

The effects of national culture on environmental disclosure: A cross-country analysis

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ABSTRACT

This study aims to answer the following research question: How does national culture affect environmental disclosure in liberal economies? Several previous studies have shown that formal institutions, such as the characteristics of the government, the country's financial system, have an influence on environmental disclosure. However, there is still a gap in the literature on how informal institutions (the country's culture) can influence the behavior of companies. The results of this study provide a solid understanding of environmental disclosure in liberal economies. In these economies, it is common for companies to be more interested in disclosing financial and governance information. Thus, analyzing environmental disclosure in these companies presents an additional gain for the literature. Managers can use our findings to understand how the country's culture can influence their business. The adoption of the Global Reporting Initiative (GRI) disclosure guidelines and the presence of a sustainability committee in the company can help companies achieve better environmental performance. We examined the level of environmental disclosure for a sample of 1,037 companies based in Australia, Canada, Ireland, New Zealand, United Kingdom, and United States of America (USA) for the period 2015-2018. To measure national culture, we used the proposed cultural dimensions by Hofstede (1983): distance to power, individualism, masculinity, aversion to uncertainty, long-term orientation, and indulgence. Our evidence shows that power distance, individualism, and masculinity have a positive effect on environmental disclosure. The results show that in cultures with less aversion to uncertainty, companies disclose more environmental information. Our findings also show us that companies that carry out an environmental disclosure following GRI guidelines disclose more sustainability information. The results show that sectors such as energy, materials, and utilities have greater environmental disclosure.

Keywords: national culture, environmental disclosure, institutional environment, cultural dimensions, cross-country analysis.

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1. INTRODUCTION

Environmental disclosure has been at the forefront of the business agenda during the last decade (Oliveira et al., 2009; Tran & Beddewela, 2020). As many companies have been criticized for their negative impacts on the environment (Pucheta-Martínez & Gallego-Álvarez, 2019), disclosing environmental information provides additional information to the market and shows compliance with the needs of stakeholders (De Villiers & Marques, 2016). Thus, environmental disclosure, in addition to meeting stakeholder expectations, contributes to the well-being of society.

In that regard, previous studies have analyzed which factors are decisive for environmental disclosure (Burgwal & Vieira, 2014; Cancela et al., 2020; Fuente et al., 2017; Tibiletti et al., 2021). In general, these studies found that the company's financial performance and certain corporate governance characteristics positively influence the level of environmental disclosure. Despite the contribution of these previous studies, they describe that new research should expand the understanding of environmental disclosure to factors at the country level.

The thesis that national factors can affect the behavior of organizations is supported by institutional theory. Studies that analyzed the national environment through culture found conflicting results (Gallego-Álvarez & Pucheta-Martínez, 2020; García-Sánchez et al., 2013; Miska et al., 2018). Additionally, these previous studies selected a group of countries to examine that do not have similar characteristics and yet generalize the results. It is necessary that new studies investigate a group of countries with similar characteristics. This presents greater confidence to generalize findings within a group of countries.

In view of the above ideas, our research proposes to answer the following research question: How does national culture affect environmental disclosure in liberal economies? To do this, we examined the level of environmental disclosure for a sample of 1,037 companies based in Australia, Canada, Ireland, New Zealand, the United Kingdom, and the United States of America (USA). To measure national culture, we use the cultural dimensions proposed by Hofstede (1983), because according to Miska et al. (2018), these dimensions are the most appropriate to measure cultural differences between countries.

In this study, we analyzed companies based in countries with similar characteristics. For example, the selected countries are liberal market economies, have a competitive labor market with flexible contracts, more

developed corporate governance mechanisms, a common law legal system and a financial system based on capital markets (Hall & Soskice, 2001). Most studies analyze the relationship between internal factors of organizations and environmental disclosure in this type of economy, because in these countries companies prefer to disclose more financial and governance information to meet the demands of shareholders (Pucheta-Martínez et al., 2019). Therefore, cultural factors are less examined in relation to environmental disclosure in liberal economies. Analyzing the effect of informal institutions (country culture) on environmental disclosure presents new evidence for organizational studies in liberal market economies.

Our evidence shows, in societies with greater distance from power, more individualistic and masculine cultures, and less aversion to uncertainty, companies tend to have greater environmental disclosure. Our findings contribute to the environmental disclosure debate, with academic, managerial, and governmental implications.

First, when examining a group of countries with specific characteristics, we bring evidence of how national culture affects the behavior of companies. When analyzing a large sample of companies from different contexts, the research fails to capture whether, in fact, the selected cultural characteristics affect all countries in the same way. Second, our findings confirm the institutional theory by finding that informal institutions in countries shape the ethical behavior of companies (Campbell, 2007).

In addition to presenting new evidence of the effect of national culture on environmental disclosure, our study presents managerial contributions. The findings of this research can be used by managers when entering new markets. They can also adopt the Global Reporting Initiative (GRI) guidelines and encourage the creation of the corporate social responsibility (CSR) committee to increase the level of environmental disclosure for their companies. Additionally, regulatory bodies should consider countries' cultural characteristics before formulating national CSR promotion policies.

