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Board of directors and environmental practices: the effect of board experience, culture, and tenure

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Abstract
This study analyses whether board diversity in terms of gender and culture, as well as members' experience and tenure, has a positive influence on the undertaking of environmental practices. The analysis was performed on a broad sample of international companies from 29 countries, on the basis of an index made up of 55 environmental activities. We designed a Tobit model in which the index of environmental practices is a function of several features of the board. The findings confirm that more diverse boards, with more experienced and long-tenured members, are more prone to the environmental commitment by promoting a broader range of environmental initiatives. The article provides new insights in terms of the influence of board diversity in culture, experience, and tenure. We extend previous literature by analysing these factors, whose effects have been less studied, rather than other drivers (such as board size and independence). Corporate governance mechanisms, and more specifically, the board of directors, may play an essential role in ensuring congruence among a firm's actions, stakeholders' demands, and societal expectations. The advantages derived from a wider knowledge base and diversity in the board lead to a pro-environmental vision on behalf of the company.

Keywords Environment · Board diversity · Legitimacy theory · Stakeholder's theory · Board tenure · Board independence

1 Introduction

Nowadays, environmental responsibility of organizations has received growing attention and concern. At the same time, it is considered to be a key issue in the schemes of Corporate Social Responsibility (CSR) (Du et al., 2014). Besides obtaining financial performance for shareholders, it is suggested that companies must have a broader moral responsibility, encompassing environment, workers, and local communities. This focus

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on environmental, social, and governance (ESG) matters has become a key indicator of management competence, risk management, and non-financial performance (Galbreath, 2013). Therefore, sustainability and environmentally proactive practices in corporations turn into a relevant part of investment strategies (Rehman et al., 2020), given that there is stronger emphasis on CSR issues.

In this sense, decisions about the environment are influenced by different pressures (Cui et al., 2015): regulators, clients, local communities, and NGOs, among others. Thus, these kinds of practices promote a climate of acceptance and support among regulators and stakeholders, dissuade activism and other stakeholders' intervention, and increase both employees' satisfaction and customers' loyalty (García-Sánchez & Martínez-Ferrero, 2017). This achieves generating an image of being a good corporate citizen and helps to legitimize companies' activities (Fernández-Gago et al., 2018). However, there also exist some internal corporate determinants, such as the mission and values of the company, size, financial performance, visibility, and position in its industry as well as the influence of the corporate governance of the firm.

Thereby, as Peters and Romi (2014) hold, environmental issues are an important component of governance objectives in a company, with a view to reinforce its ethical climate. Within the governance scheme of the company, boards of directors are an essential mechanism which contribute to considering different stakeholders' perspectives and agendas (Mason & Simmons, 2014). For instance, Schwartz et al. (2005) contend that directors, on the basis of an ethical citizenship, have responsibilities to commit to decisions that protect the environment. The need for including environmental issues in the corporate governance agenda is derived from two motives (Zubeltzu-Jaka et al., 2020): (1) the view of corporate management as a driving force for change towards sustainable development and (2) the need for dialoguing with stakeholders. One of the board's responsibilities is to align organizational behaviour with the pressure exerted by stakeholders in order to run the firm towards processes based on sustainable development (Cucari et al., 2018; Jo & Harjoto, 2011). Therefore, the features of board composition will play an essential role in managing socially responsible behaviours and in making strategic decisions (Cuadrado-Ballesteros et al., 2017; Michelon & Parbonetti, 2012).

Among the characteristics of the board that may influence the implementation of sustainable initiatives, previous literature has stressed its size (De Villiers et al., 2011; Zubeltzu-Jaka et al., 2020), independence (Haniffa and Cooke, 2002; Roy & Gosh, 2017), activity (Lipton & Lorsch, 1992), and diversity in terms of gender (Campanella et al., 2021; Pucheta-Martínez & Gallego-Álvarez, 2019). However, other aspects of the board have received less attention, such as cultural diversity, experience, and tenure. These aspects may influence the knowledge base of the board when making decisions and may be essential for taking into consideration the set of expectations that non-financial stakeholders have. Also, these stakeholders can have a positive view about board diversity, and at the same time, they value the experience and commitment of the board members.

Therefore, this study aims at analysing the role played by gender and cultural diversity and by board members' experience and tenure in undertaking environmental practices, based on legitimacy and stakeholders' theories. In this sense, we extend previous literature by analysing these factors, whose effects have been less studied, rather than other drivers (such as board size and independence). Our sample covers a broad set of companies and countries, which allows to obtain an international perspective, containing 13,548 observations from 29 countries for the period 2007–2018.

The paper is structured as follows: After this Introduction, Sect. 2 describes the importance of corporate governance and the main theories on which this paper is based.

Section 3 contains the research hypotheses, exposing the effect of each factor on the environment policy. In Sect. 4, the sample, variables, and the model are explained. Section 5 exhibits the results which are discussed in Sect. 6. Finally, Sect. 7 contains a brief conclusion of the study.

