, these receive a "carbon disclosure" qualification in a standardised scale running from 0 to 100 points.

Based on arguments of the New Sociological Institutionalism, which mainly focuses on the pressures of the institutional environment on the organisational behaviour (Greenwood *et al.*, 2008), this paper intends to respond to the following question: what factors of the institutional environment could be influencing the qualification obtained by Spanish organisations for their carbon reporting through CDP? More specifically, this paper analyses the possible incidence of these three factors: the regulatory pressures of the environment, the sustainability normative demands and the interconnectedness among organisations involved in the fight against climate change.

In the following section, we will present the theoretic arguments on which we based the hypotheses set out and contrasted in this paper through multiple regression analysis, which is the statistical technique used to analyse the influence of the mentioned factors.

2. Theoretical framework

The regulatory pressures of the institutional environment essentially refer to the establishment of rules and laws of mandatory compliance that should be observed in the development of their activities, as well as the supervision of their compliance and the establishment of sanctions if these rules are violated (DiMaggio and Powell, 1983). In relation to the other types of pressures identified in the New Sociological Institutionalism (normative and mimetic), the regulatory pressure has the highest coercive power, given that it usually comes from agents from the environment, mainly the government, and non-observation can include, in addition to sanctions, the lost of legitimacy and social acceptance of the company (Suchman, 1995; Scott, 2001).

Regarding climate change, the 1997 Kyoto Protocol – and its transposition to EU countries by means of Directive 2003/87/EC – forces the organisations belonging to the covered sectors to control and reduce their emissions, by having to supply information to the competent authorities. Although participation in the CDP questionnaire is voluntary, it could be expected that the participating companies that belong to the covered sectors, in order to adapt to the coercive pressure exercised by regulations and thus avoid possible sanctions and loss of legitimacy (Cho and Patten, 2007), would show a greater involvement in the control and reduction of emissions, which can revert in a better "carbon disclosure" qualification. This argument also conforms to the results obtained by Cho *et al.* (2012), in the sense that the covered sectors are the most contaminating in terms of carbon emissions, therefore the organisations of these sectors have a greater need to earn legitimacy, using the voluntary disclosure of information for this purpose. This leads us to consider our first hypothesis:

H1. The organisations that are required by regulation to control and inform about their carbon emissions will show a higher qualification in the CDP.

Normative demands, on the other hand, concern the rules, values and assumptions regarding the nature and behaviours shared by individuals. Whereas regulatory pressures rest on a legal basis, normative demands rest on a moral base, so that individuals and organisations tend to comply with them because they consider that it is "the morally right thing to do" (Scott, 2001). These normative demands, therefore, define how individuals and organisations should behave. Generally, professionalisation, certification and accreditation processes are linked to the generation of normative demands.

The guidelines of the Global Reporting Initiative (GRI) (2012) for the elaboration of sustainability reports, and the sustainability indexes like the Dow Jones Sustainability Index and the FTSE4Good Index (Fowler and Hope, 2007; Asociación Española de Contabilidad y Administración de Empresas (AECA), 2010), establish a series of criteria and indicators to be considered by the organisations acting as normative demands, this is, that constitute the reference for organisations of an "appropriate behaviour" in the economic, social and environmental dimensions. Among the environmental aspects considered by these guidelines and indexes we will find those related to atmospheric pollution by carbon emissions. In this sense, we could expect that companies participating in the CDP that are included in this type of indexes will show an appropriate behaviour in this respect, since they comply with the established normative demands and, particularly, with those related to the control and reduction of emissions, which could translate into a higher "carbon disclosure" qualification. Thus, we considered the following hypothesis:

H2. The organisations that conform to the sustainability normative demands of their environment will show a higher qualification in the CDP.

Lastly, the interconnectedness refers to the participation of the organisation in a network configured by other organisations or agents through which they share different resources, which may be financial, technological, knowledge, information, as well as rules and values (Smith and Powell, 2008). This interconnectedness increases the tendency of organisations to adopt and retain shared business practices, since it facilitates the voluntary dissemination of the values, rules and information that they are supported on (Oliver, 1991; Zeitz *et al.*, 1999).