In the next section, we provide an overview of the relationship between national characteristics and environmental disclosure, as well as the hypotheses developed. In the subsequent section, we describe the methods used in conducting the research. The following section presents the results of the research, followed by the discussion and implications of the study. The final section concludes with the main findings, limitations, and suggestions for future studies.

2. THEORETICAL FRAMEWORK

2.1 National Characteristics and Environmental Disclosure

Institutional theory emphasizes that cultural and social pressures influence organizational structures and practices (Scott, 1987). Following this point of view, organizations are passive agents, since the rules come from the national system, external and hierarchically superior to firms (Zucker, 1987). According to DiMaggio and Powell (1983), managerial decisions are affected by three institutional mechanisms: coercive, mimetic, and normative isomorphism.

Coercive isomorphism results from both formal and informal pressures on organizations. Formal pressures are the rules within an institutional environment and informal pressures are the cultural characteristics of the country. In relation to mimetic isomorphism, it happens when the institutional environment creates uncertainty; organizations may come to take others as models, imitating their characteristics. The normative isomorphism derives from the exchange of experiences of professionals, consultants, and universities within an organizational field (DiMaggio & Powell, 1983).

In order to obtain legitimacy, organizations seek to adapt their products, programs, and policies to the national context in which they operate (Meyer & Rowan, 1977). The rules of the game in the form of laws, norms, social conventions, and other written or unwritten rules of conduct interfere with business performance (Scott, 2008). Thus, it is relevant to how the study of national characteristics affects companies, especially the environmental disclosure (Roxas & Coetzer, 2012). Organizations release environmental information because they are forced by informal pressures from the country in which they operate. These informal pressures, like national culture, affect behavior and impose certain expectations on them (Campbell, 2007).

In this perspective, previous studies have examined how the country's institutional factors affect environmental disclosure (Baldini et al., 2018; Coluccia et al., 2018; De Villiers & Marques, 2016; Ioannou & Serafeim, 2012; Jensen & Berg, 2012; Miniaoui et al., 2019; Ortas et al., 2019). The study by Ioannou and Serafeim (2012) analyzed the influence of the national business system on social and environmental disclosure. The results show that in countries with less corruption, companies disclose more social and environmental information. In addition, the availability of qualified labor in the country

is a determining factor for companies to increase the level of social and environmental disclosure.

Jensen and Berg (2012) analyzed a sample of 309 companies and the findings show that certain national characteristics affect the level of environmental disclosure. For example, in countries with a higher density of unions and greater economic development, companies publish a rather sustainable complete report. The research conducted by De Villiers and Marques (2016) found that national governance influences environmental disclosure. They found that firms are more likely to disclose more environmental information in countries with better investor protection, a higher level of economic freedom, and better regulatory quality.

Coluccia et al. (2018) investigated the relationship between institutional factors and environmental disclosure in European companies. The findings show that the ethical behavior of firms is determined by national characteristics, such as control of corruption, rule of law, and quality of laws in the country. Baldini et al. (2018) analyzed how the countries' institutional environment influences environmental, social, and governance (ESG) disclosure. The findings show that in countries where there is greater protection for employees and lower unemployment, companies disclose more information in their official reports.

According to Miniaoui et al. (2019), one of the national characteristics that affect environmental disclosure is the country's legal system. The authors analyzed 211 companies and concluded that the European context favors greater environmental disclosure, because on this continent most countries follow the civil law legal system, which favors business decision making considering the needs of all stakeholders. The study by Ortas et al. (2019) found that companies in countries with a developed credit market have the highest levels of environmental disclosure. In addition, in countries where scientific knowledge is available, companies disclose more environmental information.

In addition to these institutional characteristics, previous studies have also sought to investigate how informal institutions in countries, represented by the cultural system, can influence environmental dissemination practices (Adnan et al., 2018; Gallén & Peraita, 2018; Garcia-Sánchez et al., 2016; Pucheta-Martínez & Gallego-Álvarez, 2019; Tran & Beddewela, 2020). Studying the relationship between informal institutions and environmental disclosure is significant because most studies that work

with national characteristics and environmental disclosure analyze the formal structures of countries, such as the legal system, financial characteristics, and political issues (García-Sánchez et al., 2016; Pinheiro et al., 2021).

García-Sánchez et al. (2016) examined the influence of national culture on the CSR disclosure. The findings show that companies located in countries with more collectivist, female cultures, and with less power distance disclose more information on CSR. The study by Adnan et al. (2018) investigated 203 companies based in China, Malaysia, India, and the United Kingdom and found that in countries where people do not easily accept hierarchical differences, companies disclose more environmental information in their official reports. The study concluded that within the same country, companies disclose a similar amount of environmental information, characteristic of mimetic isomorphism.

Gallén and Peraita (2018) examined the effect of national cultures on environmental disclosure. The results show that when firms are based in more masculine and individualistic societies, they disclose less environmental information. The study by Pucheta-Martínez and Gallego-Álvarez (2019) confirms the findings of Gallén and Peraita (2018), by showing that in cultures with a higher level of masculinity and individualism, companies are less engaged in environmental disclosure. Tran and Beddewela (2020) chose two cultural characteristics to verify the influence on the environmental disclosure of 171 Asian companies. They found that countries with a female-oriented culture, firms disclose more environmental information, and in countries with a higher rate of uncertainty avoidance, companies disclose more information in environmental reports.

