



## THE ROLE OF CULTURAL VALUES IN CARBON DISCLOSURE: A GLOBAL PERSPECTIVE

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### ABSTRACT

**Purpose:** This research has as a guiding question: What is the influence of cultural values on companies' carbon disclosure?

**Theoretical framework:** As a theoretical basis for the construction of the research hypotheses, Institutional Theory was used, which states that the national environment can shape the behavior of companies.

**Method/design/approach:** This paper analyzed the carbon disclosure of a sample of 1579 companies, headquartered in 19 countries. To compose the cultural values of the countries, the framework of Hofstede (1983) was used. This author points out that four characteristics measure a country's cultural system: distance from power; individualism; masculinity; and uncertainty aversion. Data were analyzed using hierarchical data regression.

**Results and conclusion:** In countries with more hierarchical institutions, companies are discouraged from having a greater role in carbon disclosure. Additionally, in more individualistic cultures, companies also have less disclosure of their carbon emissions. In countries with greater tolerance for cultural diversity, companies disclose more carbon information.

**Research implications:** The results of this work can be used by managers when defining their corporate disclosure policies. Managers must understand how the country's institutional dynamics work, especially the cultural values of society, before starting new businesses.

**Originality/value:** This study presents new empirical evidence that proves the assumptions of Institutional Theory. Value is also added in research on environmental disclosure, focusing on carbon disclosure across multiple countries.

**Keywords:** Cultural Values; Institutional Theory; Carbon Disclosure; Cultural Approach.



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## O PAPEL DOS VALORES CULTURAIS NA DIVULGAÇÃO DE CARBONO: UMA PERSPECTIVA GLOBAL

### RESUMO

**Objetivo:** Essa pesquisa tem como pergunta direcionadora: Qual é a influência dos valores culturais sobre a divulgação de carbono das empresas?

**Referencial teórico:** Como base teórica para a construção das hipóteses de pesquisa, foi utilizada a Teoria Institucional, que afirma que o ambiente nacional pode moldar o comportamento das empresas.

**Método:** O artigo analisou a divulgação de carbono de uma amostra de 1579 empresas sediadas em 19 países. Para compor os valores culturais dos países, foi utilizado o framework de Hofstede (1983). Esse autor aponta que quatro características medem o sistema cultural de um país: distância ao poder; individualismo; masculinidade; e aversão à incerteza. Os dados foram analisados através de regressão hierárquica de dados.

**Resultados e conclusão:** Em países com instituições mais hierarquizadas, as empresas são desencorajadas a ter uma maior atuação na divulgação de carbono. Adicionalmente, em culturas mais individualistas, as empresas também têm menor divulgação de suas emissões de carbono. Em países com maior tolerância à diversidade cultural, as empresas divulgam mais informações de carbono.

**Implicações da pesquisa:** Os resultados dessa pesquisa podem ser usados por gestores ao definir suas políticas corporativas de divulgação. Gestores devem entender como funciona a dinâmica institucional do país, especialmente os valores culturais da sociedade, antes de iniciar novos negócios.

**Originalidade/valor:** Esse estudo apresenta novas evidências empíricas que comprovam os pressupostos da Teoria Institucional. Também é acrescentado valor nas pesquisas sobre divulgação ambiental, focando na divulgação de carbono em diversos países.

**Palavras-chave:** Valores Culturais; Teoria Institucional; Divulgação de Carbono; Abordagem Cultural.

### 1 INTRODUCTION

The disclosure of carbon information has gained additional attention from managers, investors, and clients, as well as from international bodies such as the United Nations and the World Economic Forum (Pinsky et al., 2019; Villena & Dhanorkar, 2020). Therefore, companies have been inserting information about their carbon emissions in their official reports, as well as filling out a questionnaire, such as the one from the Carbon Disclosure Project, an international organization, which aims to map the carbon disclosure level of large companies, located in different parts of the world.

This disclosure has been relevant, because the combustion of carbon is one of the main causes of global warming (Raftery et al., 2017). Thus, the exacerbated presence of carbon in the atmosphere can exacerbate the effects of climate change, such as rising sea levels, melting polar ice caps, loss of biodiversity, rising temperatures, droughts, and floods, as well as irregular rainfall distribution (Fawzy et al. al., 2020).

