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Environmental disclosure in corporate websites: a study in Brazil and USA companies

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Abstract

Purpose – The internet allows much corporate information to be instantly accessed from anywhere, at any time. To better inform the more diverse stakeholders, companies have used their websites as another tool for disclosure. The purpose of this paper is to contribute to the area of environmental accounting, as it investigates whether the companies located in different countries, from different sectors, in different stages of development and regulatory environments present different levels of environmental disclosure and to explain the environmental disclosure extension on corporate websites of companies in Brazil and the USA through corporate characteristics.

Design/methodology/approach – To achieve such purpose, an environmental disclosure index (EDI) was created and a model was used to investigate whether the variables environmental performance, size, profitability, debt, sector and country explain the disclosure on the website.

Findings – It was pointed that US companies stood out compared to Brazilian companies throughout the EDI. On the one hand, the statistical model suggests that the variables, namely, organization size, sector and country of origin of the company, explain the environmental disclosure in corporate website, whereas the profitability and debt variables were not significant in the model. On the other hand, the environmental performance variable proved to be significant; however, it was contrary to what was expected from the theory of legitimacy, once a negative relation between environmental disclosure and environmental performance is expected.

Originality/value – It is considered that transnational studies on corporate environmental responsibility can improve the understanding and eventually explain the difference of this disclosure.

Keywords Environmental disclosure, Corporate website, Brazil and USA

Paper type Research paper

1. Introduction

The environmental responsibility in the corporate field has arisen mainly in the last decades, thus initiating companies' global actions in search for a promotion of acts towards the

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environment and they have aimed to explain such actions to the external public. According to Deegan (2017) currently one of the main debates in environmental accounting is "accountability" that seeks to understand the level of responsibility of organizations with other stakeholders, since companies must provide information to users so that they make a decision whether do or do not support an organization.

Companies can use different media to promote an environmentally correct image as well as manage stakeholder¨s perceptions, one of which is from corporate websites (Patten & Crampton, 2004). Managers promote disclosure in different media in order to serve all the information users, eventually disclosing voluntary information addressed to investors, while some disclosures are for the benefit of customers, employees, the press, the general public and other interested people (De Villiers & Van Staden, 2011).

Companies therefore use resources from the internet and corporate websites to design a socially acceptable approach to environmental management for the group of people who are interested in (Cho & Roberts, 2010). Thereby, organizations identify potential benefits in disclosing environmental information on a website, not only based on print management but also on how management can try to transmit shareholders value throughout environmental responsibility (Cormier, Leboux, & Magnan, 2009).

The information posted on a website has the ability to provide timely and continuous information, rather than periodic information such as printed reports, having benefits ranging from reduced costs to the ability to serve a wider range of stakeholders (Lodhia, 2010). The choice of investigating websites is therefore, due to the fact that it is a quick access tool, where information can be disclosed to a wide range of stakeholders, as well as it is a channel that companies use to disclose a diversity of environmental information and strategies (Aerts, Cormier, & Magnan, 2008; Andrikopoulos & Kriklani, 2013; Cho & Roberts, 2010; Tagesson, Blank, Broberg, & Collin, 2009).

Formerly studies on environmental accounting focused only on developed countries, however, companies located in emerging countries have also seek for better environmental accountability towards international markets and even the domestic market. Currently, there is a need for transnational studies on environmental responsibility because previously studies focused only on developed nations, resulting in the need to understand how social and environmental responsibility is addressed in countries within different economic and social contexts (Xiao, Gao, Heravi, & Cheung, 2005).

The option of using two groups of companies is justified by the possibility of investigating whether organizations located in different countries, at different stages of development and regulatory environments have different levels of environmental disclosure, as well as if companies in different contexts identify economic opportunities in voluntary environmental disclosure through websites (Bagnoli, Wang, & Watts, 2014; Barbu Dumontier, Feleagă, & Feleagă, 2014; Gamble, Hsu, Jackson, & Tollerson, 1996; Xiao et al., 2005).

The choice of investigating companies based in the USA and Brazil is backed by the fact that environmental disclosure is strongly promoted in the USA, as well as it is concerned to a mature securities market operating in a highly regulated environment (Bagnoli, Wang, & Watts, 2014). However, it is important to highlight that while there are social problems in emerging countries such as Brazil, companies must still play an important social role in providing well-being to society and addressing their concerns to natural resources (Wanderley, Lucian, Farache, & De Souza Filho, 2008). Besides, an excellent way to evaluate Brazilian environmental disclosure is to compare it to more economically developed countries, with efficient markets and those ones with greater informational demands (Ribeiro, Nascimento, & Van Bellen, 2009).

As for the theoretical contribution, the research supports the legitimacy theory, which postulates that companies with lower environmental performances will take over a greater volume of environmental disclosure in the search of legitimacy for stakeholders (Gomez-Gutierrez & Cormier, 2019; Patten, 2002). As environmental disclosure through the internet and websites demonstrates a concern for legitimacy by companies that have poor environmental performance, rather than necessarily increasing corporate responsibility (Cho & Roberts, 2010).

In this context, the general objective of the study is to explain the extent of environmental disclosure on corporate websites of companies located in Brazil and the USA through corporate characteristics. As for the specific objectives of the study, they are as follows: identify through an Environmental Disclosure Index (EDI) the extension of environmental disclosure on the investigated companies' websites; point out whether there is a difference in the extension of environmental disclosure between companies in Brazil and the USA; and to verify which variables explain the environmental disclosure in corporate website.