2 Corporate governance in decision-making on the environment

2.1 Importance of corporate governance

Corporate governance constitutes a mechanism of maximum importance to promote an ethical climate within a company and to ensure transparency, accountability, and the disclosure of high-quality corporate information (Peters & Romi, 2014). Among the different elements of corporate governance, boards of directors provide useful and valuable experience and contribute to value creation, depending on how they are able to strengthen a firm's opportunities and to reduce external threats (Barney, 1991; Ortiz de Mandojana & Aragón-Correa, 2015). When making strategic decisions, boards play a fundamental role to monitor and advise (Hambrick, 2007). At the same time, they promote ethics, transparency, and accountability (Jamali et al., 2008) by acting according to the interests of stockholders and other stakeholders.

The board of directors sets the strategies and operational objectives for the company and ensures a connection with the social and environmental needs of the context in which the firm operates (Chan et al., 2014). Among the key functions of the board, management supervision and the provision of critical resources for the organization especially stand out (Manita et al., 2018). These functions are complemented with the promotion of sustainable behaviour on behalf of the company and its accountability to stakeholders (Hill & Jones, 1992). In this sense, the board is key in adopting strategic decisions that allow the company to achieve competitive advantages, such as higher visibility, better reputation, and a better relationships with the stakeholders. These determine the relationship with the society and shape the firm's environmental commitment (García Martín & Herrero, 2020). Boards, as stockholders' representatives, play an essential role in monitoring the implementation of plans to balance multiple stakeholders' interests.

To maximize the value for shareholders, the board must comprehend the social and environmental consequences derived from companies' actions and ensure that the firm responds to stakeholders' expectations (Chan et al., 2014). Therefore, the quality of the corporate governance significantly influences social and environmental aspects, as well as the undertaking of practices and their disclosure (Chan et al., 2014; Fiandrino et al., 2019). Compared to those with worse corporate governance, companies with better corporate governance are more responsible from the social and environmental perspectives. Thus, corporate governance can be considered to be an instrument to carry out CSR practices that lead to sustainable development (Fiandrino et al., 2019; Zhang et al., 2022), including different stakeholders' expectations and perspectives. In fact, the effective management of these is essential for a firm's success (Harjoto et al., 2015).

Some characteristics of the board, such as its size, independence, level of activity, and diversity, can be measures adopted to increase the level of monitoring over executives' actions and to improve the quality of social and environmental practices and the quality of the information provided (Vitolla et al., 2020). Thus, some features can lead to implementing sustainable strategies and, consequently, can influence environmental

performance. For example, among these characteristics, it is argued that diversity, as well as directors' previous experience and their tenure on the board, promotes higher sensitivity towards environmental responsibilities (García Martín & Herrero, 2020).

2.2 Theoretical basis for the influence of the board on environmental practices

Previous literature has developed different theories that may support or justify the undertaking of environmental practices on behalf of companies and the role that corporate governance mechanisms (and more specifically, the board of directors) may play. In this respect, some theories have been exposed: legitimacy theory and stakeholder theory.

Legitimacy theory assumes that an organization will exist, while the society considers that it is legitimate in the sense that it fulfils the social expectations and it behaves as a good corporate citizen (Chan et al., 2014). Ensuring the congruence between corporate activities and societal expectations is critical to maintain or to achieve the necessary legitimacy to operate (Deegan, 2009; Nurhayati et al., 2016). When society considers that a company is not operating in a legitimate way, it will react by threatening the corporate contract to continue its operations. Therefore, boards of directors and managers will adopt strategies to exhibit that the firm is attempting to conform to social expectations. In this context, disclosure is key, although if the performance is congruent with social expectations, the legitimacy can be threatened if the company fails to inform the public about its efforts to align with these expectations (Deegan, 2009; Patten, 2020). Given that current society is more conscious of environmental problems, its expectations will require an involvement of the firm in preventing damage to the environment and in undertaking proactive practices that promote the conservation of the environment.

Stakeholder theory underscores the need for balance and meeting the demands (often opposed) from different stakeholders (groups and individuals that can affect or be affected by the activities of the organization) to achieve a firm's objectives (Freeman, 1999; Harjoto et al., 2015; Laan et al., 2005). Building mutual relationships with these stakeholders is essential to compete in the current corporate context. In this sense, success and long-term survival require all stakeholders' support and, therefore, they will depend on the ability to manage the relations with a broad set of stakeholders (Fernández Sánchez et al., 2011). To tackle all stakeholders' interests, companies must go beyond the mere maximization of value for shareholders. Consequently, according to Manita et al. (2018), organizations must be responsible not just to primary stakeholders (like customers or workers) but also to secondary stakeholders (such as social communities, local authorities, suppliers, and NGOs). Fulfilling the legitimate requirements (both legal and moral) can be one of the ways for a firm to maximize its total wealth (Donaldson & Preston, 1995). In case stakeholders perceive that the firm is not answering their demands adequately, they can proceed to boycott the company or to suggest the imposition of fines and sanctions.

This broad perspective defended by stakeholder theory suggests that, for the company, it is beneficial to be involved in CSR activities that non-financial stakeholders may consider to be important; otherwise, these groups could withdraw their support for the firm (Freeman et al., 2007; Wellalage et al., 2018). Along this line, stakeholders would pressure companies to adopt proactive environmental strategies as well as innovations that they believe they could lead to better environmental performance (Cordeiro & Tewari, 2015).