Given this scenario, several studies have investigated which factors can influence companies to disclose more information on their carbon emissions. For example, Luo (2019) found that firm size and firm financial performance are factors that affect the level of environmental disclosure. Additionally, the findings by Kouloukoui et al. (2019) show that board size and the presence of independent directors have a positive effect on carbon disclosure. However, despite advances in studies on determinants of carbon disclosure, many these studies only examine factors internal to the organization itself, such as corporate governance characteristics and financial performance (Barakat et al., 2016; Forte et al., 2020; Husted & Sousa-Filho, 2019; Oliveira et al., 2013; Wanderley et al., 2008).



Given this finding, further studies should investigate factors external to organizations that affect the level of carbon disclosure. Therefore, this research has as a guiding question: What is the influence of cultural values on companies' carbon disclosure? To find the answer, this article analyzed a sample of 1579 companies, based in 19 countries. To compose the cultural values of the countries, the framework of Hofstede (1983) was used. In this framework, the author points out that four institutional characteristics measure a country's cultural system: distance from power; individualism; masculinity; and uncertainty avoidance (Dutra et al., 2014).

The results of this study dialogue with the Institutional Theory, by showing that the environmental behavior of companies is shaped by the cultural environment in which they are operating (Matten & Moon, 2008; Whitley, 2003). The findings contribute to the literature, as they show that in countries with more hierarchical institutions, companies are discouraged from having a greater role in carbon disclosure. Additionally, in more individualistic cultures, companies also have less disclosure of their carbon emissions. Furthermore, it appears that, in countries with greater tolerance for cultural diversity, companies disclose more carbon information. The data also demonstrate that in cultures that are more open to the diversity of religions, companies are more likely to be more engaged in carbon disclosure.

These results have important academic and practical implications and contributions, bringing applications for companies and governments. By applying Institutional Theory to carbon disclosure, companies can follow institutional pillars to adopt better disclosure practices. Firms must be sensitive to institutional fields and follow the environmental norms and laws of each country, as well as they must copy and adapt the best environmental practices in their organizational contexts. In other words, by adopting institutional mimicry, corporations behave in accordance with stakeholder requirements. Governments can promote certain cultural characteristics so that their firms have better environmental transparency.

This article is structured as follows. After this introduction, the theoretical framework is presented, containing a brief explanation of Institutional Theory, the theoretical lens that explains the results, as well as the hypotheses developed. Then, the research methods are detailed. In section 4, the results and their discussion are presented. Finally, in the conclusion, the research findings are described, presenting the academic and practical implications and limitations and research suggestions.

## 2 THEORETICAL FRAMEWORK

In the current context of organizations, their structures are dictated not only by their management model, but also by their behavior and way of adapting to new trends, contingencies, and complexities, as well as stakeholder pressures (De Mascena et al., 2018; Pinheiro, da Silva Filho, et al., 2021). In view of this, Institutional Theory gains space in organizational studies as it seeks to promote ways of understanding and ways of acting in organizations, becoming a focal point of research in different areas, such as political science, economics, and sociology. In addition, Institutional Theory is considered of paramount importance by several scholars for the understanding of institutions and their functioning (Davis & North, 1970; Hall & Gingerich, 2009; Whitley, 2003). In this sense, institutional evolution seems to be more important than technological evolution (Gala, 2003; Pereira, 2012).

According to Carvalho et al. (2012), there are many definitions of institutionalization, but this is initially defined by Selznick (1948), as a process that occurs in an organization over time, a reflection of its historical peculiarities built by the people who worked there, by the groups and interests created, and by the way in which it maintains the form of relationship with the environment. The Institutional Theory, within the social sciences, began to be divided into two moments, the old economic institutionalism and the neo-institutionalism (Pereira, 2012).

The first addresses the institution as the focal point of this study. In this definition, it is highlighted that the social and cultural, legal, and normative character influence organizations, and



that these are determined from the environment in which they are inserted (Barbosa Neto & Colauto, 2010). The institutionalism point of view helps to identify and explain the main social and environmental factors that are present and that impact organizational objectives (Carvalho et al., 2005; Garcia et al., 2020).

Neo-institutionalism, in turn, configures that the external environment is changeable and to ensure its survival, the organization needs, in addition to seeking to achieve levels of productive efficiency, to seek to establish patterns of behavior through the influence of cognitive, cultural, and normative aspects in the organizations (Barbosa Neto & Colauto, 2010).

From the point of view of neo-institutionalism, Pereira (2012) highlights the processes: 1) coercive, such as the power of force and regulatory norms such as laws and rules; 2) normative, which is linked to expectations, social acceptance and morality of the environment in which one is inserted; and 3) the mimetic process, which arises from the organization's insecurity and the action of copying good practices, strategies and structures from those that are already legitimized, creating the mimetic effect (Scott, 2008; Trevisan et al., 2012).

