

Board Cultural Diversity and Environmental Innovation: Evidence from Latin America Firms

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Introdução

Environmental innovation “is the production, assimilation or exploitation of a product, production process, service or management or business method that is novel to the organisation (developing or adopting it) and which results, throughout its life cycle, in a reduction of environmental risk, pollution and other negative impacts of resources use (including energy use) compared to relevant alternatives” (Kemp & Pearson, 2007).

Problema de Pesquisa e Objetivo

This study seeks to answer the research question: To what extent does board cultural diversity influence environmental innovation?

Fundamentação Teórica

Theoretically, we use resource dependence theory. According to the resource dependence theory, firms depend on resources to survive (Shi et al., 2021) and resource dependence theory it was developed for the purpose of understanding the kind of relationships within firms that play an important role in market failures (Pfeffer & Salancik, 2003).

Metodologia

To test the hypotheses, we use a sample consisting of 450 firms-year observation of 76 firms from Argentina, Brazil, Chile, Colombia, Mexico, and Peru between 2010 and 2020. The sample is composed of countries belonging to the Morgan Stanley Capital International (MSCI) Emerging Markets Latin America Index, created in 1990, which represents medium and large capitalization in six Latin American Emerging Market countries (Argentina, Brazil, Chile, Colombia, Mexico, and Peru) (MSCI, 2021). We employed Feasible Generalized Least Squares (FGLS) regression.

Análise dos Resultados

The results indicate that board cultural diversity positively influences environmental innovation. The results also indicate that firm size positively influences environmental innovation. Finally, the results indicate that CSR committee, CEO duality, board size, profitability, and indebtedness do not influence environmental innovation.

Conclusão

The study has theoretical and practical implications. Theoretically, the results indicate that companies with cultural diversity have unique resources, which assist in the survival of the company and also in the adoption of environmental innovation practices, with this, the study reinforces the importance of the resource dependence theory. The results can also assist researchers to future research of environmental innovation and board cultural diversity from resource dependence. As practical implications, we conclude that policies are needed to increase the board cultural diversity.

Referências Bibliográficas

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Palavras Chave

Environmental Innovation, Board Cultural Diversity, Latin America

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1 Introduction

Companies are under pressure to minimize their negative impacts on the environment, and one of the mechanisms used to achieve harmony between the company and the environment is environmental innovation, which plays a crucial role in managing the impacts on the environment by minimizing waste, reducing CO₂ emissions, and reducing pollution (Nadeem et al., 2021). Environmental innovation “is the production, assimilation or exploitation of a product, production process, service or management or business method that is novel to the organisation (developing or adopting it) and which results, throughout its life cycle, in a reduction of environmental risk, pollution and other negative impacts of resources use (including energy use) compared to relevant alternatives” (Kemp & Pearson, 2007). Environmental innovation can also be defined as “green activities that optimize internal resources to improve a firm’s capacity to produce new green products and services, through compliance with environmental needs and by means of green technology” (Fernando et al., 2019). In this line, environmental innovation can lead to a greater competitive advantage, sending a positive signal from the company to the market (Nadeem et al., 2021) and helps business legitimacy (Nadeem et al., 2020).

Environmental innovation is associated with green creativity (Song et al., 2020), superior economic performance (Andries & Stephan, 2019; Hizarci-Payne et al., 2021), reduction of toxic emissions (Carrión-Flores & Innes, 2010) and reduction stock price crash risk (Zaman et al., 2021). Low level of environmental innovation can be associated with limited development knowledge, leading to a waste of financial resources, and a high level of environmental innovation can represent an optimization of financial resources (Farza et al., 2021) and environmental innovation can reduce environmental pollution from the source, allowing that environmental performance to exceed the industry average (Liao, 2018). Environmental innovation process can be more costly than non-environmental ones, but companies embrace environmental product innovations to achieve long-term goals (Hizarci-Payne et al., 2021). In this line, environmental innovation such as solar and wind energy, new types of efficient biofuels can be associated with emission reductions and environmental relief (Töbelmann & Wendler, 2020). Thus, product innovation can lead to environmental benefits (Skordoulis et al., 2020) and companies adopt environmental innovation as a strategy to achieve environmental sustainability (Song et al., 2020).