Likewise, boards of directors are effective mechanisms for monitoring and protecting all of the stakeholders' interests (Pucheta-Martínez & Gallego-Álvarez, 2019), and this can lead to a stronger involvement of the management team in environmental issues. Boards

represent various 'constituency groups' and must manage relationships with a wide set of stakeholders. This is key to implementing good environmental practices (Fernández Sánchez et al., 2011).

Although their focus is different, both theories significantly influence issues of environmental reporting and performance (Nurhayati et al., 2016). While stakeholder theory is based on the needs of stakeholders, legitimacy theory is based on maintaining social legitimacy on behalf of the firm.

3 Research hypotheses

3.1 Board diversity (gender and cultural)

Diversity inside the boards has been regarded as an aspect of vital importance in previous literature. When the members of the board have different characteristics, qualifications, and experiences, this leads to more creative, innovative, and effective decision-making (Erhard et al., 2003; Wellalage et al., 2018). Diversity can increase a board's capacity to recognize the needs and interests of different groups of stakeholders and, consequently, influence the performance of CSR activities (Harjoto et al., 2015).

Diversity may imply some advantages. First, a broad range of knowledge and abilities involving different perspectives is included in the board. Second, creativity and innovation are stimulated, giving rise to more in-depth discussions and more complete decisions. Moreover, according to Harjoto et al. (2015), since the needs from different stakeholders are better recognized and considered, diversity helps to identify the best strategies to align their interests and to deal with the potential conflicts arising from the different stakeholders.

However, diversity can also reduce the cohesion inside the board, lessening its effectiveness. Diversity creates more options, conflicts, and coordination problems (Ortiz de Mandojana & Aragón-Correa, 2015). Likewise, it can hinder the decision-making process, making it more complex to reach a consensus (Ben-Amar et al., 2013).

In the case of gender diversity, some differences in terms of communication style, personality, abilities, professional experience, and educational background have been identified between men and women (Vitolla et al., 2020). In this line, gender diversity may increase the competitive advantage of a firm in terms of saving cost, inspiring the company, and communicating across different levels or organization and between members of the board (Karim et al., 2021; p. 5) and previous evidence (e.g. Eagly, 1987) has suggested that men and women behave according to stereotypes and beliefs associated with their social role. Some feminine values can be regarded as a positive influence on decision-making and on the management of boards, such as good communication and listening abilities, diplomatic capacities, and collaborative spirit. In this line, women are more socially oriented than men, exhibit more philanthropic implication, and are less concerned about strictly economic performance (Boulouta, 2013; Ibrahim & Angelidis, 1994). In addition, men and women in the corporate field have different perceptions about the role of leadership (more communal in women, more agentic in men). Their style of leadership makes women be more ethical, more sensitive towards social and environmental issues, and more democratic (Pucheta-Martínez & Gallego-Álvarez, 2019). Thus, Nielsen and Huse (2010) hold that women can be particularly sensitive towards some organizational practices, such as CSR and environmental policies, and encourage companies to adopt a more socially responsible

approach and to respond to environmental innovations more positively than men (Liao et al., 2019). Drawing on the stakeholder theory, society may perceive that firms are engaging with social and environmental matters when they include women directors on boards, which also signals to society that firms are orientated towards stakeholders (e.g. Ibrahim & Angelidis, 1994).

Compared with male directors, women on boards usually exhibit better attendance records and are more involved with those committees that require intense monitoring (Harjoto et al., 2015). They show a greater degree of commitment, and diligence (Adams & Ferreira, 2004; Huse & Solberg, 2006); at the same time, they have different previous experiences and backgrounds (Hillman et al., 2002; Manita et al., 2018; Ramon-Llorens et al., 2021; Singh et al., 2008). This leads them to have a different orientation towards stakeholders. For example, women directors are more likely to have experience in areas of the business field that are different from their male colleagues.

A higher presence of women on the boards may provide an incentive for a better understanding of environmental problems, owing to the joint evaluation of different stakeholders' needs. Kemp et al. (2015), Li et al., (2015) and Provasi and Harasheh (2021) evidence that women, compared to men, tend to be more conscious of environmental damage. Also, they are more committed to the community and are more prone to altruism.

Previous literature has extensively analysed the relationship among gender diversity and the environmental issues in corporations, both in the implementation of practices and environmental reporting. As for the development of environmental practices, Harjoto et al. (2015) show that gender diversity is one of the factors leading to a broader range of environmental activities, given that female directors have positive attitudes towards environmental protection (Cosma et al., 2021). Likewise, Kassinis et al. (2016), Orazalin and Baydauletov (2020), Rehman et al. (2020), Shaheen et al. (2022) and Xie et al. (2020) evidence a positive effect of diversity on promoting a proactive environmental strategy. This is a key resource to increase a firm's capacity in its environmental management. Moreover, Provasi and Harasheh (2021) detect a positive association between female representation on boards and the ratings in sustainability issues for Italian companies. These studies confirm that companies with high percentages of women on their boards are more conscious of the environmental issues.