There are also defenders of a third strand within the Institutional Theory approach, the strand of the new economic institutionalism. Although this approach addresses issues such as transaction costs (Coase, 1937; Williamson, 1987), the new economic institutionalism has a common objective with the other two institutional approaches: to explain the role of institutions and influence on the environment, whether social and political or economic (Barbosa Neto & Colauto, 2010).

As for the institutionalization approach as an influencer of business strategies, Amorim et al. (2021) highlight the social responsibility of organizations and how they are influenced by the institutional environment of the country in which they operate. The results show relationships between the sector of activity, the culture of the place, the size of the company and the environmental behavior of the companies. The way institutions operate in institutionally distant countries proves the influence of isomorphism in maintaining the legitimacy of business practices (Freitas et al., 2013; Soares et al., 2020). Hence, previous studies have demonstrated how institutional aspects can affect companies' environmental disclosure (Khan et al., 2021; Martínez & Mesa, 2021; Pinheiro et al., 2020). One of the main institutional aspects is national culture (Pucheta-Martínez & Gallego-Álvarez, 2019), which is addressed in this article.

It can be seen, therefore, that over time the institutional theory, although undergoing new studies and approaches, it still provides important contributions to the management of organizations and their understanding, providing the perception of the impacts of institutional dynamics on organizational behavior. Thus, such behavior is the result of interactions with the cultural, political environment and the cognitive, symbolic, and social processes in which firms are inserted (DiMaggio & Powell, 2005). In the present study, Institutional Theory was chosen as a theoretical lens, to analyze how companies' adherence to carbon disclosure can be influenced by the country's cultural environment.

## 2.1 Research Hypotheses

The level of hierarchy in society is described as power distance, according to Hofstede (1983). In more hierarchical societies, that is, with greater distance to power, people accept more that power is distributed unequally and positions in companies are verticalized. In societies with greater power distance, people are less interested in social rights and achievements (Garcia-Sanchez et al., 2016). In societies with a high concentration of power, there is less transparency between companies (Gallén & Peraita, 2018), consequently carbon disclosure is lower (Disli et al., 2016). Previous studies have found that in countries with greater power distance, companies disclose less environmental information (Pucheta-Martínez & Gallego-Álvarez, 2019; Rosati & Faria, 2019; Vollero et al., 2020). Therefore, the first research hypothesis is:



H1: Power distance has a negative effect on carbon disclosure.

In more individualistic societies, people feel comfortable making decisions based on what they think is best (Pucheta-Martínez & Gallego-Álvarez, 2019). In these societies, the level of independence and freedom is higher than in more collective societies (Hofstede, 1983). According to Frías-Aceituno et al. (2013), in countries with collectivist cultures, companies tend to disclose more environmental information, because they consider all stakeholders in the decision-making process and not just investors. Companies based in individualistic cultures may be more concerned with achieving their own interests, as previous research affirms (Jensen & Berg, 2012; Pucheta-Martínez & Gallego-Álvarez, 2019; Vollero et al., 2020). Therefore, the second research hypothesis is:

H2: Individualism has a negative effect on carbon disclosure.

In more masculine societies, people are expected to be more competitive, aggressive, and materialistic (de Mooij & Hofstede, 2010). On the other hand, in female societies, society is more oriented towards cooperation, modesty and a focus on quality of life (Hofstede, 1983; Pucheta-Martínez & Gallego-Álvarez, 2019). In the corporate field, male societies tend to have managers who value their professional career and the company's financial success, without considering additional issues such as sustainable development (Tran & Beddewela, 2020). In relation to previous studies, most studies have found that in countries with a female orientation, companies are more engaged in carbon disclosure (García-Sánchez et al., 2013; Pucheta-Martínez & Gallego-Álvarez, 2019; Tran & Beddewela, 2020). Therefore, the third research hypothesis is:

H3: Masculinity has a negative effect on carbon disclosure.

In societies with greater uncertainty avoidance, there are more rules and people are less adept at innovation and change (de Mooij & Hofstede, 2010; Oliveira et al., 2018). When based in societies that are more open to innovation, companies adhere more to additional issues such as corporate social responsibility and gender equality (Tran & Beddewela, 2020). According to Pucheta-Martínez and Gallego-Álvarez (2019), in societies with low uncertainty avoidance, stakeholders expect more responsible behavior from firms. Thus, they require an environmental report and not just a traditional financial report. As shown by previous studies, in countries with greater uncertainty avoidance, companies disclose less information on their carbon emissions (García-Sánchez et al., 2013; Tran & Beddewela, 2020). Therefore, the fourth research hypothesis is:

H4: Uncertainty avoidance has a negative effect on carbon disclosure.