As we can see, these studies above analyze the effect of the institutional environment on the disclosure of CSR. Our study proposes the analysis of the national culture on environmental disclosure in only one group of countries. This is relevant, because the countries have similar institutional characteristics, which can facilitate the generalization of the results. Studies analyzing many countries, chosen at random, err in generalizing the results without considering individual groups.

2.2 Research Hypotheses

Distance to power refers to the level of hierarchy in society. This dimension measures the ability of members of a society to accept that power is distributed unequally (Hofstede, 1983). Countries with greater power distance tolerate more inequality and hierarchy (De Mooij & Hofstede, 2010). According to Pucheta-Martínez and

Gallego-Álvarez (2019), when companies operate in cultures with low power distance, they need to disclose more information about their environmental practices in order to gain the approval of stakeholders. In countries with a lower level of power distance, individuals assume that people are equal and they expect a democratic relationship between company and stakeholders (Gallén & Peraita, 2018). Previous studies have found that in countries where the level of distance to power is low, companies are encouraged to disclose more information about their environmental practices (Adnan et al., 2018; Gallego-Álvarez & Ortas, 2017; García-Sánchez et al., 2013, 2016). However, the study by Pucheta-Martínez and Gallego-Álvarez (2019) did not find a significant relationship between power distance and environmental disclosure. We propose that:

H₁: the level of power distance in society has a negative effect on environmental disclosure.

Individualism is the degree to which people in a society are integrated into a group. In individualistic societies, individuals are concerned about themselves and their immediate family (Hofstede, 1983). In contrast, in collectivist societies, people think more about how their individual actions can affect the group (García-Sánchez et al., 2013). In these societies, the group is considered more important than the individual, and companies tend to take into account the interests of all stakeholders, not just investors (Pucheta-Martínez & Gallego-Álvarez, 2019). Therefore, when companies operate in more collective cultures, they tend to create connections with the surrounding community, which contributes to more responsible behavior (Gallén & Peraita, 2018). Previous studies have found that a higher level of individualism in the country negatively affects environmental disclosure (Gallén & Peraita, 2018; García-Sánchez et al., 2013; Pucheta-Martínez & Gallego-Álvarez, 2019). However, Sannino et al. (2020) found that in the banking sector the impact of individualism on environmental disclosure is not significant. We propose that:

H₂: the level of individualism in society has a negative effect on environmental disclosure.

Masculinity is the degree to which role differences vary between men and women. For example, in male-oriented cultures, society is motivated by competition and success (Hofstede, 1983). Cultures with a higher degree of masculinity value professional careers and business success, giving preference to the disclosure of financial and governance information over environmental

information (García-Sánchez et al., 2016). In contrast, in female-oriented cultures, society seeks information about corporate decisions, such as preserving the environment (Pucheta-Martínez & Gallego-Álvarez, 2019). Thus, in less masculine societies, companies are expected to behave more responsibly, disclosing more environmental information. There are studies that found that the country's level of masculinity has a negative influence on environmental disclosure (Gallén & Peraita, 2018; Pucheta-Martínez & Gallego-Álvarez, 2019; Thanetsunthorn, 2015; Tran & Beddewela, 2020). We propose that:

H₃: the level of masculinity in society has a negative effect on environmental disclosure.

Uncertainty avoidance measures the extent to which members of a culture feel threatened by unknown situations (Hofstede, 1983). Companies with less tolerance to uncertainty need rules to structure corporative strategies, because they are averse to innovations (García-Sánchez et al., 2013). According to Gallén and Peraita (2018), economies like Denmark, Hong Kong, and Singapore have cultures with a low aversion to uncertainty, because in these countries people are comfortable with changes, which favors companies to innovate more in sustainability, reporting their environmental practices in the reports. Most studies have hypothesized the negative effect of uncertainty avoidance on environmental disclosure (García-Sánchez et al., 2016; Pucheta-Martínez & Gallego-Álvarez, 2019; Tran & Beddewela, 2020), since a higher level of aversion to uncertainty is related to a preference for secrecy, thus restricting environmental disclosure. We propose that:

H₄: the level of uncertainty avoidance in society has a negative effect on environmental disclosure.

Long-term orientation refers to the degree to which members of a culture orient their efforts towards the future (Acquah et al., 2021; Hofstede, 2011). Stakeholders with a short-term orientation show respect for traditions and have a focus on quick results. They prefer traditional financial

reporting to environmental reporting (García-Sánchez et al., 2013). In future-oriented societies, companies tend to release environmental reports, as these reports contain important information about the future. In short-term cultures, companies aim more to satisfy the needs of investors, as they want faster financial returns (Pucheta-Martínez & Gallego-Álvarez, 2019). Previous studies have found that companies that operate in countries with long-term orientation disclose a higher level of environmental disclosure (Disli et al., 2016; Gallén & Peraita, 2018; García-Sánchez et al., 2016). Despite this, García-Sánchez et al. (2013) found that in cultures with a long-term view, companies have less environmental disclosure. We propose that:

H₅: the level of long-term orientation in society has a positive effect on environmental disclosure.