2. Theoretical framework

2.1 Environmental accounting and disclosure in websites

The current literature on environmental accounting can be classified into three stages, the first study group examines the relevance of corporate environmental information to users seeking to assess environmental liabilities, the second study line examines what factors promote disclosure and at last, another group of studies has sought to understand the relation between disclosure and environmental performance (Clarkson, Li, Richardson, & Vasvari, 2008).

According to De Villiers and Van Staden (2011), companies are commonly sharing environmental information through annual reports, corporate websites and social and environmental reports, but nevertheless, websites and annual reports have distinct users looking for a differentiated range of information. Therefore, online platforms are opportunities for companies to bring out more environmentally responsible information to light and provide public relations opportunities with stakeholders (Cho & Roberts, 2010).

Previously, corporate information was traditionally evidenced – through annual reports or print media – however, this communication could not reach all stakeholders and it was necessary to rethink communication strategies, using Web disclosure (Cormier et al., 2009). One reason companies choose to disclose more environmental information on a website is because the cost of adding a dedicated environmental information space on the corporate website is lower than adding information in the annual report. Patten and Crampton (2004).

The alternative of providing information through the Web can offer advantages over the traditional print format, such as the ability to disclose more information to a wider range of stakeholders at a lower cost and at more regular posts than traditional reports (Williams & Pei, 1999). As well as the communication of environmental and social information through corporate websites have the ability to address multiple targets, besides serving a wide range of stakeholders, this disclosure has global range and can reach people anywhere in the world (Lodhia, 2010)

In her study, Lipe (2018) states that companies have been looking for an appropriate "information package" to be disclosed and the elements that set up this package are essential to form the external image, examples of elements of this package are the interaction with the user, the language, personal image, as well as the mode in which the nformation will be disclosed.

2.2 Legitimacy theory in the environmental disclosure context

Among the theories commonly related to corporate evidence are economic theory, stakeholder theory, disclosure theory, contingency theory and legitimacy theory (Gray, Kouhy, & Lavers, 1995). In general, these theories say that companies that experience greater social and political pressures show more social and environmental information, whether they are companies with good environmental performance or not (Patten & Crampton, 2004).

The theory of legitimacy is based on the idea that a company will use corporate disclosure in a way that influences society's perception, which will identify its behavior as acceptable (Adams, Hill, & Roberts, 1998; Campbell, 2003; Cho & Roberts, 2010; Cormier & Magnan, 2013; Deegan & Rankin, 1997; O'Donovan, 2002; Patten, 1992).

The theory of legitimacy therefore highlights that the greater the adverse changes in society's perception of the company, the more convenient it will be to try to manage such social impressions, so the theory is based on how management can try to achieve compliance or social expectations and values through disclosure (O'Donovan, 1999). Therefore, the theory of legitimacy is supported by the social contract between company and society meaning that the company's ability to benefit interested parties in an economic, social and political way (Magness, 2006).

Aerts and Cormier (2009) state that legitimacy is mainly about perception and how it is managed for relevant audiences, so the company evaluates the content, quality and process of environmental disclosure so that disclosure becomes convenient and desirable. Meaning that, companies have been disclosing socio-environmental information to fill the gap between society's expectations and corporate reputation (Campbell, 2003).

A company management will define its environmental strategy to meet financial and non-financial expectations, meaning, the company will seek to legitimize its actions for both financial analysts and other non-financial stakeholders, which can be difficult, because in several situations, company's environmental performance can validate or undermine efforts to legitimize through environmental disclosure (Cormier & Magnan, 2013).

3. Research methods

3.1 Sample selection

The companies in the sample of this study should do as follows:

- attend the "*Melhores & Maiores Exame*" or the "Fortune 500";
- in case of Brazilian companies, be listed on Ibovespa;
- not be part of the financial services and insurance industry; and
- have an available website.

It is necessary to standardize the sectors, as it makes easy for further analysis. Therefore, for the purpose of this work, companies were classified by the North American Industry Classification System. The companies that are part of the final sample are divided into 12 sectors. Of the 117 companies, 57 are from Brazil and 60 from the USA.

3.2 Environmental evidence content – environmental disclosure index

The environmental disclosure content of the present work was built from previous studies in this area to investigate the environmental disclosure attributes on a website. For the study purpose only, the EDI has 10 categories and 40 subcategories Table 1.

Category	Subcategory
1. Impact of products and processes	Mention of the firm's processes, facilities, or product innovations relative to reduction of environmental degradation
	Discussion about environmental impact of packaging
	Mention of lifecycle analysis
	Recycling end product (after customer use)
	Research and development in environmental actions
	Discussion of the company's environmental compliance status.
	Discussion of control or reduction of facilities/processes potentially polluting
	Discussion of environmental characteristics of products
	Department, service assigned to the environment
2. Statement of environmental policy	Statement of environmental policies
3. Goals and targets	Explicit qualitative goals
	Explicit quantitative goals
	Goals or targets vs. measured performance (goals achieved)
4. Wastes and odors	Efforts at reducing waste
	Efforts at reducing odors
	Waste and odors reduction initiatives
5. Efficient use or water reuse	Efforts at reducing effluents
	Kilograms of water used and/or water saving
6. Soil contamination and reserve for environmental protection	Areas affected by development activity
	Remediation efforts
	Site restoration costs
	Areas protected
7. Energy	Development/exploration of new sources
	Conservation and energy saving
	Future energy saving
8. Spills and air emissions	Number of spills
	Efforts at reducing spills
	Tons per year of key emissions
	Planning of CO2 emission reduction in the mid-term or long-term
	Efforts at reducing emissions
9. Environmental accounting	Mention of environmental investments
	Identification of potential liabilities or environmental fines
	Risks of provisions e litigation
10. Other environmental disclosures	Environmental awards
	Mention of company's environmental management system (EMS)
	Environmental Audit
	Environmental certification
	Involvement of environmental organizations
	Joint environmental projects
	Explicit initiatives with stakeholders