### 3 METHODS

As for the approach, this research is classified as quantitative, since it uses numerical data and uses statistical tests for data collection, analysis, and interpretation (Marconi & Lakatos, 2003). The statistic was used specially to perform regression models. As for the objectives, the study is characterized as descriptive and explanatory. Descriptive research makes it possible to analyze the problem closely, while explanatory research identifies factors that influence the occurrence of certain phenomena (Marconi & Lakatos, 2003). For example, this study presents which cultural variables affect corporate carbon disclosure.

As a population, the survey selected all companies listed in Forbes magazine's Global 2000 companies (2020). This list features the top 2000 largest companies in the world. Then, only companies based in economies that emit more carbon into the atmosphere were filtered, according



to Carbon Atlas (2020). Thus, the research analyzed 1579 companies located in 19 countries: Australia, Brazil, Canada, China, France, Germany, India, Indonesia, Italy, Japan, Mexico, Poland, Russia, Saudi Arabia, South Africa, South Korea, Turkey, United Kingdom and United States. It can be seen, therefore, that the sample corresponds to 78.95% of the population (1579/2000). Table 1 presents the distribution of companies by country.

**Table 1.** Distribution of companies by country.

Country	Nº of firms	Percentage of firms (%)
Australia	32	2.03
Brazil	18	1.14
Canada	61	3.86
China	266	16.85
France	57	3.61
Germany	51	3.23
India	50	3.17
Indonesia	6	0.38
Italy	26	1.65
Japan	217	13.74
Mexico	12	0.76
Poland	6	0.38
Russia	23	1.46
Saudi Arabia	14	0.89
South Africa	10	0.63
South Korea	58	3.67
Turkey	8	0.51
United Kingdom	77	4.88
United States	587	37.18
Total	1579	100.00

The country with the largest number of companies is the United States with 587 companies, representing 37.18% of the total sample. Next, the countries with the highest representation of companies are China with 266 companies and Japan with 217 companies, 16.85% and 13.74%, respectively. In contrast, the countries with the lowest representation in the sample are Indonesia (6 companies), Poland (6 companies) and Turkey (8 companies). The sample of companies is distributed among eleven industry sectors, as shown in Table 2.

**Table 2.** Distribution of companies by sector of activity.

Economic sector name	Nº of firms	Percentage of firms (%)
Communication	78	4.94
Consumer discretionary	173	10.96
Consumer staples	116	7.35
Energy	74	4.69
Financial services	391	24.76
Health care	100	6.33
Industrials	212	13.43
Materials	130	8.23
Real estate	82	5.19
Tecnology	141	8.93



Utilities	82	5.19
Total	1579	100.00

The financial sector has the largest number of companies in the sample, with 391 companies, which corresponds to 24.76% of the total sample. Then comes the industrial sector, with 212 companies and the consumer discretionary sector, with 173 companies. On the other hand, companies that belong to the electricity sector have the lowest participation in the sample. They represent only 4.69% of the total.

The dependent variable is carbon disclosure, measured by a number value, ranging from 100 (higher disclosure) to 1 (lower disclosure). The Carbon Disclosure Project questionnaire answered by the companies, classifies the companies in grades that vary from A+ to F, depending on the quality of the answers given by the companies in relation to their atmospheric emissions. Thus, this study used numerical values for each of these letters, according to the work by Kouloukoui et al. (2019). Table 3 presents the description and source of each of the variables analyzed in this research.

**Table 3.** Description of the analyzed variables.

Variables	Description	Source
CARDIS	Carbon Disclosure: level of disclosure of carbon emissions by companies. This level is measured through a numerical value, which varies between 100 (higher disclosure) and 1 (lower disclosure).	Carbon Disclosure Database
DISPOW	Distance to Power: one of the four cultural dimensions, ranging from 0 (less unequal society) to 100 (most unequal society).	Hofstede (1983)
INDIVI	Individualism: one of four cultural dimensions, ranging from 0 (least individualistic society) to 100 (most individualistic society).	Hofstede (1983)
MASCUL	Masculinity: one of four cultural dimensions, ranging from 0 (least competitive society) to 100 (most competitive society).	Hofstede (1983)
UNCAVO	Uncertainty avoidance: one of four cultural dimensions, ranging from 0 (comfortable with uncertainty) to 100 (uncomfortable with uncertainty).	Hofstede (1983)
IMPREL	Importance of religion: percentage of people who answered "very important" to the following question: How important is religion in your life?	World Values Survey Reporting
DIVREL	Trust in people of other religions/Diversity of religion: percentage of people who answered "I trust" the following question: Do you trust people of other religions than yours?	World Values Survey Reporting
HDI	Human Development Index: measures the country's human development achievements in terms of education, health and income.	World Bank