Corporate governance is a system of rules, practices, and policies that deal with the activities of the board of directors, such as overseeing the company's operations (Tibiletti et al., 2021). Board of directors is an internal corporate governance mechanism that defines long term strategies and goals for the company, and appoints and monitors managers (Al-Mamun & Seamer, 2021) and board of directors is seen as one of the determining resources for the organization to conduct efficient business (Karim et al., 2019). Board of directors is responsible for major strategic and economic decisions of the company, such as approving mergers or changes in the capital structure (Zhang & Luo, 2021) and board of directors plays a crucial role by supervising the managers (Arango & Gaitan, 2021). In this vein, the composition and characteristics of the board of directors are crucial to achieving better environmental and social results (Uyar et al., 2021a).

Diversity is part of the culture in many countries around the world (Cumming & Leung, 2021). When board members have different attributes, such as age, gender, education, and expertise, the board is diverse (Ali et al., 2021), i. e. board diversity is related to the heterogeneity of the board members (Bhuiyan et al., 2021) and board diversity provides a synergy of knowledge and experience that increases the innovative capacity of the company

(Fernandes et al., 2019). Board diversity leads to lower risk credit (Arango & Gaitan, 2021), increases technical efficiency and total factor productivity (Ali et al., 2021), innovation in companies (Bernile et al., 2018; Cumming & Leung, 2021), CSR performance (Harjoto et al., 2015) and firm value (Carter et al., 2003). Furthermore, board diversity is an effective monitoring mechanism that reduces stakeholders' agency costs (Veltri et al., 2021).

Diversity cultural on the board is "the cultural distance between board members" (Nantembelele & Sowe, 2021). Companies bring together people from different cultural backgrounds (Starostka-Patyk et al., 2015), cultural diversity enables creative advantage, having a positive impact on business innovation (Jones et al., 2021) and good cultural diversity management in companies can provide economic advantages (Lozano & Escrich, 2017). Racial diversity board helps company achieve competitive advantage (Khan, Khan, & Saeed, 2019). Moreover, foreign directors have different cultural traits that allow more experience and ideas for the board, favoring financial performance and environmental and social performance (Colakoglu et al., 2020) and foreign directors with a different culture can enhance the positive impact of diversity (Zaid et al., 2020).

Board cultural diversity is a governance feature that is barely studied (Federo et al., 2020). Previous studies provide some mixed results on whether there is an association between board cultural diversity, generational diversity, nationality diversity, ethnic diversity, and racial diversity and environmental and social aspects. Many studies find a positive and significant relationship between board cultural diversity (Boukattaya & Omri, 2021; Martínez-Ferrero et al., 2021; Post et al., 2011), generational diversity (Ferrero-Ferrero et al., 2015), nationality diversity (Joubert, 2020; Khan, Khan, & Senturk, 2019; Zhuang et al., 2018), ethnic diversity (Azmat & Rentschler, 2017), and racial diversity (Harjoto et al., 2015) and the environmental and social aspects. However, other studies find no significant (Hartmann & Carment, 2020; Khan, Khan, & Senturk, 2019) or negative association (Katmon et al., 2019; Prudêncio et al., 2021). However, to the best of our knowledge no study has examined the influence of board cultural diversity and environmental innovation., so this study seeks to fill this gap by showing this relationship in Latin America

This study seeks to answer the research question: To what extent does board cultural diversity influence environmental innovation? Theoretically, we use resource dependence theory. According to the resource dependence theory, firms depend on resources to survive (Shi et al., 2021) and resource dependence theory it was developed for the purpose of understanding the kind of relationships within firms that play an important role in market failures (Pfeffer & Salancik, 2003).

Our study has several contributions. First, in Latin America, citizens often lack access to basic conditions of education, health, and wealth (Martínez-Ferrero et al., 2021), being a region marked by social disparities and structural problems (Tabares, 2021). Thus, research on the impact of board cultural diversity in Latin America is important and is the first contribution of the study. Second, to the best of our knowledge this study is the first to research the influence of board cultural diversity on environmental innovation in Latin American countries. Third, we quantitatively analyze the influence of board cultural diversity on environmental innovation in Latin American companies. Finally, COVID-19 has made companies seek to have better environmental behaviors (Popkova et al., 2021). The study contributes by assisting managers on issues such as environmental innovation and board cultural diversity in the post-pandemic period.

The remainder of this paper is structured as follows. The second section discusses the literature review. Next, we discuss our data and methodology. The fourth section presents the empirical analyses of the study. Finally, we discuss the findings and make concluding remarks, we point out to the research limitations and delineate the related future research directions.