Source: Adapted from Deegan and Rankin (1996), Buhr and Freedman (2001), Patten (2002), Xiao et al. (2005), Tagesson et al. (2009), Cho and Roberts (2010), Bachmann, Carneiro, and Espejo (2013), Kuo and Chen (2013), Cormier, Lapointe-Antunes, and Magnan (2015)

Table 1.
Environmental disclosure content – EDI

3.3 Collecting data procedure

To investigate the attributes of environmental disclosure, the research reported to official corporate websites at predetermined dates.

Website disclosure is able to provide sustainable sources of information targeted to specific stakeholders, such as hyperlinks and menus, which provide personalized information (Lodhia, 2010). At this line, Cho and Roberts (2010) developed a framework for the investigation of environmental disclosure on websites that guided the diagram elaboration that enables the structuring of a corporate website investigation process focused on environmental information (Figure 1).

Regarding environmental responsibility reports or sustainability reports published on corporate websites, only those made available from the years 2014 to 2016 were investigated.

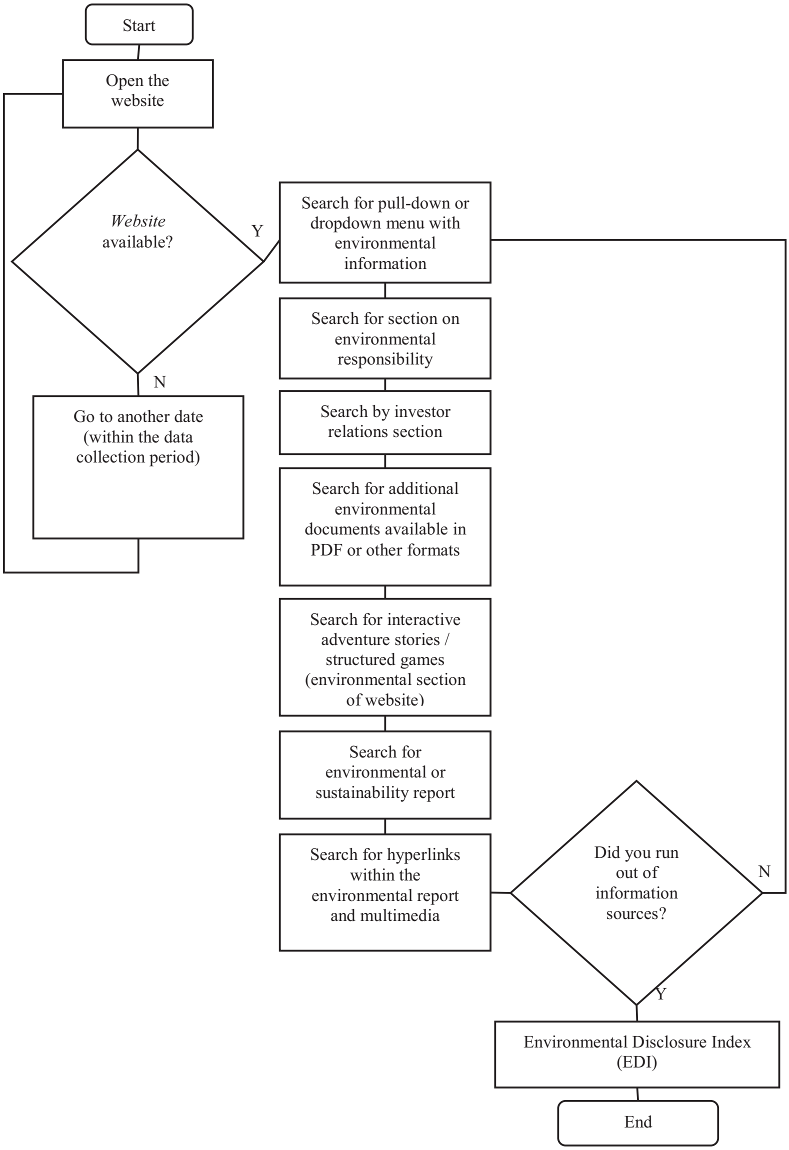

Figure 1.
Diagram for website environmental investigation

3.4 Studies hypotheses

From previous studies, the study hypotheses that follow were formulated:

H1. A negative relation between environmental performance and the extent of environmental disclosure on a corporate website is expected.

H2. A positive relation between the size and extent of environmental disclosure on a corporate website is expected.

H3. A positive relationship between profitability and the extent of environmental disclosure on a corporate website is expected.

H4. A negative relationship between debt and the extent of environmental disclosure on a corporate website is expected.

H5. A positive relationship is expected between companies operating in environmentally sensitive sectors and the extent of environmental disclosure on the corporate website is expected.

H6. It is expected that companies in the USA disclosure a greater extent of environmental information on corporate websites than companies in Brazil.]