As independent variables, this study analyzed the four cultural dimensions of Hofstede's framework (1983), in which it shows that national culture can be represented by power distance, individualism, masculinity and uncertainty avoidance. This framework was chosen, since it represents a pillar of the institutional environment of the countries (Pinheiro, Sampaio, et al., 2021). Power distance is defined as the extent to which less powerful members of institutions and organizations within a country expect and accept that power is unevenly distributed.

Individualism measures the degree of interdependence that a society maintains among its members. Masculinity indicates that society will be driven by competition, achievement and



success, success being defined by the winner. In more feminine societies, it is common for quality of life to be the sign of success. Uncertainty avoidance refers to the degree to which members of a culture feel threatened by ambiguous or unfamiliar situations and have created beliefs and institutions to try to avoid these situations.

As control variables, the research selected three variables: importance of religion, trust in people of other religions and the country's human development index. The first two variables refer to religion and were extracted from the World Values Survey report. These variables were selected considering that religion also constitutes a cultural value (Su, 2019). The HDI variable was extracted from the World Bank and measures advances in education, health, and income for each country.

Data analysis was performed, first, considering the descriptive analysis of the analyzed variables. Thus, the main descriptive statistics were provided, such as mean, standard deviation, minimum and maximum. After this analysis, the Spearman correlation coefficients of the variables were generated. The correlation matrix is important because it measures whether there is collinearity between the dependent variable and the explanatory variables. The following tests were operationalized: Shapiro-Francia test, to measure whether the data followed a normal distribution, Variance Inflation Factor (VIF), to test for the existence of collinearity in the sample and the Breusch-Pagan and White tests, which test the existence of heteroscedasticity (Fávero & Belfiore, 2017).

Finally, to measure the influence of explanatory variables on carbon disclosure, hierarchical data regression was operationalized. The following econometric model was run.

$$CARDIS_i = \beta_0 + \beta_1 DISPOD_i + \beta_2 INDIVI_i + \beta_3 MASCUL_i + \beta_4 AVEINC_i + \beta_5 IMPREL_i + \beta_6 DIVREL_i + \beta_7 IDH_i + \varepsilon_i$$

Hierarchical data regression was the most appropriate option to analyze the data, since a time span of at least three years is required to perform the panel data analysis (Fávero, 2013). It is worth mentioning that after running the data in the general model (Model 1), two more regression analyzes were carried out (Model 2 and Model 3), as additional tests. Additional tests are important to prove the signals obtained in the main test, giving greater robustness to the research findings. The data were operationalized in the STATA® software, version 13.

## 4 RESULTS AND DISCUSSION

Here, descriptive analysis and multivariate data analysis will be presented, as well as discussions of the research findings.

### 4.1 Descriptive statistics

Table 4 presents the main descriptive statistics of the variables analyzed in this research. Regarding the dependent variable, the companies in the sample disclosed, on average, 42.86% of the possible total. In addition, there were companies that did not disclose any information on their carbon emissions in 2020, as well as there were companies that made the maximum disclosure possible.

**Table 4.** Descriptive statistics of variables.

Variables	Observations	Mean	SD	Minimum	Maximum
CARDIS	1579	42.86	42.79	0	100
DISPOW	1579	53.59	17.44	35	95
INDIVI	1579	63.29	28.96	14	95





MASCUL	1579	64.91	14.08	36	95
UNCAVO	1579	55.06	21.89	30	95
IMPREL	1278	22.14	17.06	0.2	98.1
DIVREL	1278	4.54	3.61	0	8.1
HDI	1579	28.07	1080.39	0.65	0.95

Regarding the independent variables, the data show that the distance to power has an average of 53.59 out of 100, with a minimum value of 35 and a maximum value of 95. Individualism has an average of 63.29 out of 100, with a minimum value of 14 and a maximum of 95. The masculinity has an average of 64.91 out of 100, with a minimum value of 36 and a maximum of 95. Uncertainty avoidance has an average of 55.06 out of 100, with a minimum value of 30 and a maximum of 95. The importance of religion has an average of 22.14 with a minimum of 0.2% and maximum of 98.1%. Trust in people of other religions has an average of 4.54 with a minimum of 0%, that is, there is a country where people do not trust people of other religions and a maximum of 8.1%. And finally, the HDI has an average of 28.07. The data show that the country with the lowest HDI has a value of 0.65. In contrast, the country in the sample with the highest HDI has an average of 0.95.