2. Literature review and hypothesis

2.1 Board cultural diversity and environmental innovation

Knowledge is a basic requirement for a company to continuously innovate, improving the quality of products and services, and is used in designing green products (Fernando et al., 2019). According to resource dependence theory, board diversity connects the company to the external environment, leading to better performance (Ramadan & Hassan, 2021) and board diversity improves the firm's relationship with its stakeholders (Hoang et al., 2018). Directors from diverse backgrounds bring unique skills to the board, increasing the interaction between the board and the stakeholders of the company and thereby improving corporate social performance (Harjoto et al., 2015). Thus, resource dependence theory states that the company is dependent on resources to survive and to reduce this dependence, the company can have connections to the external environment through the board of directors (A. Amin et al., 2021)

Brammer et al., (2007) found low ethnic diversity on UK company boards. Companies are under pressure to adopt greater ethnic diversity, because ethnically diverse companies have a diversity of cultural practices (Azmat & Rentschler, 2017) and companies that incorporate ethnic minority directors increase their reputation with stakeholders because they respond to calls for greater diversity (Singh, 2007). Board ethnic diversity can lead to superior corporate performance, because the divergent perceptions of an ethnically diverse board can lead to innovative and improved behavior, meeting the needs of stakeholders in board decisions (Hafsi & Turgut, 2013) and minority directors tend to make socially responsible decisions and care about meeting the needs of stakeholders (Hartmann & Carmenate, 2020).

According to resource dependency theory, board members with international experience are more likely to adopt corporate social responsibility strategies because of their international policy experience (Al-Mamun & Seamer, 2021). When a board of directors is culturally diverse it has members with different cultural values with a range of knowledge and experience that benefit the organizations (Nantembelele & Sowe, 2021). Boards with different nationalities have more realistic ways of thinking that help in business decision making (Zaid et al., 2020) and the cultural mentality on the grounds of nationality is acquired in a person's upbringing, and the impression of nationality is not easily excluded (Kaczmarek & B. Nyuur, 2021). The presence of foreign directors enables new ways of thinking, different values and personality (Kaczmarek & B. Nyuur, 2021) and the presence of foreign directors provides new resources and different perspectives such as political connections, experience, skills, and access to networks (Beji et al., 2020). Furthermore, experience of board members abroad allows a close connection with foreign companies, by gaining in-depth knowledge of the foreign culture (Zhuang et al., 2018).

According to Ferrero-Ferrero et al., (2015), generational diversity encourages companies to take a sustainable approach to their business. Carter et al., (2003) indicated a positive relationship between ethnic diversity and firm value. Hafsi and Turgut (2013) suggest that ethnic diversity does not influence corporate social performance. Katmon et al., (2019) determined that board ethnic diversity does not improve the quality of CSR disclosure. Hartmann and Carmenate (2020) found that ethnic diversity does not influence a company's reputation for corporate social responsibility. Khan et al., (2021) reveal that nationality and ethnic diversity does not influence the quality of CSR disclosure. Similarly, Khan, Khan and Senturk (2019) reported an insignificant relationship between corporate board ethnic diversity and quality of corporate social responsibility disclosure. However, Prudêncio et al., (2021) concluded that ethnic diversity negatively influences corporate social responsibility. Azam et al., (2019) concluded that ethnic diversity negatively impacts CSR.

Zhuang et al., (2018) argued that in overseas background of board members is positively related to corporate social responsibility performance. Similar, Beji et al., (2020) found that the presence of foreign directors positively influences CSR performance. Joubert (2020) indicated

that nationality diversity positively influences CSR. M. H. Amin et al., (2021) concluded that nationality diversity does not influence CSR disclosure on Twitter. Joubert (2021) found that nationality diversity positively influences corporate social responsibility. However, Katmon et al., (2019) highlighted that nationality diversity negatively influences the quality of corporate social responsibility disclosure.