3.5 Data analysis procedure

The current research is based on studies conducted by Patten (2002), Xiao et al. (2005), Brammer and Pavelin (2006), Liu and Anbumozhi (2009), Tagesson et al. (2009), Cho, Roberts, and Patten (2010), da Monteiro and Aibar-Guzmán (2010), De Villiers and Van Staden (2011), Thompson and Ke (2012), Andrikopoulos and Kriklani (2013), D'Amico, Coluccia, Fontana, and Solimene (2014) and Singhania and Gandhi (2015) to investigate the validity of the hypotheses through the multiple regression analysis.

The model used is:

Multiple regression model is given as:

$$EDI\,(Environmental)DisclosureIndex) = a_0\, a_1\, Environmental\, Perfomance\, a_2\, Size\; a_3\, Profitability\, a_4\, Debt\, a_5\, Sector + a_6\, Country \tag{1}$$

Concerning the dependent EDI variable, the indexes of previous studies made by Tagesson et al. (2009), da Monteiro and Aibar-Guzmán (2010), Andrikopoulos and Kriklani (2013), Singhania and Gandhi (2015), were used in equation (2).

where EDI is given as:

EDI is given as:

$$\mathrm{EDI} = \sum_{i=I}^{40} X_i \tag{2}$$

To do so, 40 represents the subcategories of environmental disclosure attributes stablished in the environmental disclosure content. Therefore, if the information is disclosed it is assigned 1, otherwise it is assigned 0. Thus, measuring the extent of environmental disclosure on websites, this approach assumes that every item of environmental disclosure content is equal in importance in the model (Singhania & Gandhi, 2015).

The explanatory variables used in this research were based on previous studies (Figure 2). It is emphasized here that different researches may use different measures, such as the size variable, those ones chosen for this study to satisfy the research objectives.

The "environmental performance" variable is part of a range of corporate indicators developed by CSRHUB® Sustainability management tools. For the purposes of this research, only the "Environment" indicator was used, which evaluates corporate environmental performance.

For the "sector" variable, it was determined that companies in the "Manufacturing Industry", "Mining Oil & Gas Extraction" and "Electricity, Gas and Water Companies" sectors are part of companies from environmentally sensitive sectors (Cho et al., 2010; Patten & Crampton, 2004). Therefore, for the regression model were considered 1 for companies from environmentally sensitive sectors and 0 for those companies that are not part of the environmentally sensitive sectors. The same procedure was performed for the country variable, where it was considered 1 for US companies and 0 for Brazilian companies.

Regarding the methodological limitations of the present study, they are: the website investigation, since the visitation of corporate pages occurred at a single moment in time and companies can update, remove and add information without prior notice. Another methodological limitation is the measurement of the EDI, as binary assignment was used.

		Authors												
Variable	Measure	Patten (2002)	Xiao et al. (2005)	Brammer and Pavelin (2006)	Brown (2007)	Liu and Anbumozhi (2009)	Tagesson et al. (2009)	Cho, Roberts and Patten (2010)	Monteiro and Aibar-Guzmán (2010)	De Villiers and Van Staden (2011)	Thompson and Ke (2012)	Andrikopoulos and kriklani (2013)	D'Amico, et al. (2014)	Singhania and Gandhi (2015)
Environmental Performance	CSRHUB® *Environment*													
Size	Total Assets													
Profitability	ROA (Return on assets)													
Debt	Financial Leverage													
Sector	Dummy													
Country	Dummy													

Source: Adapted from Patten (2002); Xiao et al. (2005); Brammer and Pavelin (2006); Liu and Anbumozhi (2009); Tagesson et al. (2009); Cho, Roberts and Patten (2010); Monteiro and Aibar-Guzmán (2010); De Villiers and Van Staden (2011); Thompson and Ke (2012); Andrikopoulos and Kriklani (2013); D'Amico, et al. (2014); Singhania and Gandhi (2015)

Figure 2.
Variables used for the regression analysis

4. Results description and analysis

4.1 Descriptive analysis

Among the 57 Brazilian corporate websites investigated, 48 presented a section on environmental responsibility, representing therefore 84% of the Brazilian corporate websites studied. Among the 60 US corporate websites, only 1 company has no section on environmental responsibility. However, it was found that Brazilian companies most commonly present this section already on their homepage, 53% of the cases. While 59% of US companies submitted the environmental responsibility section from the drop-down menu, framework or other page than the homepage, requiring two or three clicks to access. Another step in the investigation of corporate websites was to identify and examine sustainability reports or environmental responsibility report. In this sense, it was found that the sample companies from the USA released more updated environmental reports, with reports mostly from 2015 or related to 2016.

Regarding the investigation of the environmental disclosure content for the construction of the EDI, the main considerations between the categories and subcategories are that in the categories "impact of products and processes," "goals and targets" and the category "other environmental disclosures"; all subcategories were percentage more evidenced by US companies. Concerning the "statement of environmental policy," "wastes and odors," "efficient use or water reuse," "environmental accounting" and "soil contamination and reserve for environmental protection" no disparities were found between Brazilian and US companies. In the "energy" category, "conservation and energy saving" is part of the concerns expressed in almost all of the companies in the sample. However, the "development/exploration of new sources" was more evident in the US companies; this is also repeated for the subcategory "future energy saving." Concerning "spills and airs emissions," there was a greater disclosure about information on atmospheric emissions toward the information about spills, for both Brazilian and US companies.

4.2 Statistical analysis

In this section, the results on the suggested model about methodological aspects will be presented. The software used for the statistical analysis was the STATA® 11.

