Can Organizational Culture Encourage Corporate Social Responsibility and Improve Environmental Performance in [B]³ Companies?

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Abstract

Organizational culture is one of the resources used by companies to obtain competitive advantage and organizational sustainability, whether by financial, social or environmental efficiency (Chatman & O'Reilly, 2016; Dyck et al., 2019). Another resource that is being encouraged to try and achieve sustainability is Corporate Social Responsibility (CSR), which can be facilitated or inhibited by organizational culture (Leandro & Rebelo, 2011; Shanak et al., 2020). Therefore, this study aims to analyze the relationship of organizational culture and CSR practices on environmental performance in companies listed on [B]³ (Brasil, Bolsa, Balcão), São Paulo's stock exchange. The results indicated that there are no direct relations between organizational culture, environmental performance and the mediating effect; however, at the significance level of 10%, companies with high polluting potential become more harmful to the environment when there is a predominance of market and hierarchical culture.

Keywords: competing values framework, ESG, greenhouse gases

1. Introduction

1.1 Introduction to the Problem

Some human activities, such as industrialization, urbanization and investment in infrastructure, stimulate the production and consumption of energy, which consequently influences the planet's climate change, due to the increase in carbon emissions (Beltrán-Esteve & Picazo-Tadeo, 2017; Long et al., 2017), and other GHG (Greenhouse Gases). These facts stimulate new realities, such as: stricter environmental regulation; expansion of governmental and non-governmental policies; and an increase in the number of consumers who demand sustainable products and services (Chen, 2008; González-Benito & González-Benito, 2008; Salim et al., 2019).

This context of changes in the environment external to organizations requires companies to change to the same extent. Companies use various resources to evolve in these matters, and organizational culture is one of them. Several reasons make this culture a vital element in this process: firstly, it helps managers in adapting to changes in organizational practices, due to its characteristic of transforming the lowest level of the organization. That supports and complements other changes, in which its adjustment to the different types of strategies developed is indispensable (Cameron & Quinn, 2011). Secondly, organizational culture acts as a facilitator or inhibitor of Corporate Social Responsibility practices (Leandro & Rebelo, 2011; Shanak et al., 2020), which represents the actions practiced by companies based on the interests of stakeholders, in order to obtain a better result in the social, economic and financial spheres (Chang, 2015).

Thirdly, culture is considered one of the main factors that determine the performance of companies (Chatman & O'Reilly, 2016; Dyck et al., 2019). Thus, in view of the need to explain the differences in values that originate from this organizational effectiveness, Robert Quinn and John Rohrbaugh (1981) created the Competing Values Framework (CVF), which conceives organizational culture from the conflict between stability and change, and between internal organization and external environment, creating four typologies of cultures: hierarchical, adhocratical, clan, and market. The role of the CVF is to identify and understand these underlying dimensions that underpin the complexity of the organization (Denison & Spreitzer, 1991; Cameron et al., 2014). This fact builds the fourth and last argument about the importance of culture: in addition to facilitating the change process

and acting as an internal dimension of CSR, it is a capability that improves environmental performance (Ambekar et al., 2018; Magsi et al., 2018; Dyck et al., 2019). For example, cultures that are focused on flexibility, proactivity, and have good levels of internal and external integration encourage the use of innovative practices related to the environment (Linnenluecke & Griffiths, 2010; Medeiros et al., 2014; Rosario et al., 2017). The organizational ability to accept and adapt to change also enables companies to adopt advanced environmental protection methods, such as those aimed at reducing carbon emissions. Collaborative cultures with an emphasis on human relationships easily engage with organizational goals and are motivated with green practices (Ambekar et al., 2018).

In addition to culture, CSR is also practiced, aimed at achieving better environmental outcomes as an important aspect for achieving social, environmental, and economic balance (Ye et al., 2020). Environmental performance is influenced by CSR (Suganthi, 2020), because when faced by it, companies have better control of material waste, energy saving, and pollution reduction (Anser et al., 2020), while CSR also relates in various ways (either positive or negative) to organizational culture (Bhuiyan et al., 2020).

This relationship may vary across countries, for example, in companies from emerging countries, such as Brazil, there is evidence that these relationships may differ due to their own economic, social, and policy characteristics (Bhuiyan et al., 2020). Organic organizational cultures, i.e., clan and adhocracy cultures, and market culture, are both more effective in a changing environment and more exposed to innovation, and are related to CSR practices and different organizational outcomes (Pasricha et al., 2018). In this context, this study aims to answer the following research question: What is the relationship of organizational culture and CSR practices on environmental performance in [B]³ listed companies?

Despite the relevance of these topics, there are few studies that address the antecedents of performance and the relationship between culture and specific sustainable outcomes (Wisner et al., 2006; Attig & Cleary, 2015; Dyck et al., 2019; Shanak et al., 2020). However, several researches find the relationship between culture and organizational performance, and others the relationship between environmental and economic performance (Boons & Wagner, 2009; Ameer & Othman, 2012; Sichigea et al., 2020; Voinea et al., 2020). This is usually because research treats sustainable performance considering its three dimensions (financial, social, and environmental), or only its financial aspect with the theme of "is it worth being green?"

One of the great challenges that humanity faces is discovering which factors contribute to the achievement of sustainability rather than questioning whether or not it leads to financial performance (Dyck et al., 2019). The theoretical relationship between culture and sustainable performance should be strengthened, especially considering culture as a precursor to good performance in the environmental sphere (Magsi et al., 2018). Therefore, this study seeks to understand aspects that go beyond financial results, but also an understanding of how environmental performance is achieved.

On the variable of CSR, there is demand for research that validates the factors that precede, motivate, and drive CSR, as well as the performance of sustainable technologies and their outcomes (Medeiros et al., 2014; Agudelo et al., 2020). For example, some studies have found that CSR mediates in the relationship between organizational culture and employee happiness (Espasandín-Bustelo et al., 2020) between organizational culture and non-financial performance (Bhuiyan et al., 2020), and between national culture and financial performance (Hunjra et al., 2021). The uniqueness of this study is understood in the approach of CSR as a mediator of the relationship between organizational culture and environmental performance, the latter being an outcome of corporate sustainability.

Regarding the environmental performance, there is an emphasis on the study of tools to evaluate and improve the performance of the organization on the environmental performance metric of carbon footprints (quantities of CO_2 emissions accumulated during the life cycle and production of a product). It is also important to foster studies involving the reduction of carbon footprint in countries like Brazil, due to its growing participation in global chains and to adopt the best practices possible compared to more advanced countries (Ambekar et al., 2018).

The socio-ecological problems characteristic of today's world raise the need for discussions about environmental issues (Burnett & Hansen, 2008; Dyck et al., 2019). Large GHG emissions cause global warming and generate conflicts between economic development and environmental protection (Long et al., 2017), resulting in high costs and exposing humanity to risks (Beltrán-Esteve & Picazo-Tadeo, 2017). Efficient use of resources and better management of natural resources are indispensable to reduce carbon emission, pollution, and improve environmental performance (Wu et al., 2021). All nations of the world must work towards reducing GHG emissions, and increase their responsiveness to climate change (Li et al., 2021).