Lu and Wang (2021) found that companies with cultural characteristics such as low power distance, femininity, individualism, high uncertainty avoidance and long-term orientation have better environmental performance. Post et al., (2011) suggest that cultural background is positively associated with disclosure of environmental corporate social responsibility governance. Lin et al., (2020) suggest that cultural diversity influences the disclosure of intellectual capital. Martínez-Ferrero et al., (2021) found that board cultural diversity promotes greater sustainability engagement, from a sample of 2072 annual observations over the period 2012-2018 from four countries: Argentina, Brazil, Chile, and Mexico. Boukattaya and Omri (2021) indicated that board cultural diversity positively influences corporate social responsibility and negatively influences corporate social irresponsibility. Thus, in line with resource dependence theory and prior empirical findings, the following hypothesis is proposed:

Hypothesis 1: Board cultural diversity is positively related to environmental innovation.

3 Data and Methodology

3.1 Sample construction

To test the hypotheses, we use a sample consisting of 450 firms-year observation of 76 firms from Argentina, Brazil, Chile, Colombia, Mexico, and Peru between 2010 and 2020. The sample is composed of countries belonging to the Morgan Stanley Capital International (MSCI) Emerging Markets Latin America Index, created in 1990, which represents medium and large capitalization in six Latin American Emerging Market countries (Argentina, Brazil, Chile, Colombia, Mexico, and Peru) (MSCI, 2021). The sample is unbalanced, because full data is not available for all companies and for all years. Our data set is made up of information from the Refinitiv database. The Refinitiv database consists of around 150 indicators grouped into ten dimensions that measure a company's environmental, social and governance performance (Bătae et al., 2021). Table 1 illustrates the sector classification used in this analysis, based on the Global Industry Classification Standard (GICS).

Table 1

Sample distribution by sector of activity and countries

	Argentina	Brazil	Chile	Colombia	México	Peru	Total
Communication Services	0	18	6	0	12	0	36
Consumer Discretionary	2	16	9	0	2	0	29
Consumer Staples	0	33	27	0	27	5	92
Energy	0	14	0	1	2	0	17
Financials	4	33	19	2	8	4	70
Health Care	0	11	0	0	0	0	11
Industrials	0	24	6	1	11	0	42
Materials	4	33	11	0	9	0	57
Real State	3	6	2	0	0	0	11
Utilities	0	46	38	1	0	0	85
Total	13	234	118	5	71	9	450

As is evident from the data in Table 1, the sample comprised ten activity sectors. Firms belonging to the consumer staples represent 92 observations (20.4%), followed by the utilities, financials and materials sectors at 85 (18.8%), 70 (15.5%) and 57 (12.6%) observations, respectively. The sector with the lowest representation was health care and real state with 11

observations (2.4%). In reference to countries, Brazil is the country with the most observations with 234 (52%), followed by Chile and Mexico with 118 (26.2%) and 71 (15,7%) observations, respectively.

3.2 Variables

3.2.1 Dependent variable

Environmental innovation is presented in this study as the dependent variable, in line with previous studies (García-Sánchez et al., 2021). This variable is calculated by the ratio between the score of 3 environmental innovation indicators (the use of clean technologies, ecological processes in the design and manufacture of products and manufacturing and marketing of environmentally responsible products and the total environmental innovation performance score) and the total number of environmental innovation items (3).

3.2.2 Independent variable and control variables

Our independent variable is board cultural diversity. Board cultural diversity is measured by percentage of board members that have a cultural background different from the location of the corporate headquarters (Martínez-Ferrero et al., 2021; Nantembelele & Sowe, 2021). See the variables description in Table 2.

Table 2

Variables description

Variable name	Variable name	Model name	Proxy
Dependent	Environmental innovation	EINNOV	Environmental innovation items (The use of clean technologies, ecological processes in the design and manufacture of products and manufacturing and marketing of environmentally responsible products)/Total number of items (3)
Independent	Board cultural diversity	BCD	Percentage of board members that have a cultural background different from the location of the corporate headquarters
Control	CSR sustainable committee	CSRCOM	A dummy variable equals 1 if the company has CSR sustainable committee, and otherwise 0.
Control	CEO duality	CEODUAL	a dummy variable that assumes value 1, when the CEO and the Chairman are the same person and 0 otherwise.
Control	Board size	BSIZE	The number of board members
Control	Indebtedness	IND	Total liabilities/Total assets
Control	Profitability	ROA	Earnings before interest, tax, depreciation, and amortization (EBITDA)/Total assets.
Control	Firm size	FSIZE	Natural logarithm of total assets