In this way, the associations that have set the fight against climate change as their goal, thus contributing to the decrease of carbon emissions through the promotion, for example, of projects to increase energy efficiency, the development of clean technologies and business strategies in the fight against climate change or training people in the rules and values related to it, as well as their dissemination (Pinkse and Kolk, 2009), among other initiatives, can be considered individually as a network. The organisations that participate in this network interact systematically and regularly with their peers, sharing the goal with the network, as well as the established rules and values (Campbell, 2007; González, 2010). Thus, we could expect companies belonging to this type of associations and participating in the CDP, which are more aware about the fight against climate change deriving from sharing these rules and values, will show a better "carbon disclosure" qualification. Thus, our third hypothesis can be formulated on the following terms:

H3. The organisations that are integrated in a network of agents that fight against climate change will show a higher qualification in the CDP.

3. Research method

In 2011, the last year for which we have results for CDP in Spain, the questionnaire was sent out to the 84 largest companies by stock capitalisation. A total of 30 of these companies replied to this questionnaire, obtaining a "carbon disclosure" qualification (see Table I). The remaining 54 companies were not qualified: four of them responded to the questionnaire but they did not allow making their responses public; the other 50 companies did not respond to the questionnaire[2] (CDP, 2011).

Company	"Carbon disclosure" qualification	Regulatory pressure	Sustainability normative demands	Interconnectedness
1. Abengoa	92	0	0	1
2. Abertis Infraestructuras	85	0	1	1
3. Acciona	86	0	1	1
4. ACS	56	0	1	0
5. Banco Popular Español	44	0	0	0
6. Banco Sabadell	58	0	0	1
7. Banco Santander	85	0	1	1
8. Banesto	46	0	0	0
9. Bankinter	68	0	0	0
10. BBVA	74	0	1	1
11. CIE Automotive	24	0	0	0
12. Criteria Caixa Corp	54	0	1	0
13. Enagás	83	1	1	1
14. Endesa	88	1	1	1
15. Ferrovial	90	0	1	1
16. Gamesa	46	0	1	1
17. Gas Natural SDG SA	95	1	1	1
18. Grifols	60	0	0	0
19. Iberdrola	78	1	1	1
20. Iberia	57	0	0	1
21. Inditex	57	0	1	1
22. Indra	60	0	1	0
23. Mapfre	72	0	1	1
24. NH Hoteles	72	0	0	1
25. Obrascon Huarte Lain	84	0	0	0
26. Red Eléctrica de España	60	0	1	1
27. Repsol YPF	89	1	1	1
28. Sol Meliá	74	0	0	0
29. Telecinco	55	0	0	1
30. Telefónica	90	0	1	1

Table I.
Spanish companies with a "carbon disclosure" qualification in 2011

Notes: Regulatory pressure is measured as regulatory coverage by the Directive 2003/87/CE: no (0), yes (1); sustainability normative demands are measured as the companies' membership of the DJSI: no (0), yes (1); interconnectedness is measured as the companies' membership of associations: no (0), yes (1)

Once the "carbon disclosure" qualification of these companies is known, which constitutes the dependent variable in the regression model, we refer below to the measurements of the independent variables we have considered.

Regulatory pressure

The companies that are forced to control and reduce their carbon emissions and report them to the competent authorities are those belonging to the covered sectors, when surpassing certain capacity thresholds, as established by Directive 2003/87/CE, which set out a regime for the commercialisation of greenhouse gas emissions rights in the European Community in compliance with the goals established in the Kyoto Protocol. Specifically, the covered sectors established in the regulation are electric generation, refineries, steelworks, cement, lime, glass, ceramics, paper paste, paper and cardboard.

The regulatory pressure will be considered as a dichotomous variable, considering 0 as the company that does not belong to a covered sector and 1 if it does. As we can observe in Table I, five of the participating companies in the CDP (2011) belonged to the covered sectors, and, more specifically, to the sectors of electricity generation and refinery.

Sustainability normative demands

Conformity of organisations with the sustainability regulatory demands of their environment, the second explanatory variable considered in this paper, has been measured through their listing in the Dow Jones Sustainability Index (Robinson *et al.*, 2011). The incorporation of a company in this sustainability index is done through the application of a series of criteria that measure its economic, social and environmental performance (AECA, 2010), including in this last section a series of criteria related to the environmental aspect, eco-efficiency, environmental analysis and specific criteria related to the sector. The information sources used by this index are diverse, considering the great relevance of the environmental and social reports published by the companies (Fowler and Hope, 2007).