Therefore, given the need of theoretical reinforcement for the concepts presented, and the social and environmental demand, this study is relevant for offering empirical evidence in the context of Brazilian publicly traded companies on the relationship between three important themes: organizational culture, environmental performance and CSR, the latter mediating the relationship between the first two. Therefore, the objective of this study was to analyze the impact of relationship of organizational culture and CSR practices on environmental performance in [B]³ listed companies.

And, although no evidence of any relationship between organizational culture and environmental performance was found in the case of [B]³ companies or the companies under study, it was observed that Brazilian companies showed greater predominance for market culture, unlike some studies that presented the hierarchical culture as dominant. This may be related to the fact that Brazil presents growth in the global market and approaches nations where the market culture prevails (Feijó, 2020). In addition, developing countries invest less in activities with long-term returns, such as CSR (Fiorentini, 2020), which justifies the average of 56.59 for CSR. The results also indicated that larger companies (based on asset size) and with medium polluting potential (such as meatpacking plants and slaughterhouses) need to adopt greater and better pollution reduction measures, as their relation to environmental performance is negative. This attention is also extended to companies with high polluting potential and with a predominance of market and hierarchical cultures, as they tend to be more polluting in general.

1.2 Statement of Hypothesis and Their Correspondence to Research Design

The CVF relates to environmental performance in several ways. For example, members of the clan culture, which emphasizes the internal environment, focus on human relationships, are committed to the organization, and implement change easily due to facilitative leadership and high employee motivation. In the initial stage of implementing reduction practices they may have high emission levels, however, after the consolidation of green practices, they emit less CO_2 (Ambekar et al., 2018). Therefore, hypothesis H1a was defined:

H1a: Clan organizational culture is positively related to environmental performance.

In market culture, leaders are usually rigid and demanding (Soares et al., 2018). Companies with market culture are focused on the external environment and adopt sustainable practices to meet environmental legislation, stakeholder pressure, or adaptation to competitors' green culture. They foster competition and good performance, leading them to achieve low carbon emissions in the short term (Ambekar et al., 2018).

In case studies covering 27 countries, Dyck et al. (2019) showed that the market culture does not emphasize the ecological well-being (considering the economic, social and ecological dimensions), when compared to the other culture typologies. However, they verified that this typology has a higher environmental performance when analyzing the reports of emissions and use of renewable energy. Therefore, the hypothesis H1b was constituted:

H1b: Organizational market culture is positively related to environmental performance.

In the hierarchical culture, new steps are defined by established procedures and formal rules (Soares et al., 2018). They have stable improvement policies, lack practices to reduce emissions, and show resistance in environments of change, so they are responsible for a high level of carbon emissions. Nevertheless, to stay in the game and meet the interests of stakeholders, it is possible that they adopt reduction initiatives and therefore they may present a low emission level temporarily, which vary by batch, customer, or location (Ambekar et al., 2018).

Therefore, considering the conventional nature of the hierarchical culture, the hypothesis H1c is defined:

H1c: Hierarchical organizational culture is negatively related to environmental performance.

Companies that have a predominant adhocratic culture, on the other hand, are proactive, respond more decisively to environmental challenges, anticipate environmental impacts caused by the operation rather than acting when they occur, and redesign products and processes to achieve environmental objectives (Wisner et al., 2006). These authors found that this proactivity has an impact on environmental performance and financial performance in companies in the United States. The reflexes visible are waste and discharge reduction, efficiency improvement, resource cost reduction, and environmental compliance.

The study of Sugita and Takahashi (2015), involving Japanese companies, emphasizes the culture of adhocracy under the aspects of eco innovation: the culture of adhocracy is related to good environmental performance, since its ability to develop unique solutions involving recycling and creation of ecological products, in addition to the search for prevention of pollution and climate change. Therefore, considering the ability of adhocratic culture to be proactive, innovative and improve environmental performance, we define the hypothesis H1d:

H1d: The organizational culture of adhocracy is positively related to environmental performance.

As for the quadrant of the CVF that emphasizes the internal environment are team-oriented and collaborative cultures, in which people behave as one entity and promote environmental quality practices (Thompson, 1998). CSR is encouraged in clan cultures because they have, in their nature, humanistic attributes, making people supportive and creating openness of communication between employees and managers (Espasandín-Bustelo et al., 2020).

Another facilitating attribute of CSR is the ability of these cultures to work as a team, since new initiatives demand coordination across departments and functions, and clan culture emphasizes team performance in a coordinated and well-integrated manner (Espasandín-Bustelo et al., 2020). Bhuiyan et al. (2020) also finds that there is evidence of a positive relationship between humanistic culture (when people simultaneously look out for their own interests and the needs of others) and CSR practices, and between clan cultures and internal CSR (Espasandín-Bustelo et al., 2020). Therefore, the H2a hypothesis was defined as:

H2a: Clan organizational culture is positively related to CSR practices.

In contrast to internal environment-oriented cultures, market-oriented culture is also open to environmental innovations (Burnett & Hansen, 2008) and sensitive to perceive and respond to environmental pressures from stakeholders, therefore, more likely to adopt environmental practices in the face of stakeholder pressures (González-Benito & González-Benito, 2008). Medeiros et al. (2014) e Thompson (1998) add that organizations that are market-oriented and seek to meet consumer, societal, and governmental expectations tend to adopt environmental innovation and quality practices.

This sensitivity favors market cultures, because according to Burnett e Hansen (2008) e Porter e Van der Linde (1995), organizations and their managers need incentives from environmental regulations to implement eco-efficiency actions, and this occurs due to the bounded rationality of the decision-makers. Therefore, the hypothesis H2b was defined:

H2b: Market organizational culture is positively related to CSR practices.

On the other hand, bureaucratic and autocratic structures have more difficulties in responding to social and environmental stimuli, and also in meeting the expectations of interest groups (Borger, 2001). They have more rigid internal control (Linnenluecke & Griffiths, 2010) and are often resistant to the implementation of sustainable practices (Ambekar et al., 2018). Therefore, they are considered the antithesis of an adhocratic culture (Bhuiyan et al., 2020).

Some characteristics are predominant in this type of culture: control, predictability, communication hierarchy, and standardization. This set blocks the emergence of CSR activities and, in the face of environmental changes, this culture will try to preserve its structures and norms rather than adapt (Lee & Kim, 2017). This blockage is related to the idea that CSR practices and the creation of socially responsible businesses are relatively new, and therefore would require core changes (Bhuiyan et al., 2020). Therefore, the hypothesis H2c was defined as:

H2c: Hierarchical organizational culture is negatively related to CSR practices.

The adhocratic culture, with its emphasis on entrepreneurial characteristics, creativity, and adaptability, has teams that take risks and seek strategies for innovation, growth, and acquisition of new resources. It aligns with CSR in several ways: through its absorptive capacity, that is, it absorbs and applies knowledge that is external to the organization, connecting it to external environmental problems; and also through the ease in the innovation process, which assists in the development of green ideas such as CSR itself (Chang, 2015; Strese et al., 2016). The ability to create and innovate in view of external stimuli and concern for stakeholders facilitate internal orientation toward sustainable practices (Costa et al., 2022), making CSR more usual (Pasricha et al., 2018; Turker, 2018).

The adhocratic culture is a precursor to both perspectives of CSR (either social CSR, or stakeholder-oriented CSR) in countries in Europe and Asia (Übius & Alas, 2009). The study of Espasandín-Bustelo et al. (2020) also found that adhocratic culture encourages internal CSR practices. Therefore, the hypothesis H2d is defined as:

H2d: The organizational culture of adhocracy is positively related to CSR practices.