Other works (e.g. Wellalage et al., 2018) show non-significant findings. In this sense, McKendall et al. (1999) argue that environmental fulfilment often implies complex strategic and operational decisions. Although these decisions provide long-term profitability for the company, they will require relevant expenditures in the short run. In companies orientated to more immediate profits, the board may not have sufficient resources to implement those environmental practices.

Furthermore, a positive impact of gender diversity on environmental reporting is also argued. Thus, by analysing international samples of companies, Pucheta-Martínez and Gallego-Álvarez (2019), Pucheta-Martínez et al. (2021), Campanella et al. (2021) or Vitolla et al. (2020) obtain a positive relation. In their meta-analysis of studies, Lagasio and Cucari (2019) evidence that the presence of women in the board of directors visibly increases the voluntary disclosure of environmental information. This positive influence is also observed in studies from different countries and regions, such as the Middle East and Asia (Kilincarslan et al., 2020), the Persian Gulf (Arayssi et al., 2020), or Australia (Rao et al., 2012).

Nevertheless, Trireksani and Djajadikerta (2016), Manita et al. (2018) or Agyemang et al. (2020) did not find evidence of a significant link between environmental disclosure

and gender diversity on boards. Even Cucari et al. (2018) obtained a negative relationship, suggesting that the link between gender and CSR behaviour is complex, and gender is just another aspect to consider along with the director's experience and character.

Taking into consideration the evidence obtained by previous works, we proceed to test the following hypothesis:

Hypothesis 1 The presence of women on the board of directors shows a positive association with the implementation of environmental practices.

In addition to gender diversity, there exist other diversity attributes that may influence the environmental perspective. For example, Harjoto et al. (2015) underline other dimensions, such as race, the presence on other boards, experience, and culture. In this sense, it underscores the importance of having directors from different backgrounds to supervise the managers' performance in several CSR areas and environmental policies.

Cultural diversity in boards is an aspect that may lead to different backgrounds. This diversity may lead to a higher differentiation among companies (Harjoto et al., 2015) and greater creativity and quality of decisions (Campanella et al., 2021; Golden & Zajac, 2001). Also, it may provide the board with unique perspectives that can defy the conventional vision of the majority directors (Westophal and Milton 2000). As Post et al. (2011) indicate, this diversity increases the likelihood that different perspectives, contexts, and ideas are considered within the decision-making process. In this sense, firms with more diverse boards from the cultural perspective may have more points of view and a broader knowledge base to adopt decisions about issues of environmental responsibility.

According to Westphal and Milton (2000), the divergent culture in the members of the board stimulates the knowledge acquired, which improves the competitive advantage of the organization. Besides, boards with more cultural diversity provide higher quality reports about financial and non-financial aspects, compared to those boards with less cultural diversity (Butler, 2012). In the case of disclosure of environmental information, directors with more cultural diversity will find it easier to understand the requirements and preferences from interested parts within their own cultural group, which may have a positive impact on the reporting of environmental information (Plessis et al., 2012).

Based on these arguments, we proceed to test the following hypothesis:

Hypothesis 2 Cultural diversity in the board of directors shows a positive relationship with the implementation of environmental practices.

3.2 Directors' experience

Among the characteristics of corporate governance that may promote an intense approach towards sustainability issues within organizations, the experience of the board members especially stands out. This past experience would constitute a cognitive filter to process and understand the information (Hambrick, 2007; Walls & Hoffman, 2013), and a key source to differentiate from other companies. This experience will be especially worthwhile and desirable in technology-intense sectors and rapidly changing industries (Roy & Gosh, 2017). As the experience of directors increases, these members will be better equipped to help the company fulfil its strategic objectives, including the management of environmental

risks (Peters & Romi, 2014). In this line, they have better capacities to address opportunities and innovative strategies effectively from an environmental point of view.

Globally, Walls and Hoffman (2013) affirm that the experience and the network of the board may help to shape the organization's response towards institutional pressures. The board will interpret these pressures on the basis of their members' abilities and experience; thus, on the basis of this interpretation, the response would be articulated. Consequently, the greater the collective experience of the directors, especially in matters of environmental sustainability, the more robust will be the decision-making process about those practices (Walls & Hoffman, 2013).

Previous studies (e.g. Peters & Romi, 2014) have stressed the importance of corporate governance to ensure transparency; in this sense, experience will lead to greater revelation and transparency. Thus, the greater the experience of the board in environmental issues, the more complete the information revealed will be. In this respect, Trueman (1986) indicates that experts in sustainability are more prone to increase the disclosure in order to differentiate their management abilities positively.

Directors' experience has been measured through the simultaneous presence in different boards, directors' age, or their educational background, among other options. Their simultaneous presence on several boards allows them to obtain relevant experience as well as access to additional valuable information that can be obtained from different organizations and that increases their capacity to contribute to the strategic decisions of the company they are advising and monitoring (De Villiers et al., 2011; Ortiz de Mandojana & Aragón-Correa, 2015). Moreover, the network of contacts would be a relevant source of competitive advantage for the company (Ben-Amar et al., 2013).