We will also consider the sustainability normative demands as a dichotomous variable, therefore, if the company does not belong to the index it will have a value of 0, meanwhile, if it belongs to the index it will have the value of 1 (see Table I). Of the companies participating in the CDP (2011), 60 per cent belonged to the Dow Jones Sustainability Index. It is also important to highlight that in 2011 Repsol YPF and Enagás led the gas-oil and "utilities" sectors, respectively.

Interconnectedness

To measure the interconnectedness of the companies participated in the CDP, we considered their membership in those associations identified with the fight against climate change, since this is one of their priority goals. Specifically, we have considered if the companies participating in the CDP are members of some of these associations: Spanish Association of CO_2 (Asociación Española del CO_2), Spanish Association of United Nations Global Compact (ASEPAM, Asociación Española del Pacto Mundial de Naciones Unidas), CDP, Sustainability Excellence Club (Club de Excelencia en Sostenibilidad), Ecology and Development (ECODES[3], Ecología y Desarrollo) and Forética.

As in the previous variables, we have transformed the interconnectedness into a dichotomous variable. Thus, if the company does not belong to one of the aforementioned associations it will have value 0, however, if it is a member of one of these associations, it will have value 1. As we can appreciate in Table I, of the 30

companies participating in the CDP, 20 (66.6 per cent) belong to one or several of the considered associations, thus showing this interconnectedness.

Considering our interest in analysing the relationship between the dependent variable ("carbon disclosure" qualification) and independent variables (regulatory pressure, sustainability normative demands and interconnectedness), and the metric character of the variables (for which independent variables have been transformed into dichotomous variables), we have proceeded to make a multiple regression analysis (Hair *et al.*, 2008), supported on the computer program Statistical Package for the Social Sciences (SPSS). The results we have obtained are presented below.

4. Results

Table II shows the correlations between the variables used. We can appreciate the existence of a relatively high and positive correlation ($r = 0.502$) between the "carbon disclosure" qualification and the interconnectedness variable with a significance level of 1 per cent (significance 0.005). Similarly, there is a positive correlation between the "carbon disclosure" qualification, the regulatory pressure and sustainability normative demands, although these correlations are below the former ($r = 0.440$ and $r = 0.385$, respectively) and a significance level of 5 per cent (significance 0.015 and significance 0.036, respectively). It is also worth highlighting the correlation between the variables interconnectedness and sustainability normative demands ($r = 0.433$), as well as between this last variable and the regulatory pressure ($r = 0.365$), both with a significance level of 5 per cent. These last correlations between independent variables may indicate problems of collinearity in the explanation of the dependent variable.

Applying the sequential estimation method by phases for multiple regression, the first variable inserted in the regression model is interconnectedness, due to its higher correlation with the independent variable. As we can observe in Table III, the interconnectedness variable explains the 22.5 per cent variation of the "carbon disclosure" qualification (adjusted $R^2 = 0.225$).

The model shows that companies showing interconnectedness because they belong to the associations related to the fight against climate change obtain an average

	"Carbon disclosure" qualification	Regulatory pressure	Sustainability normative demands	Interconnectedness
"Carbon disclosure" qualification				
Pearson's correlation	1			
Significance (bilateral)				
Regulatory pressure				
Pearson's correlation	0.440*	1		
Significance (bilateral)	0.015			
Sustainability normative demands				
Pearson's correlation	0.385*	0.365*	1	
Significance (bilateral)	0.036	0.047		
Interconnectedness				
Pearson's correlation	0.502**	0.316	0.433*	1
Significance (bilateral)	0.005	0.089	0.017	

Table II.
Correlation matrix

Notes: *,**Correlation is significant at the $p = 0.05$ and 0.01 level (bilateral), respectively

of 18.6 points more in their "carbon disclosure" qualification (see Table IV), showing a statistically significant regression to the 1 per cent level (significance 0.005).

By including the following variable with higher correlation in the model, the regulatory pressure, we obtain the data included in Table V.