Besides the cultural aspect of the organization, the practice of sustainable development also presents itself as an important aspect related to climate change and resource scarcity. Studies in recent years have begun to understand CSR as an alternative for solving environmental problems (Ye et al., 2020), and the GHGs emitted by companies and institutions in their production process are an important topic for sustainable development (Li et al., 2021).

A case study in an Asian hotel found that environmental management practices were able to assist in reducing

water and energy costs through the provision of environmental information (Gunarathne & Lee, 2015). Anser et al. (2020) also noted that engaging with CSR practices improves environmental performance. According to Suganthi (2020), the implementation of CSR initiatives motivates employees to solve solid and liquid waste problems, and organizations put more effort into reducing GHG emissions and avoiding the use of environmentally harmful materials. Suganthi (2020) found that CSR positively affects environmental performance in companies located in India.

As such, the H3 hypothesis is defined as:

H3: CSR is positively related to environmental performance.

The study of Soares et al. (2018) in companies of the Brazilian electric power sector could verify the importance of the cultural typologies of CVF for sustainable development: companies that present balanced cultural forces, that is, cultures that strongly identify with the basic premises, styles and predominant values, have a positive relationship with the GRI indicators (in the economic, social and environmental dimensions). Cultural values that do not develop internal values towards sustainability may have poor environmental performance (Magsi et al., 2018). Li et al. (2021) highlights the importance of operationalizing sustainability (in its social, economic and environmental aspects) with the goal of reducing CO_2 emissions, and exploring it through the adequacy of internal contextual factors.

The literature shows that organizational culture, in its various dimensions and characteristics, influences environmental performance. But it is also important to consider that culture plays a key role in the adherence to CSR practices and this, in turn, improves environmental performance. Therefore, this study brought CSR as a mediating variable in the relationship between organizational culture and environmental performance. Bhuiyan et al. (2020) also suggests the existence of mediation in this relationship and found that the effect occurs in the relationship between innovative cultures and cultures that practice respect for people with non-financial performance. Therefore, the following hypotheses were developed:

H4a: CSR practices positively mediate the relationship of clan organizational culture on environmental performance.

H4b: CSR practices positively mediate the relationship of market organizational culture on environmental performance.

H4c: CSR practices positively mediate the relationship of hierarchical organizational culture on environmental performance.

H4d: CSR practices positively mediate the relationship of adhocratic organizational culture on environmental performance.

Control variables that could possibly affect the established relationship were also considered. The size of the company was selected since it is easier for larger companies to implement environmental initiatives (Liu, 2020; Ali et al., 2022), and to obtain lower costs due to scale economies (Christman, 2000) and also to have higher environmental results compared to smaller companies, in addition to the relationship of size and CO_2 emissions (Voinea, et al., 2020; Wong et al., 2020; Li et al., 2021).

The level of pollution potential, according to the Brazilian Law Nº. 10,165 of 2000, changes the way companies on this list relate to environmental issues, because these companies have greater environmental regulation, raising the need for environmental innovation and changing their attitudes (Porter e Van der Linde, 1995; Christmann, 2000). They are among the companies that have more environmental disclosure (Arruda et al., 2016; Freitas et al., 2019) and demand more attention due to their characteristic eminent pollution (Anzilago et al., 2017; Amorim & Souza, 2020)

Environmental performance may vary according to the particular characteristics of some industries (Zhang et al., 2021) and there are sectors that suffer specific pressures from consumers, therefore, environmental practices also suffer variation according to the company's activity. Although the activity is considered relevant, it will not be used as a control variable in this study due to the way the Law Nº 10,165 of 2000 considers the activities to define the level of polluting potential. When companies operate in the international market, they tend to understand CSR differently, because in some countries the pressure from government and society, regarding environmental protection, is greater (Junquera & Ordiz, 2002; Turker, 2018; Voinea et al., 2020; Ansanelli et al., 2021). In addition, newer organizations are more willing to adopt environmental management practices (Rosario et al., 2017; Turker, 2018), and therefore the time of market performance was included. This variable indicates the period in which how long has the company been developing its activities.

2. Method

The population of this research consists of 591 companies that are indexed in [B]³ in the year 2021. Data on the CSR variable was collected for the month of June 2022. Of the total 591 companies that participated in [B]³, 464 were excluded because they were not figured in the ESG index (Environmental, Social and Governance, a proxy for the CSR variable), leaving 127 companies. Of these, 16 companies that operated in the financial market and that could therefore distort the results were excluded, leaving a total of 111 companies remaining. Next, between June and July 2022, the environmental performance data was collected. At this stage, 69 companies were excluded as they did not disclose the Integrated Report or the sustainability report, therefore not making the GRI (Global Report Initiative) 305 available, or disclosing incomplete information, leaving 42 companies qualified for the research.

Finally, in July 2022, the organizational culture data in the management reports was collected. In this process, 1 company was excluded from the dataset for inadequate disclosure. The final sample, therefore, resulted in 41 companies. The following topics present how each variable was collected.

2.1 Data Collection and Measurement of Organizational Culture

The methodology for collecting organizational culture data was proposed by Fiordelisi e Ricci (2014). This proposal received a corrigendum in 2021 that did not change the findings and conclusions of the initial paper (Fiordelisi & Ricci, 2021), and did not bring any complications to this work. However, it is suggested to consider them in future work for a more accurate measurement of organizational culture.

This methodology provides an objective assessment of culture through the analysis of reports, in which words are used as a reference and is based on the assumption that the vocabulary used by members of the organization is a reflection of the organizational culture established over time (Fiordelisi& Ricci, 2014; Parente et al., 2018; Jiang et al., 2019).

This method, tested and validated through studies such as Parente et al. (2018); Nguyen et al. (2019); Reader et al. (2020); Ilowski et al. (2022); associates the radicals found in the documents to the cultural typologies of Cameron et al. (2006), for example, using "adapt" to characterize the adhocratic culture. In total, there are 140 radicals subdivided into 34 for clan culture, 30 for adhocratic culture, 41 for market culture and 35 for control culture. Reader et al. (2020) calls this type of approach as "Discrete Culture Indicator": A measure of organizational culture in which data is collected without engaging with employees, coinciding with the artifact description of (Schein, 1999), which enables the study of culture through organizational language, practices, and systems. The typological measurement occurs through the ratio between the frequency of radicals found for the category and the total found (summing all categories) in the management reports. The word count occurred through the Atlas.ti® software.

2.2 Data Collection and Environmental Performance Measurement

The group selected for measuring environmental performance was environmental pollution, considering that environmental management and pollution are objectively measurable, and hence, are the most used in research to measure environmental pollution. Pollution can be evaluated in physical or monetary units (Wu et al., 2021). This study used the amount of GHG emitted by companies, which is contained in the Emissions group of the GRI 305 reports. Besides being a widely used indicator, GHG is also relevant because of its connection to the public policy agenda and the fact that its collection has a high degree of reliability because researchers collect the data independently (Dragomir, 2018).

2.3 Corporate Social Responsibility (CSR) Data Collection and Measurement

To measure the CSR variable, we used the ESG index, provided by the Refinitiv Eikon database, which assigns a score from 0 to 100 points for company performance, taking into account the environmental, social, and governance dimensions.