However, this simultaneous presence on different boards may be counter-productive, given that it may imply less time to supervise managers or to advise on sustainability issues (Haque, 2017; Mallin and Michelon, 2011). Likewise, this exchange of experience may bring to the board information about foreign or unfamiliar practices for the company that may not be especially useful and may be especially complex (Hafsi & Turgut, 2013; Hillman & Dalziel, 2003).

Another variable used as a proxy for experience has been the directors' age, especially diversity in age, which reflects their global experience and their maturity to manage business (Cucari et al., 2018; Hafsi & Turgut, 2013). This diversity involves the coexistence of different generations, values, experiences, habits, and cultural norms, which will influence the decision-making process. Age is associated with environmental attitudes and with the knowledge of environmental matters (Diamantopoulos et al., 2003). Thus, Ferrero-Ferrero et al. (2015) showed a positive association between age diversity and environmental performance; Post et al. (2011) obtained a curvilinear effect; Hafsi and Turgut (2013) detected a negative effect, and Giannarakis (2014) found that the average age of the board does not have a significant effect. The negative effect found by Hafsi and Turgut (2013) can be explained by the fact that age diversity leads to more polarization and a generational conflict. Members with less experience may be more reluctant to speak in the meetings, whereas those more experienced members may be closer to managers' perspectives and be more reticent to introduce controversies in decision-making.

Overall, the educational background has been regarded as a relevant driver in the revelation of information (Fernández-Gago et al., 2018; Haniffa & Cooke, 2002), especially in social and environmental aspects. The education process provides individuals with knowledge and experiences, helping them to shape their way of thinking and the variables to use in the decision-making process. As Fernández-Gago et al. (2018) argue,

depending on the type of education received, different specialized abilities are developed, which probably determine professional experience.

From the arguments exposed, we proceed to test the following hypothesis:

Hypothesis 3 The experience of the board members shows a positive association with the implementation of environmental practices.

3.3 Board tenure

Board members' tenure can significantly influence their focus on environmental matters. This tenure is linked to the experience of the directors as members of the board and to their knowledge about the firm (Hafsi & Turgut, 2013). A longer tenure on the board can lead to better knowledge of the company and its industry, shaping better operational and strategic decisions, understanding better the practices of the management team, and exercising monitoring responsibilities with better ability (Ben-Amar et al., 2013). However, at the same time, it may imply greater rigidity and commitment to the set practices and procedures and an isolation from new ideas (Ben-Amar et al., 2013). Also, it may create links with company's managers, generating greater closeness to their positions and lower effectiveness in their supervision; they may end up as captives of the managers (Vafeas, 2003).

As Kosnik (1990) and Walls and Hoffman (2013) indicate, boards with long tenure tend to conform, to be more devoted to the habitual practices, to trust in traditions, and to converge with managers' values. On the contrary, short-tenured members generally have a lower knowledge about the firm and its managers, and they can have difficulties in proposing reasoned critical positions (Hafsi & Turgut, 2013). In summary, as Ben-Amar et al. (2013) argue that longer tenures may be useful and may lead to better performance, but, going to the extreme, they can lead to an excessive conformity and a tendency to avoid conflicts even at the expense of good decisions.

Some studies have obtained a positive relationship between the board members' tenure and the environmental commitment. Thus, Harjoto et al. (2015) evidence that it leads to increasing social and environmental behaviour and reduces the exposition to environmental concerns. In their extensive review, Arslan et al. (2022) underscore that tenure in boards and top management increases the quality of environmental disclosure. However, for Chinese corporations, Khan et al. (2020) show an inverse relation between the CEO tenure and environmental performance, especially when there is a high percentage of independent directors at the same time.

Finally, other works do not find a significant influence of Board tenure (e.g. Hafsi & Turgut, 2013; Walls & Hoffman, 2013; Wellalage et al., 2018). In this sense, Hafsi and Turgut (2013) argue that the most recent members may adopt an excessively timid attitude to defend critical positions, whereas the members with longer tenure may be reluctant to include controversies in the decision-making process. This would lead to adopting a position more of follow-up than of leadership on social and environmental issues.

Considering the theoretical arguments presented and the empirical evidence obtained in previous studies, we establish the following hypothesis:

Hypothesis 4 Board members' tenure shows a positive association with the implementation of environmental practices.

4 Research sample, variables, and method

4.1 Sample

Our sample is composed of 13,548 firm-year observations for the period 2007–2018. They are from 29 countries and were obtained from the Thomson Reuters database. This database includes all countries in targeted global indices (FTSE All World, Dow Jones Global, MSCI World, MSCI EMF, SandP Global, SandP/Citigroup), and it is the financial industry's premier source of detailed financial statement data and profile data on public companies.