We include control variables at the board and company level that can affect environmental innovation performance. At the board level, we included CSR sustainable committee, CEO duality and board size. CSR sustainable committee is a dummy variable equals 1 if the company has CSR sustainable committee, and otherwise 0. CSR Committee deals with sustainability issues, effectively managing the company's relationship with its stakeholders (Konadu, 2017) and can be considered a sign that the company puts CSR issues on its agenda (Torres & Augusto, 2021), bringing greater legitimacy to the company's operations (Helfaya & Moussa, 2017), thus a positive relationship is expected between CEO separation and environmental innovation. CEO duality is a dummy variable that assumes value 1, when the CEO and the Chairman are the same person and 0 otherwise. CEO duality leads to leadership and governance problems (Fahad & Rahman, 2020) and duality causes the CEO to acquire too much power, not allowing the board of directors to control and monitor the CEO's activities

effectively (Ahmad et al., 2017). When the same person holds the positions of CEO and Chairman, the company is less likely to engage in environmental and social practices (Uyar et al., 2021b), thus, we expect that CEO duality to negatively influence environmental innovation. Board size is the number of board members. Board size can be seen as a corporate governance tool that assists in protecting and promoting the interests of the company's various stakeholders (Dakhli, 2021), being a corporate governance mechanism that has the right to make decisions that improve the company and its stakeholders (R. Ali et al., 2021). We expect a positive relationship is expected between board size and environmental innovation. At the firm level, indebtedness is included as a control variable. Indebtedness is measured by dividing total liabilities by total assets. More indebted companies may practice more social and environmental initiatives to appease their creditors (Kuzey et al., 2021). Thus, we expect firm indebtedness to positively influence environmental innovation. Profitability is computed as the ratio of Earnings before interest, tax, depreciation, and amortization (EBITDA) divided by total assets. Profitability allows the company flexibility in the budget to adopt social and environmental incentives (Nursimloo et al., 2020) and more profitable companies tend to show their commitment to society (Fahad & Rahman, 2020). Thus, we expect a positive relationship is expected between profitability and environmental innovation. Finally, firm size is measured as the natural logarithm of total assets. Larger companies tend to suffer greater public scrutiny (Jouber, 2020) and are more able to operate responsibly (Rashid, 2021). Thus, we expect firm size to positively influence environmental innovation.

3.3 Empirical model

We use panel data econometric model, with the data organized in year-firm observation units. A panel data model are complex error structures (Reed & Ye, 2011), designed specifically for panel data (Lončar et al., 2019). Homoscedasticity was checked with the Breusch-Pagan Lagrange multiplier test, and the results indicated the presence of heteroscedasticity ($p < 0.01$). To test for first-order autocorrelation the Wooldridge test was employed, and the results showed statistical significance ($p < 0.01$), confirming the existence of first-order autocorrelation. Thus, to control for heteroscedasticity and autocorrelation, we employed Feasible Generalized Least Squares (FGLS) regression. FGLS is an efficient method to deal with heteroscedasticity and autocorrelation (Reed & Ye, 2011) and the FGLS estimator requires that a heteroscedasticity or autocorrelation model be specified (Lončar et al., 2019), allowing estimation in the presence of autocorrelation and heteroscedasticity (Hategan et al., 2018). All explanatory variables are lagged relative to the dependent variable to overcome the problems of reverse causality and endogeneity. Thus, to verify the influence of board cultural diversity on environmental innovation the following model is estimated:

$$\text{EINNOV}_{i,t} = \beta_0 + \beta_1 \text{BCD}_{i,t-1} + \beta_2 \text{CSRCOM}_{i,t-1} + \beta_3 \text{CEODUAL}_{i,t-1} + \beta_4 \text{BSIZE}_{i,t-1} + \beta_5 \text{IND}_{i,t-1} + \beta_6 \text{ROA}_{i,t-1} + \beta_7 \text{FSIZE}_{i,t-1} + \varepsilon_{i,t} \quad (1)$$

Where, EINNOV is the environmental innovation. BCD is the board cultural diversity. CSRCOM is the CSR sustainable committee. CEODUAL is the CEO duality. BSIZE is the board size. IND is the firm indebtedness. Profitability is the firm profitability. Firm size is the firm size.

4.1 Results

4.1 Descriptive statics

Table 3 reports a summary of the descriptive statistics for all variables considered in the study model. The average for environmental innovation is 0.486, which is similar to the studies (Aibar-Guzmán & Frías-Aceituno, 2021) that have an average of 0.504. The maximum value

is 2 and the minimum value is 0, indicating that no company has adopted all environmental innovation initiatives and that there were companies that have not adopted environmental innovation initiatives.