According to Refinitiv (2021), ESG scores transparently and objectively measure ESG performance based on companies' reports, in which disclosure is considered the core of the methodology. This indicator has been used in several recent studies as a proxy for CSR (Fiorentini, 2020; Sichigea et al., 2020; Uyar et al., 2020; Caiazza et al., 2021; Barros et al., 2021; Soschinski et al., 2021) and can help in the scenario of study ambiguity generated by numerous metrics used as a proxy for CSR, as ESG provides a broader perspective on companies' behavior towards the environment, and better assesses performance and associated risks (Sichigea et al., 2020). Data were collected through the Refinitiv Eikon platform.

2.4 Data Analysis Techniques

To analyze the data, descriptive statistics were used first with the objective of understanding the characteristics of the sample, to know how the cultures present themselves, and the behavior of the other variables. Simple and Multiple Linear Regression was used to investigate the relationship between culture typologies and environmental performance, considering the mediation of CSR as well.

3. Results

3.1 Descriptive Statistics

This step presents the descriptive statistics that allow identifying the levels of organizational culture, environmental performance, and CSR practices. Table 1 displays the descriptive statistics of the set of variables. The environmental performance and asset size variables were standardized to reduce the distance between the standard deviation and the mean.

Table 1. Descriptive statistic

Variables	Minimum	Maximum	Mean	Standard Deviation
Environmental Performance	-0,50	5,05	0,00	1,00
Clan Culture	0,12	0,28	0,21	0,03
Market Culture	0,30	0,66	0,44	0,10
Hierarchical Culture	0,06	0,36	0,22	0,08
Adhocratical Culture	0,05	0,23	0,14	0,05
CSR	7,87	88,43	56,59	20,11
Asset Size	-0,45	5,47	0,00	1,00
Age	11	122	45	29

The organizational culture with the greatest predominance in the companies observed is market culture, which obtained the highest average (0.44), with a minimum value of 0.3 and a maximum of 0.66. This is followed by the hierarchical culture, with the second highest mean (0.22), with a minimum value of 0.06 and a maximum of 0.36. The adhocratic culture obtained the lowest average (0.14), and therefore was less evident in the sample, with a minimum value of 0.05 and maximum of 0.23. Feijó (2020) e Ilowski et al. (2022) when studying companies listed in [B]³ for a 2019 sample, similar results were found when verifying that the hierarchical culture and the market culture, together, had greater representativeness among the culture typologies, reinforcing that these Brazilian privately held companies value processes, internal controls, and are competitive.

The CSR variable, which is represented by the ESG index and can result in values between 0 and 100, obtained a minimum value of 7.87 and a maximum value of 88.43. The average for this indicator is 56.59. These results can be justified by the fact that developing nations have more scarce and limited resources, and therefore tend to invest less in activities that involve long-term returns, such as CSR (Fiorentini, 2020). The company with the worst environmental performance obtained a maximum value of 5.05 for GHG emissions. The least polluting company, on the other hand, obtained a score of -0.50, while the average pollution score was 0, indicating that the worst performing company exceeded the amount of pollutants commonly emitted by other companies by 5 times.

These companies have, on average, 45 years in the market, with the youngest being 11 years (minimum) and the oldest being 122 years (maximum). The smallest company has assets worth -0.45 and the largest has assets equivalent to 5.47, while the average is 0. For the standard deviation no relevant values were identified, that is, the values of the observations are close to the average.

Table 2. Sample distribution by economic activity

Sector/Economic Activity Variables	F	Environmental Performance (GHG Emission)	Clan Culture	Market Culture	Hierarchical Culture	Adhocratical Culture	CSR
Water and Sewage	1	-0,41	0,18	0,31	0,35	0,16	7,87
Medical Assistance	3	-0,49	0,20	0,45	0,22	0,14	59,70
Consumer Goods	7	0,20	0,21	0,52	0,15	0,12	60,53
Civil Construction	3	-0,49	0,21	0,46	0,17	0,17	23,27
Energy and Gas	12	0,10	0,23	0,38	0,24	0,16	63,01
Base Industries	7	0,63	0,21	0,42	0,24	0,13	61,13
Logistics and mobility	5	-0,44	0,19	0,48	0,21	0,12	48,69
Technologies and Services	1	-0,50	0,19	0,39	0,30	0,12	72,87
Telephony	2	-0,45	0,20	0,47	0,19	0,14	69,63
Total	41	-0,41	0,21	0,44	0,22	0,14	56,59

Note. F = frequency; the table shows the average values of the variables.

Analyzing only the competitive characteristics of companies, in the studies of de Feijó (2020) e Ilowski et al. (2022), in companies from [B]³ in the year 2019, market culture scored second highest (behind hierarchical culture). On the other hand, the present research (with data from 2021) indicated that the culture with the highest predominance is market culture. This change in position may be related to Brazil's growing participation in the global market, which raises the need for these companies to remain competitive (Ambekar et al., 2018).

The market culture also prevails in companies on the consumer goods segment (having the highest average, 0.52), which may be a result of the proximity of this group with the consumer, demanding greater product adjustments to meet market conditions (Avlonitis et al., 1997). The hierarchical culture predominates in water and sewage companies, with an average of 0.35. For clan culture, energy and gas companies stand out (with an average of 0.23), and for the adhocratic culture, the largest representation is in the construction companies (average of 0.17).

Table 3. Environmental performance in companies with polluting potential

Polluting Risk	Environmental Performance (GHG Emission)	Asset Size
High polluting potential	3,10	0,40
Medium polluting potential	2,47	-0,12
Small/No polluting potential	-5,57	-0,23

According to Table 3, companies with high polluting potential are those that have the worst environmental performance, i.e., they emit more GHGs into the atmosphere (on average 3.10), and they are also in the group of largest companies according to asset size (on average 0.40). On the other hand, companies with low or no polluting potential, show the best environmental performance, with fewer GHG emissions (on average -5.57) and smaller asset size (on average -0.23).

The companies with medium polluting potential show better performance compared to the companies with high polluting potential (with an average of 2.47), but they are closer to the worst performance (on average 3.10) than the best performance (-5.57). This occurs because, in this sample, the companies in the beverage and food segment are considered of medium polluting potential, but they are responsible for high GHG emissions, especially companies that produce and sell food of animal origin, such as slaughterhouses and meatpacking plants, according to the analysis of secondary data.

3.2 Relationship Between Organizational Culture, Environmental Performance and CSR

For satisfactory analysis of the regressions, the basic assumption of linearity was evaluated beforehand, and statistical tests for heteroscedasticity, normality of the residuals, and multicollinearity were analyzed.

To verify the presence of heteroscedasticity, the Breusch-Pagan/Cook-Weisberg test was performed, and although there were outliers for the model variables, the test result indicated that there was no heteroscedasticity problem, as shown in Table 4, where the p-value was greater than 0.05 (p = 0.659).

Table 4. Breusch-Pagan/Cook-Weisberg test

Statistic	BP	P-value
Breusch-Pagan/Cook-Weisberg	04,128	0,659

To check the normality of the data (Table 5), the Kolmogorov-Smirnov (Hair et al., 2009) and Shapiro-Francia (Fávero, 2015) tests were appropriate due to the sample being larger than 30 observations.