In this case, the adjusted coefficient of determination barely increases by 6.6 per cent (adjusted $R^2 = 0.291$) and the reduction of the standard error of the estimate is very small (0.679), so that the introduction of this second variable provides a relatively scarce provision to the prediction set. This, together with the significance level of the regression of the regulatory pressure (significance 0.069) exceeds the limit considered as appropriate, 5 per cent (see Table VI), make it possible for this variable to be excluded from the model.

It also happens when inserting our third variable in the model, the sustainability normative demands (Table VII). The adjusted coefficient of determination decreases by 1.4 per cent (adjusted $R^2 = 0.277$) and the standard error of the estimate does

Model	R	R^2	Adjusted R^2	Standard error of the estimate
1	0.502[a]	0.252	0.225	15.651

Notes: [a]Predictor variables: (constant), interconnectedness

Table III. Model summary

Model	Non-standardised coefficients		Standardised coefficients			95 per cent confidence interval	
	B	Standard error	β	t	Significance	Lower limit	Upper limit
1 (Constant)	57.000	4.949		11.517	0.000	46.862	67.138
Interconnectedness	18.600	6.062	0.502	3.068	0.005	6.183	31.017

Table IV. Coefficients

Model	R	R^2	Adjusted R^2	Standard error of the estimate
1	0.583[a]	0.340	0.291	14.972

Notes: [a]Predictor variables: (constant), interconnectedness, regulatory pressure

Table V. Model summary

Model	Non-standardised coefficients		Standardised coefficients			95 per cent confidence interval	
	B	Standard error	β	t	Significance	Lower limit	Upper limit
1 (Constant)	57.000	4.734		12.039	0.000	47.286	66.714
Interconnectedness	14.933	6.112	0.403	2.443	0.021	2.392	27.475
Regulatory pressure	14.667	7.731	0.313	1.897	0.069	−1.197	30.530

Table VI. Coefficients

not decrease, thus showing a reduction in the explanation of the variation of the dependent variable.

Furthermore, the statistical significance levels of the regression coefficients of the independent variables included in the model exceed 5 per cent (see Table VIII).

Thus, the program SPSS introduces in the multiple regression model only the interconnectedness as a predictor variable, excluding the regulatory pressure and sustainability normative demands variables. This does not mean that these variables are not correlated with the "carbon disclosure" qualification, as we can appreciate in Table II, but for their effect as a set in the multiple regression model, which is not significant to the effect of explaining the changes in dependent variables. This fact, together with the correlation between independent variables (see Table II), which can indicate collinearity problems, suggests a separate consideration of the influence of these variables on the "carbon disclosure" qualification. Thus, the simple regressions of these variables show that the regulatory pressure explains the 16.5 per cent variation of the "carbon disclosure" qualification (adjusted $R^2 = 0.165$), with a regression coefficient of 20.64; while the variable sustainability normative demands explains an 11.7 per cent (adjusted $R^2 = 0.117$), considering a regression coefficient of 13.72. In both cases, the statistical significance levels are 5 per cent.

5. Discussion and conclusions

The aim of this paper was to analyse the influence of certain factors of the institutional environment (regulatory pressure, sustainability normative demands and interconnectedness) on the qualifications obtained by the Spanish organisations in the CDP (CDP, 2011). The obtained results have led us to accept the three hypotheses established in this paper, also manifesting that the factor of greatest influence in the variation of this qualification is the interconnectedness. Thus, the organisations that belong to an association related to the fight against climate change usually have a higher "carbon disclosure" qualification. The regulatory pressure and the sustainability normative demands also have an influence, although their

Model	R	R^2	Adjusted R^2	Standard error of the estimate
1	0.593[a]	0.352	0.277	15.115

Table VII. Model summary

Notes: [a]Predictor variables: (constant), interconnectedness, regulatory pressure, sustainability normative demands

Model	Non-standardised coefficients		Standardised coefficients			95 per cent confidence interval	
	B	Standard error	β	t	Significance	Lower limit	Upper limit
1 (Constant)	55.638	5.161		10.781	0.000	45.030	66.246
Interconnectedness	13.269	6.613	0.358	2.006	0.055	−0.324	26.862
Regulatory pressure	13.153	8.099	0.280	1.624	0.116	−3.495	29.801
Sustainability normative demands	4.540	6.485	0.127	0.700	0.490	−8.789	17.869

Table VIII. Coefficients

explanatory power of the CDP qualification is lower and also with a lower statistical significance level.