Table 5 presents Pearson's correlation matrix. This matrix was created to check the existence or not of collinearity between the explanatory variables and the dependent variable. According to Fávero (2013), collinearity can interfere with the results of hierarchical regression.

**Table 5.** Pearson's Correlation Matrix.

	CARDIS	DISPOW	INDIVI	MASCUL	UNCAVO	IMPREL	DIVREL	HDI
CARDIS	1.000							
DISPOW	-0.31***	1.000						
INDIVI	0.25***	-0.87***	1.000					
MASCUL	0.09***	-0.08***	-0.13***	1.000				
UNCAVO	0.29***	0.02	-0.15***	0.29***	1.000			
IMPREL	0.12***	-0.58***	0.74***	-0.45***	-0.20***	1.000		
DIVREL	0.11***	-0.71***	0.89***	-0.47***	-0.31***	0.89***	1.000	
HDI	0.00	-0.01	0.04	0.04**	0.02	-0.03	-0.03	1.000

\*\*\*p<0.01. \*\*p<0.05. \*p<0.01.

As can be seen in Table 5, although the correlation coefficient between the dependent variable and the explanatory variables were significant, they are all weak correlations, that is, they all present values below 0.80. The highest correlation coefficient is between carbon disclosure and power distance with a correlation of 0.31, weak correlation. When analyzing the total matrix, the highest correlation coefficient (0.89) is between individualism and trust in people of other religions. In addition, the variables religious importance and trust in people of other religions also have the same coefficient (0.89).

## 4.2 Multivariate analysis and discussion of results

Before operationalizing the hierarchical regression, the following tests were performed: Shapiro-Francia test, to measure whether the data followed a normal distribution, Variance Inflation Factor (VIF), to test the existence of collinearity in the sample and the Breusch-Pagan and White, which test the existence of heteroscedasticity. The findings of these tests can be seen in Table 6.

**Table 6.** Normality, collinearity, and heteroscedasticity tests.



Variables	W'	z	VIF	Breusch-Pagan Test
CARDIS	0.82	12.22		Chi2(1)=109.17
DISPOW	0.87	11.47	10.0	Prob>chi2 = 0.0000
INDIVI	0.91	10.56	6.18	
MASCUL	0.85	11.84	4.74	White test
UNCAVO	0.88	11.16	1.63	chi2(1)=404.32
IMPREL	0.89	10.45	8.59	Prob>chi2 = 0.0000
DIVREL	0.89	10.39	2.52	
HDI	0.00	16.30	1.10	

The null hypothesis of the Shapiro-Francia W test is that the population is normally distributed. Thus, if the p-value is smaller than the W', then the null hypothesis is accepted and there is evidence that the data follow the normal distribution. The data reveal that the p-value is smaller than the W' of each of the variables. In this way, it can be confirmed that the data is distributed normally. Regarding the VIF, most variables are below or around 10, which is the most suitable to prove the absence of collinearity. The data also reveal that the sample does not have heteroscedasticity, since the value of Prob>chi2 is less than 0.05.

After listing these tests above, the hierarchical data regression was operationalized. In Model 1, all companies in the sample were included in the econometric analysis. In Model 2 and Model 3, additional tests were carried out to prove the signal obtained in the main model, that is, in Model 1. In Model 2, American companies were excluded, since the United States has a sample of 587 companies, which could bias the results. In Model 3, companies belonging to the financial sector were removed, since these companies can follow particular norms and rules. The results of the multivariate analysis are shown in Table 7.

**Table 7. Multivariate Analysis Results.**

Variables	Model 1		Model 2		Model 3	
	Coef.	t	Coef.	t	Coef.	t
DISPOW	-1.05***	-5.24	-1.54***	-3.62	-1.00***	-5.63
INDIVI	-0.71***	-2.82	-0.79*	-1.91	-0.45**	-1.91
MASCUL	0.46***	2.93	0.60**	2.18	0.44**	3.17
UNCAVO	0.64***	10.75	0.91***	5.23	0.55***	9.28
IMPREL	-0.23	-1.32	-0.56**	-1.97	-0.05	-0.34
DIVREL	6.47***	2.83	8.45**	2.27	6.06***	3.00
HDI	0.000	0.79	-118.12	-0.86	0.00	0.51
Obs.	1278		984		691	
Prob>F	0.0000		0.0000		0.0000	
R-squared	0.2267		0.2871		0.4142	
Adj R-squared	0.2224		0.2820		0.4082	

\*\*\*p<0.01. \*\*p<0.05. \*p<0.01.