Table 5. Kolmogorov-Smirnov and Shapiro-Francia Test

Variable	Gl**	Kolmogorov-Smirnov		Shapiro-Francia	
		Statistic	Sig.	z	Prob>z
ENVP	41	0,121	0,135	0,157	0,437
CSR	41	0,092	0,200*	1,322	0,093
CLAN	41	0,131	0,076	-0,001	0,500
MAR	41	0,134	0,062	1,867	0,030
HIER	41	0,085	0,200*	-0,841	0,799
ADH	41	0,103	0,200*	-1,336	0,909
ASSET SIZE	41	0,129	0,084	3,344	0,000
TIME	41	0,183	0,001	0,390	0,348

Note. *. This is a lower limit of true significance; a. Lilliefors Significance Correlation.

All variables presented normality for the Kolmogorov-Smirnov test, except market time ($p = 0.001$), where $p < 0.05$, and to correct this problem, it was standardized, thus meeting the normality assumption (Hair et al., 2009). On the other hand, for the Shapiro-Francia test, the variables market culture and size did not meet the assumption (Fávero, 2015), even after standardization. No heteroscedasticity problem was identified (Table 4), and this could have been affected by non-normality (Hair et al., 2009), so these variables remained in the model.

To analyze multicollinearity, that is, whether there are relationships between the explanatory and control variables, Pearson's correlation test was used at this stage. The result is shown in Table 6:

Table 6. Pearson's Correlation

Correlation Statistic		ENVP	CLAN	MAR	HIER	ADH	SIZE	TIME	HIGH	MEDIUM	INTERNA
ENVP	Pearson	1									
CLAN	Pearson	-0,208	1								
MAR	Pearson	-0,174	0,986	1							
HIER	Pearson	-0,181	0,985	0,996	1						
ADH	Pearson	-0,184	0,981	0,992	0,986	1					
SIZE	Pearson	-0,789	0,236	0,212	0,198	0,221	1				
TIME	Pearson	0,247	-0,433	-0,425	-0,43	-0,413	-0,305	1			
HIGH	Pearson	-0,65	0,195	0,183	0,183	0,17	-0,19	-0,194	1		
MED	Pearson	-0,413	0,162	0,137	0,136	0,145	0,385	-0,122	0,307	1	
INTER	Pearson	0,145	-0,187	-0,205	-0,169	-0,201	-0,334	0,014	-0,135	-0,236	1

Note. There were no significant values. ENVP = Environmental Performance; CLAN = Clan culture; MAR = Market culture; HIER = Hierarchical culture; ADH = Adhocratic culture; Size = Asset Size; TIME = Time on the market; HIGH = High polluting potential; MED = Medium polluting potential; INTERNA = International market performance.

The correlation matrix shown indicates the strength and direction of the relationships established. The assumption of multicollinearity is violated when there are strong relationships between the explanatory and control variables. In Table 6 it is possible to identify that there is a high correlation between the culture variables (clan and market = 0.986, clan and hierarchical = 0.985). To solve the problem of multicollinearity, it was decided to use four different regression models, considering each type of culture as the independent variable. The multicollinearity problem was solved and all variables presented a VIF (Variance Inflation Factor) value lower than 5 (Tables 8, 9 and 10).

The test of means was also performed to identify if there are differences in the population means. The result for the one-way ANOVA test is shown in Table 7.

Table 7. ANOVA test of a factor

	ANOVA TEST	Square Sum	df	Mean Square	Z	Sig.
ENVP	Between Groups	39,791	39	1,020	5,862	0,318
	In Groups	0,174	1	0,174		
	Total	39,965	40			
CLAN	Between Groups	0,046	39	0,001	23,484	0,162
	In Groups	0,000	1	0,000		
	Total	0,046	40			
	Between Groups	0,385	39	0,010	7,890	0,276
MAR	In Groups	0,001	1	0,001		
	Total	0,386	40			
	Between Groups	0,240	39	0,006	123,141	0,071
HIER	In Groups	0,000	1	0,000		
	Total	0,240	40			
ADH	Between Groups	0,080	39	0,002	2,576	0,463
	In Groups	0,001	1	0,001		
	Total	0,081	40			

Note. *. This is a lower limit of true significance; a. Lilliefors Significance Correlation.

For the one-factor ANOVA test, the null hypothesis H0 is assumed to show no differences for environmental performance and culture typologies. H1 states that if at least one company obtains a different population mean, the null hypothesis is rejected. In the cases of the variables presented in Table 7, all obtained p > 0.05, we failed to reject the null hypothesis. That is, there are no differences for the levels of culture and environmental performance for the sample analyzed.

To verify the occurrence of mediation between two variables, in this case the mediation of CSR in the relationship between organizational culture and environmental performance, it is necessary to verify, beforehand, statistically significant relationships in some structures: direct relationship between organizational culture and environmental performance; between organizational culture and CSR; and between CSR and environmental performance, when controlled by organizational culture. If any of these relationships are not statistically significant, mediation can be considered unlikely or impossible (Abu-Bader & Jones, 2021). The first relationship is presented in Table 8 (regression models 2, 3, 4, and 5), which correspond to clan culture, market culture, hierarchical culture, and adhocratical culture as predictors of environmental performance, respectively.

Table 8. Statistic (culture and environmental performance)

Statistic	Model 2 (Clan)		Model 3 (Market)		Model 4 (Hierarchical)		Model 5 (Adhocratical)	
R²	0,416		0,397		0,397		0,427	
R² adjusted	0,313		0,292		0,290		0,326	
ANOVA	0,004		0,006		0,006		0,003	
Variable	Coefficient	VIF	Coefficient	VIF	Coefficient	VIF	Coefficient	VIF
(Constant)	1,989		0,999		0,317		-1,031	
CULTURE	-10,274	1,039	-0,939	1,308	-0,092	1,318	9,601	1,035
SIZE	0,802*	1,140	0,759*	1,253	0,779*	1,266	0,771*	1,128
AGE	-0,045	1,110	-0,074	1,107	-0,074	1,108	-0,044	1,109
HIGH	1,179	1,140	1,245***	1,144	1,270***	1,144	1,157	1,140
MEDIUM	2,693**	1,154	2,827**	1,137	2,828**	1,139	2,809**	1,137
INTERNA	-1,057	1,148	-0,946	1,416	-1,036	1,422	-0,900	1,170

Note. Significant to the level of: *** p < 0.10; **p < 0.05; *p < 0.01.

The explanation capacity of the models corresponds to 31.30% (adjusted R^2 = 0.313); 29.2% (adjusted R^2 = 0.292); 29.0% (adjusted R^2 = 0.290); and 32.6% (adjusted R^2 = 0.326). And, although the models showed statistical significance for the ANOVA test (model 2, p = 0.004; model 3, p = 0.006; model 4, p = 0.006; model 5, p = 0.003), according to Table 8, the cultural variables had no statistical significance in the relationship with environmental performance, i.e., p-value > 0.05. These facts were also evidenced through Pearson's correlation (Table 6), as exposed earlier.