Table 1 shows that the countries with the highest contributions in terms of the number of companies are as follows: the USA (16.65%), Japan (16.30%), Republic of Korea

Table 1 Number of companies and observations by country

Country	Companies	Observations	Percentage
Argentina	8	96	0.71
Australia	65	780	5.76
Austria	2	24	0.18
Belgium	6	72	0.53
Brazil	22	264	1.95
Canada	90	1080	7.97
China	141	1692	12.49
Denmark	7	84	0.62
Egypt	14	168	1.24
Finland	3	36	0.27
France	34	408	3.01
Germany	27	324	2.39
India	11	132	0.97
Ireland	11	132	0.97
Italy	7	84	0.62
Japan	184	2208	16.30
Korea; Republic, S. Korea)	143	1716	12.67
Mexico	15	180	1.33
Netherlands	13	156	1.15
New Zealand	3	36	0.27
Portugal	2	24	0.18
Russia	13	156	1.15
Singapore	5	60	0.44
South Africa	6	72	0.53
Spain	15	180	1.33
Sweden	15	180	1.33
Switzerland	18	216	1.59
UK	61	732	5.50
USA	188	2256	16.65
Total	1129	13,548	100

(12.67%), China (12.49%), Canada (7.97%), Australia (5.76%), and the UK (5.40%). Table 1 also shows the number of firms per country (the USA, 188; Japan, 184; Republic of Korea, 143; China, 141; Canada, 90; and Australia, 65); the total number of firms is 1129.

In Table 2, we provide the industries in which firms in our sample operate. We use the industry classification employed by the Thomson Reuters database; the Thomson Reuters Business Classification (TRBC) is an industry classification of global companies. The sectors with more representation are industrial, consumer cyclical, and basic metals, with 18.16, 17.09, and 15.94%, respectively; telecommunications services have the lowest representation (2.39%).

4.2 Dependent variable

Our dependent variable is formed by the environmental practices developed by firms and publicly communicated. This variable is measured through a multidimensional construct of the companies analysed and can be considered as a reasonable proxy for actual environmental action. First, we take the information provided by companies in Thomson Reuter's database referring to the 55 items that represent environmental practices. Then, we assign the value 1 if the companies disclose this item of environmental information, and the value 0 otherwise, according to the methodology followed by previous studies (e.g. Gallego-Álvarez & Ortas, 2017; Kolk & Pinkse, 2010).

Environmental practices are divided into three big areas: resource use (19 items), emissions (13 items), and innovation (23 items). The resource use reflects the firm's execution and capacity to reduce the use of materials, energy, and water and how the firm finds more efficient solutions to improve the supplier chain. Some of the practices in this group are the following: policy energy efficiency, renewable energy use, toxic chemical reduction, targets energy efficiency, policy sustainable packaging, or policy water efficiency.

The dimension of emissions is linked to the commitment and efficacy of a company in reducing environmental emissions in the operational processes, and this includes the emission policy and topics related to biodiversity, emissions reduction, climate change, commercial risk opportunities, or environmental expenditures and investment.

Table 2 Number of observations by activity sector

Sector name	Number of observations	Percentage
Basic Materials	2160	15.94
Consumer Cyclicals	2316	17.09
Consumer Non-Cyclicals	1656	12.22
Energy	1105	8.16
Healthcare	1236	9.12
Industrials	2460	18.16
Technology	1440	10.63
Telecommunications Services	324	2.39
Utilities	851	6.28
Total	13,548	100

Last, the innovation area compiles the corporate capacity to reduce the environmental costs and charges of their clients, thereby creating new market opportunities through new technologies and processes or ecological products. Some of the items analysed are noise reduction, clean energy products, hybrid vehicles, organic products initiatives, agrochemical products, or clean energy products.

4.3 Independent variables

The first independent variable considered is female board members, this variable is named as Fmleboard, and it represents the proportion of women on the board of directors. It is obtained by the ratio of the total number of female directors on boards/total number of directors on boards. Compared to male directors, women on boards usually exhibit better attendance records, and they are more involved with those committees that require intense monitoring (Harjoto et al., 2015). They show a greater degree of commitment, and diligence (Adams & Ferreira, 2004; Huse & Solberg, 2006). Compared with male directors, women have different previous experiences and backgrounds (Hillman et al., 2002; Manita et al., 2018; Singh et al., 2008) which lead them to have a different orientation towards stakeholders.

The second independent variable is board culture diversity, Bculdiversity is the percentage of board members who have a cultural background different from the location of the corporate headquarters. This diversity may lead to a higher differentiation among companies (Harjoto et al., 2015), greater creativity, and better quality decisions (Campanella et al., 2021; Golden & Zajac, 2001). Also, it may provide the board with unique perspectives that can defy the conventional vision of majority directors (Westophal & Milton 2000).

Board specific skills is the third independent variable, labelled as Bspecskills. This is the percentage of board members who have an industry-specific background; Walls & Hoffman (2013) affirm that the experience and the network of the board may help to shape the organization's response towards institutional pressures and board tenure. Btenure is the average number of years each board member has been on the board; tenure is linked to the experience of the directors as members of the board and to their knowledge about the firm (Hafsi & Turgut, 2013). A longer tenure on the board can lead to better knowledge of the company and its industry, shaping better operational and strategic decisions, understanding better the practices of the management team, and exercising their monitoring responsibilities with better ability (Ben-Amar et al., 2013).