From the analysis of Model 1, it appears that power distance has a negative influence on carbon disclosure. In other words, in countries with greater power distance, companies are discouraged from disclosing more environmental information. This result was also found in Model 2 and Model 3. Thus, it can be said that companies located in more hierarchical cultures and where people are more accepting of differences in power, disclose less information on their carbon emissions.

According to Pucheta-Martínez and Gallego-Álvarez (2019), in societies with greater power distance, people have fewer resources because, in general, resources and power are unevenly



distributed. In this way, companies based in these societies tend to consider investors in their decision-making, issuing traditional financial reports. In addition, in countries with greater distance to power, firms often reduce the participation and influence of other stakeholders in the corporate decision-making process, as they privilege the transparency of financial information (Pucheta-Martínez & Gallego-Álvarez, 2019).

In countries where there is greater inequality of power, companies are more likely to have less dialogue with stakeholders. This favors the company trying to issue more information to investors, leaving environmental information, which is useful to other stakeholders, in the background. These findings confirm previous studies (Pucheta-Martínez & Gallego-Álvarez, 2019; Rosati & Faria, 2019; Vollero et al., 2020). The results confirm research hypothesis 1.

Individualism has a negative effect on carbon disclosure in the three models. This means that, in countries where people are more individualistic and with a greater level of freedom, companies disclose more complete information on their carbon emissions into the atmosphere. In this way, individualism is a determining factor for the disclosure of carbon by companies, indicating that in more collectivist cultures, companies are more participatory in environmental disclosure (Pinheiro, Sampaio, et al., 2021).

More collectivist societies tend to be more sensitive to stakeholder interests (Vollero et al., 2020). In this way, when companies publish an environmental report or respond to a survey about their carbon emissions, they tend to be more transparent, because they believe that employees, customers, suppliers, non-governmental organizations, unions, and government are important for them to achieve their goals. its strategic objectives. Thus, in more collective societies, cohesion between individuals predominates (Vollero et al., 2020).

According to Garcia-Sanchez et al. (2016), it is expected that in more individualistic societies, firms disclose less environmental information, because, in these cultures, managers are more concerned with the financial interests of the company itself. Previous studies confirm the findings of this research (Jensen & Berg, 2012; Pucheta-Martínez & Gallego-Álvarez, 2019; Vollero et al., 2020), by stating that in more individualistic societies, companies are not opened to disclosing a large volume environmental information, such as disclosing their carbon emissions. These findings confirm research hypothesis 2.

The findings also indicate that masculinity positively influences carbon disclosure. Thus, the results allow us to infer that in economies with more competitive cultures and where people are more focused on professional success, companies tend to disclose more carbon information. These findings were evident in the three econometric models. Thus, proving that, in fact, the country's masculinity factor matters in the level of carbon disclosure of firms.

Research hypothesis 3 predicted the opposite of this research finding. More masculine cultures are more assertive and focus more on material success than more feminine cultures (García-Sánchez et al., 2013), as the latter focus on quality of life. One of the reasons for this finding is that since in more human-oriented cultures, the corporate environment is more competitive, so it is evident that companies want to stand out more and not just prepare and publish a traditional financial report. In this way, companies are more engaged on additional issues such as carbon disclosure.

According to Tran and Beddewela (2020), male societies show less attention to well-being and business ethics, emphasizing corporate financial results. Despite this statement, the findings demonstrate that male societies can also have a good engagement in environmental issues, using carbon disclosure as a differentiating factor in a more competitive market.

By analyzing the results of Table 7, uncertainty avoidance has a positive effect on carbon disclosure. Both in Model 1 and in the additional models, it was found that uncertainty avoidance is a factor that influences the behavior of companies in relation to carbon disclosure. Therefore, in cultures where people are less open to innovation, companies tend to disclose more information about their carbon emissions. In contrast, countries with cultures with greater uncertainty avoidance have companies with a higher level of carbon disclosure.



According to Oliveira et al. (2018), cultures with a higher level of uncertainty avoidance impose more rules on people. This statement can also be reflected for companies, that is, in these cultures there are more rules for companies to behave more ethically and disclose more information on their carbon emissions. Thus, one of the justifications for uncertainty avoidance having a positive effect on carbon disclosure is that in environments with greater uncertainty avoidance, companies are legally obliged to act more responsibly.