Table 2 presents the descriptive statistics of the EDI variables and environmental performance. It is noted that the average of EDIs is higher for US companies, with 21.13, while the average of Brazilian companies is 15.37. Among the US companies is the company with the largest extent of disclosure, 33 EDI. However, the environmental performance of the Brazilian companies investigated seems to have better average performance, 60, while the US companies averaged 58.23. Another point to be noticed is that among Brazilian companies is the company with the highest environmental performance indicator, 77, while among the US companies investigated the highest performance was 72. The minimum values also show good environmental performance by the Brazilian companies, while these ones had a minimum performance of 38, among the US companies the lowest performance was 33.

The results of the proposed multiple linear regression model are described in Table 3. R^2 and the adjusted R^2 show good fit of the data to the model. As well as the small difference between R^2 and adjusted R^2 demonstrates the adequacy of the number of explanatory variables considered. The adjusted R^2 value indicates that 47.76% of the variation of the dependent variable EDI can be explained by the explanatory variables included in the model, Table 4.

The model proved to be significant, since the probability of F-Statistics is less than 0.05, rejecting the hypothesis that the estimated parameters are simultaneously equal to zero.

Table 2. Descriptive statistics of the variable model – Brazil and USA separately

	Average		Standard deviation		Minimum		Maximum	
Variable	Brazil	USA	Brazil	USA	Brazil	USA	Brazil	USA
EDI	15.3684	21.1333	7.4393	8.2183	0	0	29	33
Environmental Performance	60	58.2333	7.9686	9.1473	38	33	77	72
Size	1.27E + 10	1.02E + 11	3.23E + 10	9.75E + 10	8.78E + 08	1.52E + 10	2.31E + 11	4.93E + 11
Profitability	0.0191	0.0726	0.0821	0.0561	−0.414	−0.0395	0.143	0.3493
Debt	1.9175	4.8046	5.0552	6.1390	−11.8	1.11	24.1	43.78
Sector	0.5789	0.5	0.4981	0.5042	0	0	1	1

Source: Research Data (2019)

	Coefficient	Standard error	t	p-value
Environmental Performance	0.420629	0.069844	6.02	0.000
Size	4.67E–12	2.07E–12	2.26	0.026
Profitability	–11.14962	8.129951	–1.37	0.173
Debt	0.074919	0.1004228	0.75	0.457
Sector	4.082465	1.165484	3.5	0.001
Country	5.575251	1.473327	3.78	0.000
Constant	–12.39344	4.163071	–2.98	0.004
R^2				0.5047
Adjusted R^2				0.4776
F				18.68
Prob > F				0.0000
Number of observations				117

Source: Research Data (2019)

Table 3. Multiple linear regression result – depending variable: EDI

Regarding the regression assumptions, auxiliary tests were performed to verify the absence of problems in the tested model. The normality of the model residuals was verified, and the data were normal. Regarding the questions involving multicollinearity, the VIF statistics identified that all regressors of the model have values below 2, with the variable country with the highest VIF (1.75) and an average of 1.3 among the explanatory variables. Therefore, it can be affirmed that there are no multicollinearity problems. On the other hand, the Breusch–Pagan/Cook–Weisberg test result indicated the absence of heteroscedasticity in the model (prob> χ^2 = 0.3172).

Therefore, the variable environmental performance (*H1*) was significant for the model (p-value = 0.000). However, the hypothesis is rejected since it proved to be opposite to the expected, as the estimated parameter indicates a positive differential of 0.42 percentage points in the EDI for each environmental performance variance.

The variable size (*H2*) was significant at a significance level of 5% (p-value = 0.026), indicating that there is a positive relationship between the size and extent of environmental disclosure on a corporate website. This result resembles those from studies made by Gray, Javad, Power, and Sinclair (2001), Brammer and Pavelin (2006), Liu and Anbumozhi (2009), Cho et al. (2010), da Monteiro and Aibar-Guzmán (2010), Rover, Tomazzia, Mucia, and Borba (2012), Thompson and Ke (2012), D'Amico et al. (2014), mainly to the findings of research made by Patten and Crampton (2004) and Andrikopoulos and Kriklani (2013), since the object of study was also the corporate websites.

The explanatory variable profitability (*H3*) was not statistically significant at the 5% confidence level (p-value = 0.173), it is rejected the hypothesis that there is a positive relationship between profitability and the extent of environmental disclosure on a corporate website. The studies by Thompson and Ke (2012) and Cho et al. (2010) also applied ROA as a measure of profitability. However, unlike the present research, they had results that indicated a positive relationship between profitability and environmental disclosure. Another hypothesis is debt (*H4*), since it was not significant within the model (p-value = 0.457), it is rejected the hypothesis that there is a negative relationship between debt and the extent of environmental disclosure on a corporate website. Unlike the results of studies made by Brammer and Pavelin (2006), Andrikopoulos and Kriklani (2013), D'Amico et al. (2014), Singhania and Gandhi (2015), resembling only the study made by Liu and Anbumozhi (2009).

However, the explanatory variable sector (*H5*) was significant at the 1% confidence level (p-value = 0.001). This result resembles to the research made by Gray et al. (2001), Patten and Crampton (2004), Wanderley et al. (2008), Liu and Anbumozhi (2009), Suttipun and Stanton (2012), D'Amico et al. (2014), Singhania and Gandhi (2015), as they conclude that environmentally sensitive companies provide more information than companies without high environmental impact. The estimated parameter in the model still indicates an increase ratio of 4.1 percentage points when the company is classified as environmentally sensitive.