Table 3

Descriptive statics

Variables	N	Mean	SD	Minimum	Maximum
ENVINOV	450	0.486	0.722	0	2
BCD	450	24.71	21.56	4.166	91.66
CSRCOM	450	0.555	0.497	0	1
CEODUAL	450	0.36	0.480	0	1
BSIZE	450	11.18	4.139	6	24
ROA	450	0.109	0.850	-1.222	0.439
IND	450	0.630	0.213	0.140	1.255
FSIZE	450	22.84	1.302	19.62	26.51

The average of board cultural diversity is 24.71, which is slightly lower than the study of (Martínez-Ferrero et al., 2021), which had an average of 32.02. The minimum value is 4.166 and the maximum value is 91.66, indicating that no company had all board members with cultural background different from the corporate headquarters location. The average CSR sustainable committee is 0.555, showing that more than half of the companies in the sample have CSR committees.

4.2 Correlation matrix

Table 4 presents the correlation matrix. We use the correlation matrix in our study in order to measure the strength and direction of the linear relationship between our dependent variable and the independent and control variables. The highest reported variance inflation factor (VIF) is 1.26 for indebtedness and the lowest is 1.04 for CEO duality. Environmental innovation has significantly positive correlation with board cultural diversity, CSR committee and company size.

Table 4

Correlation matrix and variance inflation factor (VIF)

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	VIF
(1)ENVINOV	1.00								
(2)BCD	0.209*	1.00							1.11
(3)CSRCOM	0.293*	-0.100*	1.00						1.05
(4)CEODUAL	-0.063	-0.034	-0.02	1.000					1.04
(5)BSIZE	-0.050	-0.245	0.073	0.068	1.000				1.20
(6)ROA	0.006	0.0727	0.017	-0.148*	-0.036	1.000			1.12
(7)IND	0.046	-0.156*	0.153*	0.125*	-0.067	-0.283*	1.000		1.26
(8)FSIZE	0.225*	-0.029	0.009*	0.032	0.258*	-0.156*	0.269*	1.000	1.20

* Symbolizes significance at 5%, respectively.

4.3 Multivariate analysis

Table 6 presents the results of the FGLS regression. The study used the xtglm routine in the STATA 16 program. The results indicate that board cultural diversity is positively related to environmental innovation, thus supporting Hypothesis 1. This evidence is consistent with the notion that a more culturally diverse board has a wide range of experiences and expertise that benefit companies. In addition, the presence of members with different cultures helps the board to have new ways of thinking and have more connections, making the board more likely to adopt environmental strategies, such as environmental innovation.

Table 5

Results

Dependent variable: Environmental innovation			
Feasible Generalized Least Squares			
	Coefficient	Standard error	p-value
BCD _(t-1)	0.002	0.001	0.011**
CSRCOM _(t-1)	0.342	0.035	0.328
CEODUAL _(t-1)	-0.0266	0.029	0.367
BSIZE _(t-1)	0.006	0.003	0.067*
ROA _(t-1)	-0.050	0.107	0.638
IND _(t-1)	-0.030	0.076	0.696
FSIZE _(t-1)	0.053	0.021	0.011**
Constant	-1.079	0.453	0.017*
Observations		338	
Firms		62	
Wald chi2		23.44***	
Period		10	

Note: ***p < 0.01, **p < 0.05, *p < 0.1. EINNOV is the environmental innovation. BCD is the board cultural diversity. CSRCOM is the CSR sustainable committee. CEODUAL is the CEO duality. BSIZE is the board size. IND is the firm indebtedness. Profitability is the firm profitability. Firm size is the firm size. All continuous variables are winsorized at the 1st and 99th percentiles. The sample period observed is 2010–2020

This evidence is consistent with the notion that a more culturally diverse board has a wide range of experiences and expertise that benefit companies. In addition, the presence of members with different cultures helps the board to have new ways of thinking and have more connections, making the board more likely to adopt environmental strategies, such as environmental innovation. This evidence is consistent with the findings of (Velte, 2021) that board size has a positive effect on corporate social performance. Finally, firm size positively influences environmental innovation. This evidence is consistency with the notion that larger firms have a greater number of stakeholders to report on their activities (Pareek et al., 2021).