The study by Pucheta-Martínez and Gallego-Álvarez (2019) also found that in environments with greater uncertainty avoidance, companies perform lower in carbon disclosure. The authors argue that the greater number of codes of conduct forces companies to behave more ethically. It can also be inferred that in environments with greater aversion to uncertainty, stakeholders are less flexible to environmental laws and therefore demand more detailed carbon disclosure from firms (Disli et al., 2016).

Regarding the control variables, this study found, within the significance level, only one: trust in people of other religions. Findings show that individuals' greater trust in people of different religions has a positive effect on carbon disclosure. In practice, this means that in societies with greater religious tolerance and where people are more accepting of the diversity of thoughts and beliefs, companies have a greater environmental role, disclosing more information on their carbon emissions.

Religion is an important informal institution that shapes people's behavior (van Aaken & Buchner, 2020). According to Su (2019), religious belief generates greater responsibility and social awareness today. Through another cultural variable, people's trust in other religions, this study shows that in cultures with people more open to accepting religious differences, companies disclose more information about their carbon emissions. This finding confirms the study by Brammer et al. (2007), which showed that in cultures with greater diversity of beliefs, companies have greater social responsibility. In societies with greater religious acceptance, managers tend to look at the needs of minority groups, because they are also relevant to the company's performance, including social and environmental issues in board meetings (Griffin & Sun, 2018).

## 5 CONCLUSIONS

This study answered the following research question: What is the influence of cultural values on corporate carbon disclosure? Through the analysis of Hofstede's theoretical framework (1983), the influence of four cultural values (distance from power, individualism, masculinity, and uncertainty avoidance) on companies' carbon disclosure was analyzed. The research analyzed a sample of 1579 companies, based in 19 countries and the results showed that carbon disclosure is affected by the national context, proving the Institutional Theory, by showing that the behavior of companies is shaped by the institutional context of the country, in which she operates.

The findings showed that in countries with greater power distance, that is, institutions are more hierarchical, and the distribution of power is uneven, companies are discouraged from having a greater role in carbon disclosure. In more individualistic cultures, companies also have less disclosure of their carbon emissions. Furthermore, in more competitive countries and where there is greater aversion to uncertainty, firms tend to behave more responsibly in relation to carbon disclosure. It was also found that countries with greater acceptance of religious diversity, companies have a greater commitment to carbon disclosure.

The results of this article dialogue with previous studies (Disli et al., 2016; Pucheta-Martínez & Gallego-Álvarez, 2019; Tran & Beddewela, 2020). It is possible to conclude that firms must be sensitive to the local environment in which they are operating. Companies must follow the rules (normative pillar of the Institutional Theory) when reducing and being transparent in relation to their carbon emissions. In addition to following environmental standards, corporations must also adapt to changes in the organizational field in which they operate. They can follow the mimetic pillar of Institutional Theory by imitating companies with better environmental performance.



Finally, it is important that firms are sensitive to regional culture and formulate their carbon disclosure strategies, according to the cultural environment of the country or geographic region.

### 5.1 Academic and practical implications

The findings of this research have important academic and practical implications. First, this research confirms the assumption of Institutional Theory, which states that the behavior of companies is shaped by the national context of the country. A greater number of studies have investigated how internal factors of organizations, such as corporate governance characteristics and financial performance, influence carbon disclosure. This study examines external factors of firms, concluding that not only internal factors are determinants of carbon disclosure.

In addition to academic contributions, this research has managerial applications. The results can be used by managers when defining their corporate environmental disclosure policies. Furthermore, managers must understand how the country's institutional dynamics work, especially the cultural values of society, before starting new businesses. Legislators can encourage greater transparency of carbon emissions information by creating a national award to reward the most transparent companies in the Carbon Disclosure Project questionnaire.

### 5.2 Limitations and future research

This study has certain limitations. For example, only large companies were analyzed. Thus, the results cannot be generalized to companies of other sizes. Another limitation refers to Hofstede's framework (1983), that is, only four variables were considered to compose the cultural values of the countries. In addition, this research analyzed a specific year, making statistical analysis impossible using the panel data analysis method.

Therefore, further studies must overcome these limitations. A research suggestion is to examine new frameworks for composing the cultural values of countries, analyzing issues such as country corruption, country legal system and country communication system. Future studies may also analyze a longer period, adding control variables at the company level, such as profitability, liquidity, and profitability.

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