The variable country (*H6*) was also significant at a significance level of 1% (p-value = 0.004), indicating that the company's origin explains the extent of environmental disclosure on the corporate website. Therefore, the estimated parameter points to a positive differential of 5.6 percentage in the EDI, when the company is located in the USA. This result resembles to research results made by Xiao et al. (2005), Wanderley et al. (2008), Liu and Anbumozhi (2009) and Singhania and Gandhi (2015) who conclude that the extent of environmental disclosure differs between developed and developing countries.

Finally, models were run separately for Brazilian and US samples. However, there were no distinct results than the results found in the complete model, so it was decided not to discuss them among the research results.

5. Discussion

This paper aimed to explain the extent of environmental disclosure on corporate websites of companies located in Brazil and the USA through corporate characteristics. One of the main methodological limitations of this study was investigating corporate websites, however it was found that the proposed diagram for this investigation of environmental disclosure, which was elaborated from the study by Cho and Roberts (2010), was extremely important to guide the research, although there are large disparities between the websites investigated, such as layouts and distinct interfaces.

Overall, US company websites were more inviting, with graphics, animations, and layouts in the sections about environmental responsibility. The built environmental disclosure content also was proved to be adequate when investigating corporate websites, and there was no need during the search for new adaptations or totally non-existent subcategories, as well as being able to properly capture the environmental disclosure of companies from two different countries.

The first specific objective was to build EDIs for the investigated companies, and among the main conclusions are that on average, US companies have higher EDIs (21.13) than Brazilian companies (15.37). The second specific objective was to point out whether there is a difference in the extent of environmental disclosure between companies located in Brazil and the USA. From the analysis of the filling of the environmental disclosure content and, consequently, the EDI construction, it can be stated that there was a greater extension of disclosure by US companies than the disclosure on Brazilian corporate websites. Although in some subcategories the disclosure is similar between companies in the USA and Brazil, companies in the USA stood out in most of the subcategories of EDI. Except the subcategory "areas protected", where there was a greater disclosure by Brazilian companies.

After investigating websites, the third specific objective was to verify which variables explain environmental disclosure on a corporate website using a multiple regression model. Table 4 summarizes the research results regarding the examination of the previously formulated hypotheses.

Overall, the research results suggest that the variables organization size, the business sector and the country of origin of the company explain the extension of environmental

Hypothesis	Expected signal	Meaningful for the model	Result
H1: A negative relation between environmental performance and the extent of environmental disclosure on a corporate website is expected	−	Yes	Rejected
H2: A positive relation between the size and extent of environmental disclosure on a corporate website is expected	+	Yes	Not rejected
H3: A positive relationship between profitability and the extent of environmental disclosure on a corporate website is expected	+	No	Rejected
H4: A negative relationship between debt and the extent of environmental disclosure on a corporate website is expected	−	No	Rejected
H5: A positive relationship is expected between companies operating in environmentally sensitive sectors and the extent of environmental disclosure on the corporate website is expected	+	Yes	Not rejected
H6: It is expected that companies in the USA disclosure a greater extent of environmental information on corporate websites than companies in Brazil	+	Yes	Not rejected

Source: Research Data (2019)

Table 4. Summary of research hypothesis results

disclosure on a corporate website. While the profitability and debt variables were not significant in the model.

Yet, the variable environmental performance was significant, however, opposite to what was expected in the theory of legitimacy, since a negative relationship between environmental disclosure and environmental performance was expected. Although there is strong evidence that companies use environmental disclosure as a tool of legitimation, we identified the inverse through the variables used for this research, better performing companies have higher EDIs rates.

6. Final considerations and conclusions

The environmental performance measure used in this research may have its limitations and there was no control over such variable, as they were data from CSRHUB® Environment and, therefore, may or may not correctly capture the environmental performance of the investigated companies. Although it was unable to reach conclusions on the theory of legitimacy, the study sought to obtain answers through statistical tests regarding the relation environmental performance versus environmental disclosure.

The results of the regression model, however, suggest a greater extension of environmental disclosure when the company is located in the USA, confirming the research by Xiao et al. (2005), Wanderley et al. (2008), Liu and Anbumozhi (2009) and da Monteiro and Aibar-Guzmán (2010).

Despite its methodological limitations, this study contributes to research on environmental accounting, as it examines non-traditional means of accounting as well as it improves understanding of environmental disclosure by companies in Brazil and the USA. In this sense, the attempt to understand the characteristics of environmental information disclosed by companies through electronic means or websites is still incipient in international literature.

References

Adams, C. A., Hill, W. Y., & Roberts, C. B. (1998). Corporate social reporting practices in Western Europe: Legitimating corporate behaviour?. *The British Accounting Review*, *30*, 1–21. https://doi.org/10.1006/bare.1997.0060

Aerts, W., & Cormier, D. (2009). Media legitimacy and corporate environmental communication. *Accounting, Organizations and Society*, *34*, 1–27. https://doi.org/10.1016/j.aos.2008.02.005

Aerts, W., Cormier, D., & Magnan, M. (2008). Corporate environmental disclosure, financial markets and the media: An international perspective. *Ecological Economics*, *64*, 643 –659. https://doi.org/10.1016/j.ecolecon.2007.04.012

Andrikopoulos, A., & Kriklani, N. (2013). Environmental disclosure and financial characteristics of the firm: the case of Denmark. *Corporate Social Responsibility and Environmental Management*, *20*, 55–64. https://doi.org/10.1002/csr.1281

Bachmann, R. K. B., Carneiro, L. M., & Espejo, M. M. S. B. (2013). Evidenciação de informações ambientais: Proposta de um indicador a partir da percepção de especialistas. *Revista de Contabilidade e Organizações*, *7*, 36–47.