The results indicate that CSR committee does not influence environmental innovation going against the idea that CSR committee signals a company's commitment to environmental practices (Torres & Augusto, 2021). This evidence is consistency with the findings of Rodrigue et al., (2013). The evidence shows that CEO duality does not influence environmental innovation, going against the notion that CEO duality may cause CEOs to have no concern to engage in environmental activities. These results are consistent with the findings of Fatma and Chouaibi (2021). The results also suggest that profitability does not influence environmental innovation, contrary to the idea that more profitable firms are more stable and have resources and therefore should be more likely to engage in environmental aspects, the findings are consistent with Martínez-Ferrero et al., (2021). Finally, we conclude that debt does not influence environmental innovation, a possible reason for this evidence is that indebted firms do not have the resources to invest in environmental activities, such as environmental innovation.

4.4 Sensitive analysis

The panel-corrected standard error (PCSE) method was used to further robust the results. PCSE, like FGLS is an efficient method to overcome heteroscedasticity and autocorrelation (Reed & Ye, 2011). In addition, FGLS can overestimate the significance of coefficients (Beck & Katz, 1995) and PCSE has a better efficiency than the FGLS estimator in samples that the number of periods is equal to or greater the number of cross sections (Hossain, 2016) Thus, we used PCSE for robustness analysis, the `xtpcse` command was used in STATA. Table 6 shows the results.

Table 6
Results

Dependent variable: Environmental innovation			
Panel-corrected standard error (PCSE)			
	Coefficient	Standard error	p-value
BCD _(t-1)	0.006	0.002	0.019**
CSRCOM _(t-1)	0.064	0.102	0.527
CEODUAL _(t-1)	-0.348	0.068	0.610
BSIZE _(t-1)	0.006	0.008	0.476
ROA _(t-1)	-0.044	0.269	0.870
IND _(t-1)	0.099	0.160	0.534
FSIZE _(t-1)	0.092	0.042	0.028**
Constant	-1.904	0.907	0.036**
Observations		349	
Firms		73	
R-squared		0.085	
Wald chi2		16.13**	
Period		10	

Note: ***p < 0.01, **p < 0.05, *p < 0.1. EINNOV is the environmental innovation. BCD is the board cultural diversity. CSRCOM is the CSR sustainable committee. CEODUAL is the CEO duality. BSIZE is the board size. IND is the firm indebtedness. Profitability is the firm profitability. Firm size is the firm size. All continuous variables are winsorized at the 1st and 99th percentiles. The sample period observed is 2010–2020.

Similar results are observed with board cultural diversity and firm size positively influencing environmental innovation, conversely board size does not influence environmental innovation.

5 Conclusions

This study examined the relationship between board cultural diversity and environmental innovation. Using data from 450 annual observations of 76 Latin American companies that make up the Morgan Stanley Capital International (MSCI) Emerging Markets Latin America Index over the period 2010–2020. We measure environmental innovation by the ratio between the score of 3 environmental innovation indicators (the use of clean technologies, ecological processes in the design and manufacture of products and manufacturing and marketing of environmentally responsible products and the total environmental innovation performance score) and the total number of environmental innovation items and the cultural diversity of the board by the percentage of board members that have a cultural background different from the location of the corporate headquarters.

The results indicate that board cultural diversity positively influences environmental innovation. The results also indicate that firm size positively influences environmental innovation. Finally, the results indicate that CSR committee, CEO duality, board size, profitability, and indebtedness do not influence environmental innovation.

The study has theoretical and practical implications. Theoretically, the results indicate that companies with cultural diversity have unique resources, which assist in the survival of the company and also in the adoption of environmental innovation practices, with this, the study reinforces the importance of the resource dependence theory. The results can also assist researchers to future research of environmental innovation and board cultural diversity from resource dependence. As practical implications, we conclude that policies are needed to increase the board cultural diversity. In this context, policy makers could create laws that encourage greater cultural diversity on the board. The study also assists managers in business decision making by showing the importance of greater cultural diversity on the board.

The study has limitations. First, few companies make available information about the cultural diversity of the board. Second, the study has only a quantitative approach. Finally, the study is focused only on Latin American countries. As future research, we suggest using other databases, such as Bloomberg to verify more information about board cultural diversity, future studies could also conduct a qualitative approach to the results, and finally, future studies could study the reality of other countries with different institutional characteristics.

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