4.4 Control variables

Also, we control for the effect of some variables that, according to previous empirical evidence, may affect the adoption of environmental practices. First, board size may influence the implementation of these type of practices, given that as the board size increases, there will be a greater likelihood of incorporating environmental experts to advise (Agyemang et al., 2020; Fernández-Gago et al., 2018; García Martín & Herrero, 2020; Khalid et al. 2022). Second, the presence of independent directors is usually considered to be a good corporate governance practice that may influence both the quality of monitoring and the efficacy of decision-making. A higher proportion of independent directors usually leads to considering other stakeholders' interests, beyond the stockholders (Haniffa and Cooke, 2002; Khalid et al. 2022; Peng & Zhang, 2022; Roy & Gosh, 2017). Thus, many works

have stressed that board independence would increase environmental practices (De Villiers et al. 2009; Jo and Harjoto 2012; Rao et al., 2012; Zubeltzu-Jaka et al., 2020). Third, a higher level of activity in the board may lead it to pay more attention to CSR problems and, thereby, provide a diligent response to the negative social and environmental impact of the firm (Pucheta-Martínez & Gallego-Álvarez, 2019). Additionally, we control for the effect of company size, profitability, and activity sector.

4.5 Proposed method

Environmental practices = f (Female Board, Board Culture Diversity, Board Specific Skills, Board Tenure, Board Size, Board Independence, Board Meeting, Size, Roa, Activity Sectors).

$$\text{Environ\_practic}_{it} = \beta_0 + \beta_1 \text{Fmleboard}_{it} + \beta_2 \quad \text{Bculdiversity}_{it} + \beta_3 \quad \text{Bspecskills}_{it} + \beta_4 \text{Btenure}_{it} + \beta_5 \quad \text{Bsize}_{it} + \beta_6 \quad \text{Bindepen}_{it} + \beta_7 \quad \text{Bmeeting}_{it} + \beta_8 \text{Size}_{it} + \beta_9 \text{Roa}_{it} + \beta_{11} \text{Sectors}_{it} \sum \beta_{12} \text{Years} + \eta_i + \mu_{it}.$$

$\text{Environ\_practic}_{it}$ is the dependent variable of the model, and it refers to information about the environmental behaviour implemented by companies in the period *i* and the year *t*. It represents an index which is obtained by adding up the 55 items related to environmental practices and described in the dependent variable section. Fmleboard_{it} represents the proportion of women on the board of directors, and it is obtained by the ratio of the total number of female directors on boards/total number of directors on boards. $\text{Bculdiversity}_{it}$ is the percentage of board members who have a cultural background different from the location of the corporate headquarters. $\text{Bspecskills}_{it,}$ is the percentage of board members who have an industry-specific background. Btenure_{it} is the average number of years each board member has been on the board. Bsize_{it} is the total number of directors on boards. Bindepen_{it} is a numerical variable that represents the percentage of independent directors on the board of directors, and it is obtained by the ratio: total number of independents on boards/total number of directors on boards. Bmeeting_{it} is the numbers of meetings held by boards each year. Size_{it} represents corporate size, and it is measured by the logarithm of total assets of the company. Roa_{it} is the profitability of a company, measured as the ratio between operating income and total assets. Sectors_{ik} is a dummy variable that takes the value of 1 if the company belongs to the sector k, and 0 otherwise. The sectors analysed in this work are basic materials, consumer cyclicals, consumer non-cyclicals, energy, healthcare, industrials, technology, telecommunications services, and utilities.

The econometric methodology must take into consideration that the dependent variable takes values ranging from 0 to 55. Put another way, they are left- and right-side censored. The most adequate solution is a Tobit model for panel data, given that it allows for consideration of a dependent variable limited by the right side and the left side. The basic Tobit model assumes that there is a latent variable (yit*) that can be explained by an observable variable(s) (xit), thereby providing coefficients for the variables through the maximum likelihood method.

Table 3 Sample descriptives

Variable	Obs	Mean	Std dev
Environ_practic	13,548	10.9356	11.0527
Fmleboard	13,548	11.74	11.06
Bculdiversity	13,548	6.0091	16.2752
Bspecskills	13,548	36.05878	32.34651
Btenure	13,548	4.479064	4.315322
Bsize	13,548	7.401461	5.876447
Bindepen	13,548	50.77	38.88
Bmeeting	13,548	5.640906	6.430222
Size	13,548	9.088611	2.270111
Roa	13,548	4.915694	8.135229
Basic materials	13,548	0.1594331	0.366093
Consumer Cyclicals	13,548	0.1709477	0.3764772
Consumer Non-Cyclicals	13,548	0.1222321	0.3275657
Energy	13,548	0.0815619	0.2737061
Healthcare	13,548	0.0912312	0.2879482
Industrials	13,548	0.1815766	0.3855094
Technology	13,548	0.1062888	0.3082182
Telecommunications Services	13,548	0.023915	0.1527899
Utilities	13,548	0.0628137	0.2426365

5 Results

5.1 Descriptive analysis

The main descriptive statistics are exhibited in Table 3. In the sample analysed, companies have implemented 10.93 out of the 55 potential items of environmental initiatives; however, a wide dispersion is detected. On average, the presence of women directors on boards reaches 11.74% (also with a wide dispersion). This percentage reflects that, despite growing participation of females on boards, there remains a low presence, confirmed by previous empirical studies (e.g. García-Izquierdo et al., 2018). As for cultural diversity, 6% of the directors have different cultural backgrounds from the place where the headquarters are located; therefore, boards are not especially diverse in terms of culture. Thirty-six per cent of the directors have experience with industry-specific background, on average. The mean tenure is estimated at 4.47 years serving the board. The boards have 7.40 directors and have held 5.64 meetings on a yearly basis. On average, half of the directors may be considered to be independent.