Indulgence measures the degree to which people regulate their desires and impulses. In indulgence societies, people show a willingness to fulfill their impulses and desires and value leisure time (Hofstede, 2011). In indulgence societies, people tend to create a sense of freedom and control over life (Ismail & Lu, 2014). Organizations within less-indulgence cultures have more incentives to carry out activities related to the environment, better knowing the needs of their stakeholders (Pucheta-Martínez & Gallego-Álvarez, 2019). According to Disli et al. (2016), indulgence societies are characterized by a wasteful lifestyle, which increases the environmental pollution of companies in the environment. Previous studies have found that a higher level of indulgence in the country negatively influences environmental disclosure (Disli et al., 2016; Gallego-Álvarez & Ortas, 2017; Pucheta-Martínez & Gallego-Álvarez, 2019). However, the findings of Pinheiro et al. (2021) and Sun et al. (2019) show that in more indulgent cultures, companies are more engaged in environmental practices. We propose that:

H₆: the level of indulgence in society has a negative effect on environmental disclosure.

3. METHODS

The data collection process for the 2015-2018 period is as follows. This period of analysis was chosen for two reasons: 1) the period after the signing of the United Nations Global Compact; and 2) when this research began to be designed, the researchers only collected data until 2018.

First, all companies based in liberal economies (Australia, Canada, Ireland, New Zealand, the United Kingdom, and the USA) were selected from the Thomson Reuters Eikon® database. Second, after this selection, companies without environmental or financial/economic information were

excluded. Therefore, the sample of this study was composed of 1,037 companies based in 6 countries, which follow the model of liberal capitalism. Only these 6 countries

make up the group of liberal capitalism, according to the methodology of Hall and Soskice (2001). Table 1 provides the number of companies by country.

Table 1
Sample distribution by country

Country	Number of companies	Percentage	Cumulative percentage
Australia	84	0.081	0.081
Canada	149	0.144	0.225
Ireland	28	0.027	0.252
New Zealand	6	0.006	0.257
United Kingdom	213	0.205	0.463
United States of America	557	0.537	1.000
Total	1,037	1.000	

Source: *Elaborated by the authors.*

As can be seen, the country with the highest representation is the USA with 53.7%, followed by the United Kingdom with 20.5%. In contrast to these figures, New Zealand and Ireland are the countries with the lowest representation, with 6 and 28 companies,

respectively. These international companies operate within 11 industries as shown in Table 2. According to Table 2, companies belonging to the materials, energy, and utilities sectors had greater environmental disclosure.

Table 2
Number of companies by industry

Economic sector name	Nº of companies	Percentage	Cumulative percentage	Environmental disclosure
Communication	56	0.054	0.054	13
Discretionary consumer	177	0.171	0.225	12
Consumer staples	82	0.079	0.304	13
Energy	55	0.053	0.357	14
Financial	130	0.125	0.482	12
Health care	73	0.070	0.553	13
Industrials	177	0.171	0.723	12
Materials	126	0.122	0.845	15
Real estate	10	0.010	0.854	12
Technology	105	0.101	0.956	12
Utilities	46	0.044	1.000	14
Total	1,037	1.000		

Source: *Elaborated by the authors.*

In this study, we used the sectoral classification based on the Refinitiv Business Classifications (TRBC) economic sector classification by Thomson Reuters. Table 2 shows that the companies are distributed within 11 industries: communication, discretionary consumer, consumer staples, energy, financial, health care, industrials, materials, real estate, technology, and utilities. The industries with the greatest representation are industrial and discretionary consumption with 17% and the lowest representation comes from real estate with 1%.

The dependent variable is the environmental disclosure of companies. To measure this environmental disclosure,

we created an environmental performance index, which was developed based on the model from Gamerschlag et al. (2011) and Pinheiro et al. (2022). In our index, we select the categories of environmental disclosure, according to Gamerschlag et al. (2011): recycled, energy consumption, biodiversity, emissions, effluents and water, waste, spills, and environmental impacts. From these categories, we allocate the environmental indicators from the Thomson Reuters Eikon® database. Table 3 shows the environmental disclosure index.

Table 3
Environmental disclosure index

Pillars of environmental disclosure	Description
Recycled	Waste recycled total
	Waste recycled to total waste score
Energy consumption	Energy efficiency initiatives
	Energy use total
Biodiversity	Renewable energy use
	Biodiversity impact reduction
Emissions	Biodiversity restoration protection
	CO ₂ equivalents emission total
	NO _x emissions
	SO _x emissions
Effluents and water	Ozone-depleting substances
	Water discharged
	Water pollutant emissions
	Water recycled
	Water withdrawal total
Waste	Water technologies
	Waste total
	Non-hazardous waste
Spills	Hazardous waste reduction
	Recent spills and pollution controversies
Environmental impacts	Accidental spills
	Environmental resource impact controversies
	Land environmental impact reduction
	Toxic chemicals or substances reduction
	Environmental products

Source: *Elaborated by the authors.*

Our environmental disclosure index is measured by the sum of the 25 items related to environmental problems. Each of these items take the value 1 if the company reports this item analyzed, and 0 if the company does not report this item. Thus, when companies disclose more information about their environmental problems, the higher their score on the environmental disclosure index.