The results allowed the conclusion of the group hypotheses H1. That is, H1a, which proposed that clan

organizational culture is positively related to environmental performance, was rejected (p > 0.05). Hypothesis H1b, which suggested the positive and significant relationship of market culture with environmental performance, was rejected (p > 0.05). Hypothesis H1c, which proposed the negative and significant relationship between hierarchical culture and environmental performance, was rejected (p > 0.05). And, hypothesis H1d, which proposed the positive and significant relationship between adhocracy culture and environmental performance, was also rejected.

On the other hand, the company size and medium polluting potential variables were significant in all models, indicating that larger companies with medium environmental impact (according to the Law Nº 10,165 of 2000) have worse environmental performance.

The models also allow inferring that companies with high polluting potential have worse environmental performance when they are in the presence of the hierarchical culture and the market culture at the 10% significance level. This is justified because the hierarchical culture lacks sustainable practices due to its characteristic resistance to change, so it is more disposed to emit GHG (Ambekar et al., 2018), and the market culture emphasizes competitiveness and short-term results rather than ecological well-being when compared to other cultures Dyck et al. (2019).

To evaluate the second required relationship, Table 9 presents the models (6, 7, 8 and 9), for the relationship between clan culture, market culture, hierarchical culture and adhocratical culture and CSR, respectively.

Table 9. Statistics (culture and CSR)

Statistic	Model 6 (Clan)		Model 7 (Market)		Model 8 (Hierarchical)		Model 9 (Adhocratical)	
R²	0,199		0,211		0,211		0,200	
R² adjusted	0,058		0,072		0,072		0,059	
ANOVA	0,240		0,203		0,203		0,237	
Variable	Coefficient	VIF	Coefficient	VIF	Coefficient	VIF	Coefficient	VIF
(Constant)	-26,815		-5,375		-23,010		-26,826	
CULTURE	15,443	1,039	-26,186	1,308	33,252	1,318	17,889	1,035
SIZE	3,878***	1,140	3,410	1,253	3,386	1,266	3,904***	1,128
AGE	2,927	1,110	2,995	1,107	2,843	1,108	3,028	1,109
HIGH	8,165	1,140	7,380	1,144	7,380	1,144	7,824	1,140
MEDIUM	-6,672	1,154	-6,863	1,137	-7,154	1,139	-6,907	1,137
INTERNA	2,224	1,148	4,504	1,416	4,529	1,422	2,425	1,170

Note. Significant to the level of: *** p < 0.10; **p < 0.05; *p < 0.01.

These models did not show relevant values for R², suggesting that clan culture (adjusted R² = 0.058), market culture (adjusted R² = 0.072), hierarchical culture (adjusted R² = 0.072) and adhocratical culture (adjusted R² = 0.059) do not provide a good prediction of the CSR variable, according to models 6, 7, 8 and 9. This is also justified through the values obtained for the ANOVA test (p > 0.05). Therefore, no culture variable was able to explain CSR.

Thus, the hypotheses in group H2 had the same conclusion, where H2a proposed a positive and significant relationship between clan culture and environmental performance, H2b considered that there is relationship between market culture and CSR, H2c suggested that hierarchical culture has negative relationship with CSR, and H2d established positive relationship between adhocratical culture and CSR. Therefore, all hypotheses in group H2 were rejected.

The last required relationship has been set out in Table 10. This presents the tests for the models concerning the relationship between CSR and environmental performance when controlling for clan culture (model 10), market culture (model 11), hierarchical culture (model 12), and adhocratical culture (model 13) variables.

Table 10. CSR and performance, controlled by culture

Statistic	Model 10 (Clan)		Model 11 (Market)		Model 12 (Hierarchical)		Model 13 (Adhocratic)	
R²	0,428		0,408		0,408		0,436	
R² adjusted	0,307		0,283		0,283		0,317	
ANOVA	0,006		0,010		0,010		0,005	
Variable	Coefficient	VIF	Coefficient	VIF	Coefficient	VIF	Coefficient	VIF
(Constant)	2,388		1,075		0,653		-0,674	
CULTURE	0,015	1,249	0,014	1,267	0,015	1,267	0,013	1,250
SIZE	-10,504	1,040	-0,572	1,329	-0,577	1,338	9,363	1,037
AGE	0,745*	1,256	0,712*	1,344	0,730*	1,356	0,719*	1,246
HIGH	-0,088	1,122	-0,116	1,119	-0,116	1,120	-0,085	1,122
MEDIUM	1,057	1,188	1,141	1,183	1,162	1,183	1,053	1,184
INTERNA	2,792**	1,169	2,923**	1,153	2,932**	1,156	2,901**	1,153

Note. Significant to the level of: *** $p < 0.10$; **$p < 0.05$; *$p < 0.01$.

All models showed statistical significance ($p < 0.05$) for the ANOVA test (model 10 = 0.006; model 11 = 0.010; model 12 = 0.010 and model 13 = 0.005), indicating that at least one independent variable is related to CSR. The models have explanation power (adjusted R²) equivalent to 30.70%, 28.30%, 28.30% and 31.70%, respectively. Through these models, one can reject H3, which suggested that CSR is positively related to environmental performance, because the relationships between the variables were not significant ($p > 0.05$).

The regressions also found that variables in the third necessary relationship (CSR and performance, controlled by culture) were not significant ($p > 0.05$). Nevertheless, the mediation regressions were performed to conclude the theoretical hypotheses. For this, the IBM SPSS Statistics PROCESS ® macro software extension was used, by means of the bootstrapping method, which is a computer technique capable of extracting a large number of subsamples. In this case, a total of 5,000 subsamples were processed, with confidence limits of 95% (Abu-Bader & Jones, 2021).

The evidence ($p > 0.05$) indicates that there was no mediation of the CSR variable in the relationship between culture typologies and environmental performance. Therefore, the H4 hypotheses were rejected. H4a proposed that CSR practices positively mediate the relationship of clan organizational culture on environmental performance. H4b indicated that CSR practices exert positive mediation on the relationship of market organizational culture on environmental performance. H4c indicated that CSR practices exert positive mediation on the relationship of hierarchical organizational culture on environmental performance. And H4c indicated that CSR practices exert positive mediation on the relationship of adhocratical organizational culture on environmental performance.

Finally, regression was performed using the Stepwise method, which considers only the variables with statistical significance. Model 14 considers the variable size as predictor and has an explanatory power of 21.70% (adjusted R³), while model 15 covers the variables size and average polluting potential, with explanatory power of 27.90% (adjusted R³), as shown in Table 11:

Table 11. Stepwise regression

Statistic	Model 14		Model 15	
R²	0,237		0,315	
R² adjusted	0,217		0,279	
ANOVA	0,001		0,001	
Variable	Coefficient	VIF	Coefficient	VIF
(Constant)	0,632		1,017	
TAM	0,755*	1,000	0,718*	1,007
MED			2,071*	1,007

Note. Significant to the level of: *** $p < 0.10$; **$p < 0.05$; *$p < 0.01$.

The results for the ANOVA test reveal that the models show statistical significance ($p > 0.05$), i.e., the variables have a significant relationship with environmental performance. The models also meet the prerequisite of multicollinearity, as the VIF value is less than 5 for both models. Thus, the variables size and medium polluting potential have no autocorrelation. Therefore, regression 15 ($p < 0.05$ and adjusted R² = 0.279) understands that

environmental performance can be explained by company size, i.e., the larger the company (by asset value), the lower the environmental performance (higher amount of GHG emitted), and by the medium polluting potential category.