The results of this paper highlight the importance of the role developed by the associations fighting against climate change, since they allow the members to belong to a network through which they share the resources, norms and values (Campbell, 2007; González, 2010) that positively and significantly influence their behaviour related to carbon reporting. This way, the organisations that belong to these kind of associations increase their social legitimacy in their environment through a better consideration of the projects like CDP.

Although the regulatory pressure is considered in the NIS literature as the one with the greatest influence (Scott, 2001), our paper corroborates this influence but not its influence degree. In this respect, it is also to be highlighted that some research works have shown that if organisations perceive that they are forced by the regulation (Seidman, 1983) or if they mistrust the agents that are exercising this regulatory pressure (Kostova and Roth, 2002), organisations will be reluctant to adopt entrepreneurial practices or to adopt organisational behaviours promoted by the regulation. Specifically, in this paper, we can appreciate that the organisations required by the regulation to control and report their carbon emissions (Enagás, Endesa, Gas Natural SDG SA, Iberdrola and Repsol YPF) have obtained a higher qualification in the CDP. However, other organisations that are not obligated by the regulation (like Banco Santander, Ferrovial, Obrascon Huarte Lain, Telefónica) also have obtained a high qualification, which is even higher than those that are obligated. In this sense, and given that these companies are not the most contaminating in terms of carbon emissions, they do not need to participate to protect or increase their environmental reputation (Cho *et al.*, 2012). Their behaviours, therefore, could indicate a real belief in the fight against climate change, and not a ceremonial or apparent participation (Hess and Warren, 2008).

Sustainability normative demands, measured in this paper through the listing on these organisations in the DJSI (Robinson *et al.*, 2011), also have a positive influence on the organisation's carbon reporting, although on a lower level to the other considered factors. As it is shown in this paper, these sustainability normative demands contribute to explain close to 12 per cent of the variation of the qualification obtained by the organisations in the CDP.

One of the main implications of the work we have developed is the recognition of the convenience of the associations fighting against climate change and the need to promote the participation by the organisations, since we can understand that they contribute to achieve a greater awareness and internalisation of these norms and values in favour of the fight against climate change that will ultimately condition their behaviour. In this regard, it is also to be highlighted that the sustainability indexes, such as DJSI, are considered as references by organisations.

Finally, although the regulation influences on the organisational behaviour in the fight against climate change, as Sullivan (2009) manifested when considering the greatest 125 European companies, it is worth highlighting that this fight cannot be based exclusively on a coercive regulation, given that the companies that are participating voluntarily are also showing results. In this sense, as it is stated by Pinkse and Kolk (2009), in the fight against climate change, it is relevant to promote the action of organisations through, for example, training and dissemination campaigns, as well as the development of other voluntary initiatives, such as voluntary and negotiated agreements.

The main limitation of this paper is the reduced number of Spanish companies participating in the CDP. For this reason, as a future research line, this study may be extended to an international level, analysing the influence of the factors considered in the "carbon disclosure" qualifications obtained, for example, in Australia 200, China 100, Europe 300 or Global 500. Likewise, we could consider other independent variables (such as the economical environment, sectoral regulation) which can contribute to the explanation of the carbon reporting qualification developed by the organisations, in general, and the "carbon disclosure" qualification, in particular.

Notes

1. CDP (2011) is a non-profit organisation that was founded in 2000 and represents 551 institutional investors. This organisation develops the Carbon Disclosure Project, which consists of a questionnaire on carbon emissions information that participating organisations respond to voluntarily.
2. The research of Stanny and Ely (2008) showed that in US companies that are subject to a greater scrutiny as a result of their size, previous environmental information disclosures and foreign sales, presented a higher probability of voluntarily revealing information about climate change through the CDP questionnaire.
3. ECODES is the local CDP partner and is responsible for the development and drafting of the CDP report in Spain, in collaboration with PricewaterhouseCoopers.

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