National culture was measured according to the cultural dimensions of the model created by Hofstede (1983), which found that the country's culture can be measured by six distinct characteristics: power distance (POWDIS), individualism (INDIVI), masculinity (MASCUL), uncertainty avoidance (UNCAVO), long-term orientation (LONORI), and indulgence (INDULG). All data on the countries' national culture were collected from the Hofstede website (<https://www.hofstede-insights.com/country-comparison/thailand/>).

Power distance index ranges from 0 to 100. In countries with a score close to 0, the hierarchy is established for convenience, superiors are accessible, and information is frequently shared with managers and employees. In

countries with a score close to 100, the hierarchy is respected and inequalities between people are accepted. In organizations, there is a boss who makes individual decisions.

Individualism index ranges from 0 to 100. In countries with a score close to 0, people from birth are integrated into strong groups formed by the extended family. In the work environment, it is important to build relationships of trust and in general, the meetings begin with general matters. In countries with a score close to 100, people take care of themselves and their immediate family. In the business world, employees are expected to have initiative and promotion decisions are based on merit.

Masculinity index ranges from 0 to 100. In countries with a score close to 0, the dominant values in society are quality of life and care for others. In women's societies, it is not admirable to stand out from the crowd. On the other hand, in countries with a score close to 100, society is driven by competition, achievement, and success. Behavior at school and at work is based on the shared values that the winner takes everything.

Uncertainty avoidance index ranges from 0 to 100. This index indicates the extent to which members of a culture feel threatened by the unknown and have created institutions to try to prevent this. In countries with a score close to 0, people feel comfortable with uncertainty. However, in countries with a score close to 100, people are not comfortable with uncertainty and therefore they consider that laws and rules are important to make the country a safer place to live.

Long-term orientation index ranges from 0 to 100. In countries with a score close to 0, there is a normative culture. People in these countries show great respect for traditions, a small propensity to save for the future and a

focus on achieving quick results. In contrast, in countries with a score close to 100, people save money and encourage education as mechanisms to prepare for the future.

Finally, indulgence index also ranges from 0 to 100. In countries with a score close to 0, society has a tendency towards cynicism and pessimism. In these societies, people do not place much emphasis on leisure time and their actions are restricted by social norms. In contrast, in countries with a score close to 100, society has a tendency towards optimism. Additionally, people attach importance to leisure time and spend their money as they wish. Table 4 presents the description of the variables in this study.

Table 4
Variable's description

Variable	Description	Source
POWDIS	Power distance: this variable ranges from 0 (egalitarian) to 100 (embraces hierarchy).	Hofstede website*
INDIVI	Individualism: this variable ranges from 0 (collectivism) to 100 (individualism).	Hofstede website
MASCUL	Masculinity: this variable ranges from 0 (quality of life matters) to 100 (power matters).	Hofstede website
UNCAVO	Uncertainty avoidance: this variable ranges from 0 (comfortable with uncertainty) to 100 (uncomfortable with uncertainty).	Hofstede website
LONORI	Long-term orientation: this variable ranges from 0 (traditions and short-term) to 100 (futuristic and long-term).	Hofstede website
INDULG	Indulgence: this variable ranges from 0 (normative repression) to 100 (satisfaction is good).	Hofstede website
CSRCOM	Corporate social responsibility committee: 1 = if the company has a CSR committee, 0 = otherwise.	Thomson Reuters Eikon
GRI	Adoption of the Global Reporting Initiative guidelines: 1 = if the company prepares an environmental report based on the GRI guidelines, 0 = otherwise.	Thomson Reuters Eikon
ROE	Return on equity: the ratio between net income and average shareholders' equity.	Thomson Reuters Eikon
SECTOR	High impact sector: it takes the value 1 if the company operates in an industry with strong and direct environmental impact and 0, otherwise.	Thomson Reuters Eikon
COUNTRYEFFECT	Country effect: if the company is in countries with high biodiversity (Australia, United States of America, and Canada), it takes the value 1 and 0, otherwise.	-

* <https://www.hofstede-insights.com/country-comparison/thailand/>

Source: *Elaborated by the authors.*

As a control variable, this study analyzed five variables at the company level: the presence of a CSR committee in the company, the adoption of the GRI guidelines, the financial performance measured by the return on equity (ROE) and sector. Additionally, we inserted the variable country effect to test whether in countries with greater biodiversity and size, companies tend to disclose more environmental information. These control variables were chosen because in the literature they are closely related to environmental disclosure, since they can influence the level of environmental disclosure of companies.