This result is adherent to the literature that suggests that companies with polluting potential tend to develop a worse relationship with environmental and sustainable performance. But this relationship occurred only for companies with medium polluting potential; companies with high polluting potential did not justify the environmental performance. Alves et al. (2013) e Machado et al. (2011) argue this fact through the Legitimacy Theory, that is, actions and procedures prior to contracts between groups, that demonstrate the intention of each party (in this case between company and society). Therefore, companies with high pollution potential suffer greater social pressure to take care of environmental issues, leading them to invest more resources to care for the environment and achieve social legitimacy, i.e., companies implement activities that reduce the negative effects of the operation, and thus legitimize their operations before society and improve environmental performance. For example, the companies Petróleo Brasileiro SA and Vale SA had good scores for ESG (76.16 and 87.88, respectively), and carry out sustainability actions and disclosures (sustainability reports), but emitted high GHG emissions, as their mean scores were 5.05 and 0.41 while the mean and minimum values were 0 and -0.5, respectively.

Machado et al. (2011) supported this theory in a study conducted with Brazilian companies when he verified that those that have polluting potential make more environmental investments compared to those that do not present high risks to the environment.

These results can also be argued based on the willingness that medium-polluting potential companies have for environmental disclosure and because in this group are contained companies from the food segment (slaughterhouses and meatpacking plants) that are responsible for high GHG emissions. The work of Freitas et al. (2019) proved that companies with medium polluting potential are more sensitive to socio-environmental disclosures. These disclosures may favor the significant results of this group with environmental performance.

As for the positive and significant result ($p < 0.05$) of the relationship between size and GHG (i.e., size negatively affecting environmental performance), it is opposite to the findings of Beuren et al. (2013), which found that company size positively affects eco-control systems (systems to support environmental decision making), as well as environmental performance, in companies of the [B]³ in the year 2011. Voinea et al. (2020) also observed, in Brazilian companies, that company size positively affects environmental performance, this fact may be associated with scale economies that help larger companies to achieve better performance. The difference between these results evidenced in the literature and the results found in this work may be explored in future studies.

4. Discussion

The first correlation proposed in this study suggested that there is a positive and significant relationship between clan culture variable and environmental performance (H1a). However, among the companies in [B]³, no significant relationship was observed ($p > 0.05$). These findings were contrary to the study of Bhuiyan et al. (2020), which analyzed the relationship between some characteristics of clan culture (such as respect for people, team orientation, and human rights) in companies in Bangladesh, which, like Brazil, is an emerging economy. One of the reasons for the difference between the two results may be related to the fact that the present study limited the population to the companies of [B]³, unlike the work of Bhuiyan et al. (2020) that had its scope extended to privately held companies and used a larger sample, with 201 companies in the industry and services segments. These justifications also corroborate the next contrary results for the authors of Bhuiyan et al. (2020).

In addition, clan cultures emphasize values linked to people, traditions and their main objective is in developing people (González-Benito & González-Benito, 2008), which suggests that the companies in the sample may be focusing more efforts on their employees, when compared to investments for better environmental performance.

As for the relationship between market culture and environmental performance (H1b), there was also no statistical significance ($p > 0.05$). Bhuiyan et al. (2020) also found opposite results for market culture characteristics, represented by result orientation, consumer rights, and information disclosure. These aspects obtained statistical significance for the relationship with non-financial performance (social and environmental), except responsibility for external stakeholders, which showed no statistical significance and the indicator scored weak and positive in the correlation analysis.

The market culture aims to gain efficiency of processes to better serve the market (Linnenluecke & Griffiths, 2010). This may cause this group to emphasize greater issues of economic results, which may be an indication of

why the relationship between this culture and environmental performance was not significant.

For the relationship between hierarchical culture and environmental performance (H2c, p > 0.05), the findings were similar to those of Bhuiyan et al. (2020), who also found that there is no significant relationship between the stability characteristic and non-financial performance (social and environmental).

In hierarchical culture, the company emphasizes values such as stability, control, and productive efficiency (Cameron & Quinn, 2011). In the context of these companies, located in developing countries, this type of culture may be emphasizing these values in order to have higher economic returns and gain global competitiveness, making environmental objectives secondary.

And about the relationship between adhocratic culture and environmental performance (H1d, which was rejected, p>0.05), the results indicate that there is no association between the two variables, although there is evidence of a negative and weak relationship (Table 6), corroborating with Bhuiyan et al. (2020) e Sugita e Takahashi (2015). However, it is opposite to the findings of Wisner et al. (2006), which found that proactivity, one of the essential characteristics of adhocratic culture, generates impact on environmental performance, such as the reduction of waste and environmental discharges.

In general, the relationships between organizational culture and environmental performance were opposite to the results of Joost (2021), which also used CVF to analyze the relationship between organizational culture and environmental performance in US companies, which concluded that the clan, market and adhocratic cultures relate positively to environmental performance, while the hierarchical culture has a negative relationship.

In parallel, Abdulrahim et al. (2020), which surveyed companies on the Indonesian stock exchange, found that there are significant relationships between clan, market, hierarchical, and adhocratic cultures, and sustainability performance (considering, in addition to environmental performance, the economic and social performance). This difference between the results reinforces the need for studies that substantiate culture relationships with specific sustainability performance, i.e., considering each dimension of sustainability (environmental, social, and economic) separately (Dyck et al., 2019).

Hypothesis group 2, which examines the relationship between organizational cultures and CSR, was also rejected in full. H2a, which suggested the relationship between clan culture and CSR, although rejected (p > 0.05), was similar to the result of Bhuiyan et al. (2020), in which companies that are team-oriented, which foster respect for people, did not relate to stakeholder-oriented CSR. These results were contrary to the study of Espasandín-Bustelo et al. (2020), which observed that there are relationships between clan cultures and CSR.

According to Lee and Kim (2017) the relationship between members of a clan culture is based on trust and care, and individual goals are aligned with organizational goals. In the case of the sample collected, organizational efforts may be aligned with group goals and majority interests, and these, consequently, are not related to the development of CSR practices.

H2b considered that there is a relationship between market culture and CSR. The hypothesis was rejected (p > 0.05), and the results were different from the results found by Bhuiyan et al. (2020), in which companies that are results-oriented are positively related to CSR. Market culture establishes competitive, coordinated and adaptive strategies, enabling these companies to take on environmental practices or not, and this depends on the circumstances in which they are involved (González-Benito & González-Benito, 2008).

Similarly, the findings of Bhuiyan et al. (2020), found that organizations that emphasize stability and attention to detail relate positively to CSR, countering H2c (hierarchical culture has negative relationship with CSR), which was rejected (p > 0.05). Usually, members of the hierarchical culture do not engage in CSR activities and managers do not emphasize stakeholders in the long term, and the emphasis on economic performance can create conflicts with CSR activities (Lee & Kim, 2017) and discourage it, because these activities generate additional costs (Bhuiyan et al., 2020).

Finally, H2d, which established a positive relationship between adhocratic culture and CSR, was rejected (p > 0.05), countering studies such as Übius and Alas (2009), in which adhocratic culture is a predecessor of social CSR and stakeholder-oriented CSR in European and Asian countries. Contrary to the study of Bhuiyan et al. (2020), in which innovative companies relate, positively, to stakeholder-oriented CSR, and also opposite to the study of Espasandín-Bustelo et al. (2020) which found that adhocratic culture encourages internal CSR practices, this culture typology was the least prominent in the sample, hindering findings regarding this relationship.