Bagnoli, M., Wang, T., & Watts, S. G. (2014). How do corporate websites contribute to the information environment? evidence from the U.S. and Taiwan. *Journal of Accounting and Public Policy*, *33*, 596–627. https://doi.org/10.1016/j.jaccpubpol.2014.08.001

Barbu, E. M., Dumontier, P., Feleagă, N., & Feleagă, L. (2014). Mandatory environmental disclosures by companies complying with IASs/IFRSs: The cases of France, Germany, and the UK. *The International Journal of Accounting*, *49*, 231 –247. https://doi.org/10.1016/j.intacc.2014.04.003

Brammer, S., & Pavelin, S. (2006). Voluntary environmental disclosures by large UK companies. *Journal of Business Finance & Accounting*, *33*, 1168–1188. https://doi.org/10.1111/j.1468-5957.2006.00598.x

Brown, A. M. (2007). Natural environmental disclosures: Strategic responses by port moresby stock exchange entities. *Business Strategy and the Environment*, *16*, 75–89. https://doi.org/10.1002/bse.464

Buhr, N., & Freedman, M. (2001). Culture, institutional factors end differences in environmental disclosure between Canada and the United States. *Critical Perspectives on Accounting*, *12*, 293–322. https://doi.org/10.1006/cpac.2000.0435

Campbell, D. (2003). Intra-and intersectoral effects in environmental disclosures: Evidence for legitimacy theory?. *Business Strategy and the Environment*, *12*, 357–371. https://doi.org/10.1002/bse.375

Cho, C. H., & Roberts, R. W. (2010). Environmental reporting on the internet by America's toxic 100: Legitimacy and self-presentation. *International Journal of Accounting Information Systems*, *11*, 1–16. https://doi.org/10.1016/j.accinf.2009.12.003

Cho, C. H., Freedman, M., & Patten, D. M. (2012). Corporate disclosure of environmental capital expenditures: A test of alternative theories. *Accounting, Auditing & Accountability Journal*, *25*, 486–507. https://doi.org/10.1108/09513571211209617

Cho, C. H., Roberts, R. W., & Patten, D. M. (2010). The language of US corporate environmental disclosure. *Accounting, Organizations and Society*, *35*, 431–443. https://doi.org/10.1016/j.aos.2009.10.002

Clarkson, P. M., Li, Y., Richardson, G. D., & Vasvari, F. P. (2008). Revisiting the relation between environmental performance and environmental disclosure: An empirical analysis. *Accounting, Organizations and Society*, *33*, 303–327. https://doi.org/10.1016/j.aos.2007.05.003

Cormier, D., & Magnan, M. (2013). The economic relevance of environmental disclosure and its impact on corporate legitimacy: An empirical investigation. *Business Strategy and the Environment*, *24*, 431–450. https://doi.org/10.1002/bse.1829

Cormier, D., Leboux, M. J., & Magnan, M. (2009). The use of web sites as a disclosure platform for corporate performance. *International Journal of Accounting Information Systems*, *10*, 1–24. https://doi.org/10.1016/j.accinf.2008.04.002

Cormier, D., Lapointe-Antunes, P., & Magnan, M. (2015). Does corporate governance enhance the appreciation of mandatory environmental disclosure by financial markets?. *Journal of Management & Governance*, *19*, 897–925. https://doi.org/10.1007/s10997-014-9299-4

D'Amico, E., Coluccia, D., Fontana, S., & Solimene, S. (2014). Factors influencing corporate environmental disclosure. *Business Strategy and the Environment*, *25*, 1 –15. https://doi.org/10.1002/bse.1865

da Monteiro, S. M., & Aibar-Guzmán, B. (2010). Determinants of environmental disclosure in the annual reports of large companies operating in Portugal. *Corporate Social Responsibility and Environmental Management*, *17*, 185–204. https://doi.org/10.1002/csr.197

Deegan, C. (2017). Twenty five years of social and environmental accounting research within critical perspectives of accounting: Hits, misses and ways forward. *Critical Perspectives on Accounting*, *43*, 65–87. https://doi.org/10.1016/j.cpa.2016.06.005

Deegan, C., & Rankin, M. (1996). Do Australian companies report environmental news objectively?. *Accounting, Auditing & Accountability Journal*, *9*, 50–67. https://doi.org/10.1108/09513579610116358

Deegan, C., & Rankin, M. (1997). The materiality of environmental information to users of annual reports. *Accounting, Auditing & Accountability Journal*, *10*, 562–583. https://doi.org/10.1108/09513579710367485

De Villiers, C., & Van Staden, C. J. (2011). Where firms choose to disclose voluntary environmental information. *Journal of Accounting and Public Policy*, *30*, 504–525. https://doi.org/10.1016/j.jaccpubpol.2011.03.005

Gamble, G., Hsu, K., Jackson, C., & Tollerson, C. D. (1996). Environmental disclosures in annual reports: an international perspective. *The International Journal of Accounting*, *31*, 293–331. https://doi.org/10.1016/S0020-7063(96)90022-9