After data collection, we submit the data for analysis of the main descriptive statistics (mean, standard deviation, minimum and maximum). Then, we operationalized the correlation matrix. We estimate our model using the dynamic panel of generalized methods of moments (GMM). This technique is efficient because it individually analyzes each of the independent variables and understands its effect on the dependent variable. To test our hypotheses, we run the following model:

$$ENDIS_{it} = \beta_0 + \beta_1 POWDIS_{it} + \beta_2 INDIVI_{it} + \beta_3 MASCUL_{it} + \beta_4 UNCAVO_{it} + \beta_5 LONORI_{it} + \beta_6 INDULG_{it} + \beta_7 CSRCOM_{it} + \beta_8 GRI_{it} + \beta_9 ROE_{it} + \beta_{10} SECTOR_{it} + \beta_{11} COUNTRYEFFECT_{it} + \omega_{it} + \theta_{it}$$

1

in which β is the estimated parameter and all variables are indexed by i for the individual cross-sectional unit (company) and t for the period (time). The random error term is divided into two parts: the combined effect (θ) and the individual effect (ω).

In addition to the main econometric models, in which we include all companies, we operationalize robustness models to confirm and give greater validity to the previous models. For robustness models, we excluded U.S. companies, as they represent most of our sample, which could bias the results.

4. ANALYSIS OF RESULTS

4.1 Descriptive Analysis

In Table 5, we present the main descriptive statistics used in our study. The dependent variable, environmental disclosure, has a mean of 13.11, that is, the companies in our

sample achieved an average score of 13.11 (52.44% of the total of 25 points). In our sample, the lowest environmental disclosure was 10 points, which is equivalent to 40% of the total and the highest environmental disclosure was 25 points, which is equivalent to 100% of the total.

Table 5
Descriptive statistics

Variable	Obs.	Mean	Std. Dev.	Min	Max	Shapiro-Francia W test
ENVDIS	3,966	13.118	3.089	10	25	0.920
POWDIS	3,966	38.276	2.832	22	40	0.847
INDIVI	3,966	88.359	4.804	70	91	0.777
MASCUL	3,966	61.466	4.263	52	68	0.851
UNCAVO	3,966	44.144	5.196	35	51	0.837
LONORI	3,966	32.133	10.337	21	51	0.847
INDULG	3,966	68.395	1.109	65	75	0.896
CSRCOM	3,967	0.594	0.491	0	1	1.000
GRI	3,966	0.283	0.450	0	1	1.000
ROE	3,631	0.172	0.638	-19	11.904	0.257
SECTOR	3,966	0.2155	0.4112	0	1	1.000
COUNTRYEFFECT	3,966	0.7639	0.4246	0	1	1.000

ENVDIS = environmental disclosure.

Source: *Elaborated by the authors.*

Regarding the variables representing the national culture, power distance index is 38.27 out of 100, individualism index is 88.35 out of 100, masculinity index is 61.46 out of 100, uncertainty avoidance index is 44.14 out of 100, long-term orientation is 32.13 out of 100, and indulgence is 68.39 out of 100. In addition, CSR committee and GRI adoption are dummy variables. ROE has a mean of 0.172. Sector has an average of 21.55 and the country effect has an average of 76.39.

The Shapiro-Francia W test for normality is provided for the variables. Our evidence shows that the data are normally distributed.

Table 6 shows the correlation matrix between the variables. The data show that no coefficient between the dependent variable and the other variables has a high correlation. The matrix correlations are weak or moderate since there is no coefficient above 0.80. Thus, we found that multicollinearity is not a problem in our research.

Table 6
Correlation matrix

Variable	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
(1) ENVDIS	1.00										
(2) POWDIS	-0.05***	1.00									
(3) INDIVI	-0.01	0.51***	1.00								
(4) MASCUL	0.04***	-0.36***	0.47***	1.00							
(5) UNCAVO	-0.08***	0.66***	0.09***	-0.64***	1.00						
(6) LONORI	0.08***	-0.45***	-0.19***	0.11***	-0.78***	1.00					
(7) INDULG	0.02*	-0.14***	0.32***	0.04**	0.07***	0.12***	1.00				
(8) CSRCOM	0.42***	-0.10***	-0.08***	-0.02	-0.13***	0.21***	0.07***	1.00			
(9) GRI	0.63***	0.009	-0.02	-0.02	0.02*	-0.03**	-0.01	0.43***	1.00		
(10) ROE	0.02	-0.01	0.01	0.03**	-0.03**	0.01	0.00	0.03***	0.00	1.00	
(11) SECTOR	0.27***	-0.003	-0.16***	-0.22***	0.10***	0.01	0.03***	0.15***	0.18***	-0.02*	1.00
(12) COUNTRYEFFECT	-0.09***	0.81***	0.19***	-0.56***	0.59***	-0.79***	-0.14***	-0.16***	0.02*	-0.02*	0.05***

*** = $p < 0.01$; ** = $p < 0.05$; * = $p < 0.10$.

Source: Elaborated by the authors.

4.2 Multivariate Analysis and Discussion

In Table 7, we present the findings of the six models built to test the hypotheses. In all models, we

checked the regression assumptions (heteroscedasticity, multicollinearity, and endogeneity), verifying that no model suffers from these problems.