H3, also rejected (p > 0.05), suggested that CSR is positively related to environmental performance. These results are opposite to that of Anser et al. (2020), who found that companies that engage in CSR have better environmental performance in hotel and tourism companies in Pakistan. Similarly, when studying companies in

India from the manufacturing, automotive, insurance and information technology segments, Suganthi (2020) found that there is a positive relationship between CSR and environmental performance, as companies make more effort to reduce GHG emissions when they undertake CSR initiatives. Orazalin and Baydauletov (2020) also concluded that companies that have the most effective CSR strategies achieve the best environmental performance

Although CSR practices improve the environmental performance of organizations, as the company becomes more willing to respond to regulation and institutional demands, and to better control their materials waste, energy, and pollution (Anser et al., 2020), companies usually report more on the positive impacts of their operation over the negative ones (Kornieieva, 2020), increasing ESG scores but not necessarily decreasing negative environmental impact.

Therefore, all the hypotheses of the mediation group were rejected. However, these results were found, partially, in other works such as that of Bhuiyan et al. (2020), which also did not find statistical significance for CSR mediation in the face of the relationship between control and stability cultures and non-financial performance in a developing country. And although there is evidence in the literature that CSR acts as a mediator in the relationship between culture and performance, the results showed that there is no such relationship for clan, market, hierarchical, and adhocratical cultures for the companies in [B]³.

The hypothesis of a positive mediation in the relationship of clan organizational culture on environmental performance (H4a), different from Bhuiyan et al. (2020), found the mediation of CSR between cultural characteristics of respect for people and non-financial performance. On the other hand, the rejection of H4b and H4c corroborates with these authors, as there was no statistical significance for the mediation of CSR in the face of the relationship between control and market cultures and non-financial performance. But it countered them in rejecting H4d, as they identified that CSR mediates the relationship between innovative cultures and non-financial performance. These results strengthen the argument of Espasandín-Bustelo et al. (2020), which states that the culture literature, as a predecessor to CSR, does not yet have a definite consensus.

Several factors may justify these results. First, the possibility of bias in the collected data, due to companies not always being interested or willing to disclose, in a transparent way (Teck et al., 2020), their environmental information. This practice is known in the literature as SDG-washing (Sustainable Developmental Goals), which consists of reporting positive contributions and ignoring negative impacts related to the SDGs (Kornieieva, 2020). In addition, this study has shown limitations regarding sample size (only 41 companies), and sectors included (only 9), while comparative studies use other company segments, larger samples, and internal perspectives on environmental performance.

From the results, it was found that there are no relationships between organizational culture, CSR and environmental performance, and therefore, there is no mediating effect of CSR in the [B]³ company scenarios. On the other hand, it could be observed that larger companies (with higher asset value) tend to have the worst environmental performance, and companies that are considered having medium polluting potential by the Law Nº. 10,165 of 2000, are negatively related to environmental performance. This occurs mainly because companies in the food segment, such as those that operate with slaughterhouses and meatpacking plants, are responsible for high GHG emissions and are in the category of medium polluting potential according to this legislation, in addition to the fact that these companies are more willing to disclose their socio-environmental information.

These results contribute to the organizational culture and CSR literature, since they offer empirical evidence of two complex themes that still lack a defined consensus, as cited by Espasandín-Bustelo et al. (2020), especially in the Brazilian context. Moreover, it contributes to the literature of environmental performance and CSR, since the latter has been considered a resource capable of assisting in the resolutions of environmental problems (Ye et al., 2020).

The results also collaborate with the management of companies, because it helps management in the search for answers about which types of cultures (analyzing aspects such as, for example, the words used by its members) fit better with the results of CSR and environmental performance, that is, how to use the resource of organizational culture to improve relations with stakeholders and increase environmental performance (reducing GHG emissions). These contributions help, mainly, companies that are categorized with medium polluting potential (because they reflected worse environmental performance), and those that have high polluting potential (because they are more prone to pollution in the face of market and hierarchical cultures).

The insights offered by this research, that culture is not related to environmental performance in [B]³ companies, and the indication in the literature that there are internal variables (such as individual characteristics of managers, employee beliefs, and corporate governance) that can affect culture and CSR (Santos et al., 2020), Al-Swidi et al.

(2021), Ali et al. (2022), may trigger further research that considers these variables and obtains significant values for the relationship between culture, CSR, and environmental performance.

Additionally, this study suggests that further work should be made to investigate other cultural types and characteristics, their combinations, and the reasons that lead them to adopt CSR practices. This type of study enables a better understanding of which typologies of cultures need to be encouraged in order to manage organizational responsiveness and effectiveness (Pasricha, Singh, & Verma, 2018). And, in case of using the methodology of Fiordelisi e Ricci (2014), it is suggested that the amendments of the corrigendum of Fiordelisi e Ricci (2021) be considered.

Acknowledgments

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Appendix A

Companies

	Empresa	Code
1	AES Brasil Energia SA	AESB3.SA
2	Ambev SA	ABEV3.SA
3	Braskem SA	BRKM3.SA
4	BRF SA	PDG_pr.SA^D97
5	CCR SA	CCRO3.SA
6	Cielo SA	CIEL3.SA
7	Copasa MG	CSMG11.SA^H07
8	CPFL Energia SA	CPFE11.SA^H05
9	ISA CTEEP SA	TRPL9.SA^H09
10	EDP Energias do Brasil SA	ENBR1.SA^L08
11	Enalta Participações SA	ENAT3.SA
12	CEMIG SA	CMI_r.SA^K95
13	Eneva SA	MPXE11.SA^G11
14	Engie Brasil Energia SA	TBLE5.SA^J05
15	Even SA	EVEN9.SA^K08
16	EZTEC SA	EZTC3.SA
17	Hidrovias do Brasil SA	HBSA3.SA
18	Hypera SA	HYPE12.SA^L10
19	Light SA	LIGH9.SA^I99
20	Lojas Renner SA	LREr.SA^H97
21	Marfrig Global Foods SA	MRFG11.SA^H10
22	Minerva SA	BEEF9.SA^J09
23	Movida Participações SA	MOVI3.SA
24	Neoenergia SA	GNA_p.SA^F98
25	Odontoprev SA	ODPV3.SA
26	Petróleo Brasileiro SA	PETR9.SA^H00
27	Rede D'Or São Luiz SA	RDOR3.SA
28	Rumo SA	PIUM9.SA^I01
29	Sendas Distribuidora SA	ASAI3.SA
30	Simpar SA	SIMH3T.SA
31	Suzano SA	SUZB14.SA^G11
32	Tegra Incorporadora SA	BISA9.SA^C09
33	Telefônica Brasil SA	TLPP12m.SA^A01
34	Tim SA	TIMS3S.SA
35	TAESA SA	TAEE3.SA
36	Tupy SA	TUPY9.SA^G99
37	Ultrapar Participações SA	UGPA10.SA^K99
38	USIMINAS SA	USIM11.SA^F00
39	Vale SA	VAL_pi.SA^E93
40	Via SA	GLOB1.SA^L10
41	Vibra Energia SA	BRDT4.SA^E03

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