Gomez-Gutierrez, L., & Cormier, D. (2019). Barriers to worldwide institutionalization of social and environmental disclosure. *International Journal of Sustainable Development & World Ecology*, *26*, 99–112. https://doi.org/10.1080/13504509.2018.1511487

Gray, R., Kouhy, R., & Lavers, S. (1995). Corporate social and environmental reporting: A review of the literature and a longitudinal study of UK disclosure. *Accounting, Auditing & Accountability Journal*, *8*, 47–77. https://doi.org/10.1108/09513579510146996

Gray, R., Javad, M., Power, D. M., & Sinclair, C. D. (2001). Social and environmental disclosure and corporate characteristics: A research note and extension. *Journal of Business Finance & Accounting*, *28*, 327–356. https://doi.org/10.1111/1468-5957.00376

Kuo, L., & Chen, V. Y. (2013). Is environmental disclosure an effective strategy on establishment of environmental legitimacy for organization?. *Management Decision*, *51*, 1462–1487. https://doi.org/10.1108/MD-06-2012-0395

Lipe, M. G. (2018). Unpacking the disclosure package: Using experiments to investigate investor reactions to narrative disclosures. *Accounting Organizations and Society*, *68-69*, 15–20. https://doi.org/10.1016/j.aos.2018.05.001

Liu, X., & Anbumozhi, V. (2009). Determinant factors of corporate environmental information disclosure: an empirical study of Chinese listed companies. *Journal of Cleaner Production*, *17*, 593–600. https://doi.org/10.1016/j.jclepro.2008.10.001

Lodhia, S. K. (2010). Research methods for analysing world wide web sustainability communication. *Social and Environmental Accountability Journal*, *30*, 26–36. https://doi.org/10.1080/0969160X.2010.9651819

Magness, V. (2006). Strategic posture, financial performance and environmental disclosure an empirical test of legitimacy theory. *Accounting, Auditing & Accountability Journal*, *19*, 540–563. https://doi.org/10.1108/09513570610679128

O'Donovan, G. (1999). Managing legitimacy through increased corporate environmental reporting: an exploratory study. *Interdisciplinary Environmental Review*, *1*, 63–99. https://doi.org/10.1504/IER.1999.053837

O'Donovan, G. (2002). Environmental disclosures in the annual report. *Accounting, Auditing & Accountability Journal*, *15*, 344 –371. https://doi.org/10.1108/09513570210435870

Patten, D. M. (1992). Intra-industry environmental disclosures in response to the Alaska oil spill: A note on legitimacy theory. *Accounting Organizations and Society*, *17*, 471–475. https://doi.org/10.1016/0361-3682(92)90042-Q

Patten, D. M. (2002). The relation between environmental performance and environmental disclosure: A research note. *Accounting, Organizations and Society*, *27*, 763–773. https://doi.org/10.1016/S0361-3682(02)00028-4

Patten, D. M., & Crampton, W. (2004). Legitimacy and the internet: An examination of corporate web page environmental disclosures. *Advances in Environmental Accounting & Management*, *2*, 31–57.

Ribeiro, A. M., Nascimento, L. F., & Van Bellen, H. M. (2009). Evidenciação ambiental: Análise comparativa multissetorial entre brasil, estados unidos e inglaterra. *Contextus – Revista Contemporânea de Economia e Gestão*, *7*, 7–22. https://doi.org/10.19094/contextus.v7i1.32100

Rover, S., Tomazzia, E. C., Mucia, F. D., & Borba, J. A. (2012). Explicações Para a divulgação voluntária ambiental no Brasil utilizando a análise de regressão em painel. *Revista de Administração*, *47*, 217–230. https://doi.org/10.5700/rausp1035

Singhania, M., & Gandhi, G. (2015). Social and environmental disclosure index: Perspectives from Indian corporate sector. *Journal of Advances in Management Research*, *12*, 192–208. https://doi.org/10.1108/JAMR-12-2013-0069

Suttipun, M., & Stanton, P. (2012). A study of environmental disclosures by Thai listed companies on websites. *Procedia Economics and Finance*, *2*, 9 –15. https://doi.org/10.1016/S2212-5671(12)00059-7

Tagesson, T., Blank, V., Broberg, P., & Collin, S. V. (2009). What explains the extent and content of social and environmental disclosures on corporate websites: A study of social and environmental reporting in Swedish listed corporations. *Corporate Social Responsibility and Environmental Management*, *16*, 352–364. https://doi.org/10.1002/csr.194

Thompson, B., & Ke, Q. (2012). Whether environmental factors matter: Some evidence from UK property companies. *Journal of Corporate Real Estate*, *14*, 7–20. https://doi.org/10.1108/14630011211231419

Wanderley, L. S. O., Lucian, R., Farache, F., & De Souza Filho, J. M. (2008). CSR information disclosure on the web: A context-based approach analysing the influence of country of origin and industry sector. *Journal of Business Ethics*, *82*, 369–378. https://doi.org/10.1007/s10551-008-9892-z

Williams, S. M., & Pei, C.-A. H. W. (1999). Corporate social disclosures by listed companies on their web sites: An international comparison. *The International Journal of Accounting*, *34*, 389–419. https://doi.org/10.1016/S0020-7063(99)00016-3

Xiao, J. Z., Gao, S. S., Heravi, S., & Cheung, Y. C. Q. C. (2005). The impact of social and economic development on corporate social and environmental disclosure in Hong Kong and the U.K. *Advances in International Accounting*, *18*, 219–243. https://doi.org/10.1016/S0897-3660(05)18011-8

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