Table 7
Multivariate analysis results

Variable	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
	Coef.	Coef.	Coef.	Coef.	Coef.	Coef.
POWDIS	7.006***					
INDIVI		7.437***				
MASCUL			6.952***			
UNCAVO				-6.711***		
LONORI					-0.677	
INDULG						1.855
CSRCOM	0.831***	0.862***	0.904***	0.861***	0.869***	0.850***
GRI	3.339***	3.325***	3.293***	3.318***	3.316***	3.330***
ROE	0.067	0.063	0.062	0.068	0.068	0.069
SECTOR	1.096***	1.139***	1.155***	1.102***	1.073***	1.060***
COUNTRYEFFECT	-1.152***	-0.752***	-0.372***	0.160	-0.823***	-0.659***
Obs.	3,631	3,631	3,631	3,631	3,631	3,631
R ²	0.4573	0.4585	0.4583	0.4561	0.4549	0.4546
VIF mean	1.76	1.14	1.31	4.39	1.74	1.12
Breusch-Pagan test	1,007.97***	1,034.42***	1,030.43***	1,011.12***	1,015.42***	1,013.31***
Durbin-Watson test	No endogenous					
Wald x ² test	2,269.63	2,254.74	2,240.64	2,243.13	2,204.85	2,209.44

VIF = variance inflation factor.

*** = $p < 0.01$; ** = $p < 0.05$; * = $p < 0.10$.

Source: Elaborated by the authors.

The results obtained show that certain characteristics of the countries' national culture can affect the environmental disclosure of companies. The results obtained show that certain characteristics of the countries' national culture can affect the environmental disclosure of companies. As shown by the empirical results, firms respond to pressures from the institutional environment (national culture) in which they operate and adopt procedures, such as environmental disclosure, as a means of legitimizing their actions before stakeholders.

Our evidence found that power distance has a positive effect on environmental disclosure. Unlike what we predicted, in more individualistic and male-oriented societies, companies disclose more environmental information. Additionally, societies that are more flexible and more open to innovation tend to have companies that are more engaged in environmental disclosure.

In liberal countries, where the power distance is greater, companies tend to disclose more environmental information. This contradicts the work by Adnan et al. (2018), who found that firms that operate in countries with a lower level of power distance disclose more environmental information, since in these environments there is better communication between the company and its stakeholders. However, the findings of this cultural dimension were similar to the study by Ho et al. (2012), which found a positive effect of distance to power on environmental disclosure. In the study by Pucheta-Martínez and Gallego-Álvarez (2019), this variable was not significant.

In more individualistic societies, companies disclose more environmental information. This finding contradicts previous studies (Gallén & Peraita, 2018; García-Sánchez et al., 2013; Ho et al., 2012; Pucheta-Martínez & Gallego-Álvarez, 2019). Countries like Australia, United Kingdom, and USA have high scores for individualism, characterized by having private and competitive people (Hofstede, 1983). By alluding personal characteristics to organizational characteristics, companies headquartered in these countries can be competitive and individual. This

motivates them to look for innovations to improve their corporate reports, including environmental issues in them.

Following this line of thought, companies in more individualistic environments tend to make decisions for themselves, to innovate and generate greater value for stakeholders. This individualistic and competitive attitude can favor transparency in corporate reporting, to stand out from competitors and attract more investments.

Additionally, the findings suggest that in male cultures there is a greater orientation for stakeholders. These results contradict previous studies (Pucheta-Martínez & Gallego-Álvarez, 2019; Tran & Beddewela, 2020), which found that female-oriented cultures positively influence environmental disclosure. According to Hofstede (1983), organizations with a female culture are not competitive as those with a male culture. This may be one of the reasons for these findings. For example, in countries with a more masculine orientation, organizations tend to be more competitive and release a more complete environmental report to attract new investments, enter new markets, and convey an ethical corporate image (Pinheiro et al., 2021).

In societies with less aversion to uncertainty, companies disclose more environmental information. In other words, societies that are less averse to uncertainty are more receptive to change and therefore can release a more complete environmental report. This assumption is supported by Pucheta-Martínez and Gallego-Álvarez (2019), who suggest that managers may be inclined to limit environmental disclosure in contexts where uncertainty is greater, as the costs may outweigh the benefits. In countries with less uncertainty aversion, companies can disclose more environmental information to reduce uncertainties in the environment and attract new investments (Disli et al., 2016; Ho et al., 2012). Our findings confirmed this evidence, showing that in cultures with less uncertainty aversion, companies disclose more environmental information.

Table 8 presents the results of our robustness tests, without the presence of U.S. companies.

Table 8
Robustness analysis

Variable	Model 7	Model 8	Model 9	Model 10	Model 11	Model 12
	Coef.	Coef.	Coef.	Coef.	Coef.	Coef.
POWDIS	6.632***					
INDIVI		8.171***				
MASCUL			9.659***			
UNCAVO				-4.864*		
LONORI					-0.361	

Table 8
Cont.

Variable	Model 7	Model 8	Model 9	Model 10	Model 11	Model 12
	Coef.	Coef.	Coef.	Coef.	Coef.	Coef.
INDULG						10.272**
CSRCOM	0.725***	0.758***	0.860***	0.777***	0.811***	0.791***
GRI	3.523***	3.519***	3.451***	3.492***	3.480***	3.500***
ROE	0.079	0.073	0.071	0.081	0.079	0.078
SECTOR	1.472***	1.497***	1.509***	1.452***	1.455***	1.462***
COUNTRYEFFECT	-1.337***	-0.835***	-0.200	-0.244	-1.012***	-0.970***
Obs.	1,622	1,622	1,622	1,622	1,622	1,622
R ²	0.4782	0.4800	0.4799	0.4745	0.4737	0.4746
VIF	1.42	1.12	1.96	6.04	1.41	1.11
Breusch-Pagan test	387.31***	413.36***	402.80***	398.57***	411.77***	422.58***
Durbin-Watson test	No endogenous					
Wald x ² test	1,170.70	1,156.25	1,137.15	1,133.43	1,098.04	1,097.34

VIF = variance inflation factor.

*** = $p < 0.01$; ** = $p < 0.05$; * = $p < 0.10$.

Source: Elaborated by the authors.

In general, the signals remain the same, indicating that our previous findings are reliable. However, the indulgence variable became significant, suggesting that in more indulgent cultures, companies disclose more environmental information. Although this finding is contrary to our H₆, it is in line with previous studies (Pinheiro et al., 2021; Sun et al., 2019). In cultures with greater indulgence, companies prefer to work in a context of freedom, which encourages people to discuss issues beyond traditional financial goals, including reputation and environmental disclosure as well.

Additionally, our results show that the presence of a CSR committee has a positive effect on environmental disclosure. This committee controls management decisions in relation to sustainability issues, which favors the adoption of more ethical behavior by the organization (Cancela et al., 2020).

The adoption of the GRI guidelines for the disclosure of an environmental report also had a positive effect on environmental disclosure. In other words, companies that disclose an environmental report following GRI standards tend to have a better environmental performance than companies that do not disclose following these standards. GRI standards cover all environmental dimensions and prevent companies from disclosing only good environmental indicators (Fuente et al., 2017).

Our results confirm that companies belonging to sectors with greater environmental impact (energy, materials, and utilities) have greater environmental disclosure. These companies directly exploit natural resources and therefore

there are more institutional pressures for them to be more transparent. When we analyze the country effect, the results suggest that the country's natural biodiversity is not a determining factor for companies to disclose more environmental information, indicating that in smaller countries, companies have greater environmental disclosure. Based on this result, we hypothesized that, in smaller countries (Ireland, New Zealand, and the United Kingdom), companies deal with the limitation of natural resources and thus preserve the environment and make better use of their spaces. Therefore, companies are more concerned about the environment and are more transparent about their environmental practices.

Our results have important implications for the previous literature. First, our findings present evidence that national characteristics, such as cultural dimensions, affect business behavior in relation to environmental disclosure. These findings reinforce the main thesis of institutional theory, which states that companies act according to the national institutions of the country in which they operate. Thus, the different pressures from institutional fields will influence the adoption of environmental disclosure by companies. These results have academic contributions, since the influence of national characteristics on environmental disclosure has received much less attention in studies on liberal economies (Tran & Beddewela, 2020).

Second, our study provides a solid understanding of how a country's cultural dimensions affect environmental disclosure. This is important because previous studies

that work on the relationship between institutional environment and environmental disclosure present a qualitative perspective and with the analysis of only a national context (Hu & Loh, 2018). In addition, our results confirm most of the previous studies in the literature, but also present a new finding: individualism and masculinity can positively affect environmental disclosure.

Third, our evidence also has managerial implications. In addition to company-level factors, managers should consider that factors at the country level, such as national culture, can shape companies' environmental strategies and policies. Managers must pay attention to cultural issues before entering new markets. For example, in cultures that

are less averse to uncertainty, companies should invest more resources in environmental reporting. Regarding organizational factors, this study encourages companies to increase the implementation of a CSR committee and the adoption of GRI guidelines for environmental disclosure. Our study found that these actions are relevant to greater environmental disclosure.

Finally, our findings may be of interest to policy makers. Regulatory bodies should consider countries' cultural characteristics before formulating national CSR promotion policies. We encourage governments in each of the countries analyzed to learn from each other and create a national environment that promotes CSR.

5. CONCLUSION

This study had the following research question: How does national culture affect environmental disclosure in liberal economies? To answer it, we examined a sample of 1,037 companies based in liberal economies. Our evidence shows that environmental disclosure is affected by the country's national culture. For example, in countries with greater power distance, individualism, and masculinity, companies disclose more environmental information. Furthermore, in countries with less aversion to uncertainty, that is, societies that are more receptive to change, companies engage more in environmental disclosure.

5.1 Limitations and Future Research

The provided findings are not free from limitations. First, environmental disclosure was measured by an environmental disclosure index, which considered the amount of information disclosed by firms and not the quality of this disclosure. Second, the sample consisted

of companies with information available in the Thomson Reuters Eikon® database. Thus, the sample was restricted to companies present in this database.

To overcome these limitations, further studies may adopt the following recommendations. Future studies may analyze a sample of companies based in coordinated economies or in emerging economies, as well as considering research with small and medium-sized companies. Future research may include new independent variables to represent the national culture, for example a variable such as the country's religiosity index. Furthermore, new studies in this field may try to answer research questions that this research did not answer: (i) How do informal institutions affect environmental disclosure in emerging and developed economies? (ii) How does the country's level of corruption influence the level of environmental disclosure? (iii) How does the leadership style preferred by country managers affect environmental disclosure?

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