To check if there are multicollinearity problems, we calculated the correlation matrix. As shown in Table 4, no correlation coefficient value is higher than 0.8. Thus, we can conclude that multicollinearity is not a concern in this analysis.

Table 4 Correlation matrix

	1	2	3	4	5	6	7	8	9
Environ_practic(1)	1.0000								
Fmleboard (2)	0.3059	1.0000							
Bculdiversity (3)	0.2091	0.2126	1.0000						
Bspec-skills(4)	0.4787	0.2934	0.1230	1.0000					
Btenure(5)	0.4555	0.3910	0.2071	0.5992	1.0000				
Bsize(6)	0.6872	0.2953	0.2141	0.6050	0.6018	1.0000			
Bindepen(7)	0.2908	0.5641	0.2209	0.4741	0.5357	0.3224	1.0000		
Bmeeting(8)	0.4558	0.3263	0.1479	0.5053	0.4141	0.4965	0.4174	1.0000	
Size(9)	0.3441	0.1694	0.1160	0.2879	0.2646	0.3290	0.2131	0.2447	1.0000
Roa(10)	0.0333	0.1214	0.0132	0.0633	0.1231	0.0477	0.1189	0.0297	0.1250
Basic_materi-als(11)	−0.0190	−0.0225	0.0402	−0.0443	−0.0559	−0.0763	−0.0129	−0.0429	−0.0159
Consumer_cycl(12)	0.0122	0.0278	−0.0363	0.0355	0.0527	0.0089	0.0245	0.0006	−0.0269
Consumer_no cy(13)	−0.0772	−0.0133	−0.0182	−0.1210	−0.0871	−0.0870	−0.0780	−0.0784	−0.0543
Energy(14)	−0.0872	−0.0389	0.0021	0.0110	−0.0189	−0.0434	0.0514	0.0064	0.0383
Health-care(15)	−0.0625	0.0450	0.0104	−0.0291	0.0311	−0.0470	0.0351	0.0175	−0.0127
Industri-als(16)	0.1334	−0.0053	0.0332	0.1293	0.0997	0.1854	0.0054	0.0580	0.0329
Technol-ogy(17)	0.0029	−0.0179	−0.0237	−0.0002	−0.0122	−0.0645	−0.0065	−0.0297	−0.0306
Telecom-mun(18)	−0.0007	0.0159	−0.0103	0.0256	−0.0035	0.0486	0.0058	0.0356	0.0403
Utilities(19)	0.0712	0.0205	−0.0105	−0.0240	−0.0360	0.0805	−0.0166	0.0648	0.0722

	10	11	12	13	14	15	16	17	18
Roa(10)	1.0000								
Basic_mate-rials(11)	−0.0618	1.0000							
Consumer_cycl(12)	0.0502	−0.1978	1.0000						
Consumer_no cy(13)	0.0232	−0.1625	−0.1695	1.0000					
Energy(14)	−0.0292	−0.1298	−0.1353	−0.1112	1.0000				
Health-care(15)	0.0613	−0.1380	−0.1439	−0.1182	−0.0944	1.0000			
Industri-als(16)	−0.0373	−0.2051	−0.2139	−0.1758	−0.1404	−0.1492	1.0000		
Technol-ogy(17)	0.0530	−0.1502	−0.1566	−0.1287	−0.1028	−0.1093	−0.1624	1.0000	
Telecom-mun(18)	−0.0112	−0.0682	−0.0711	−0.0584	−0.0466	−0.0496	−0.0737	−0.0540	1.0000
Utilities(19)	−0.0567	−0.1128	−0.1176	−0.0966	−0.0771	−0.0820	−0.1219	−0.0893	−0.0405

	19
Utilities	1.0000

5.2 Multivariate analysis

Table 5 exhibits the results of the multivariate analysis derived from the model proposed in Sect. 4.5, estimated by Tobit models. Each column reflects the impact of each factor. The index of environmental practices is the dependent variable in all of them. The final column contains the results of the model considering the whole set of variables which confirm the results obtained for each previous column. The results have also been divided by geographical areas. To avoid extending the length of the study, they have not been shown but are available upon request.

As can be observed, the coefficients for Female on boards (coef = 0.657, $p < 0.01$), Cultural diversity (coef = 0.023, $p < 0.01$), Board experience (coef = 0.024, $p < 0.01$), and Board tenure (coef = 0.358, $p < 0.01$) are positive and statistically significant at the 1 per cent level. Thus, a higher presence of female directors on boards, different cultural backgrounds of the directors, board members' experience in the industry of the company whose board they are appointed to, and a higher number of years serving the board are positive factors that encourage the adoption of environmental activities. Moreover, the results obtained underline the importance of having larger, active, and independent boards to achieve a greater extent of environmental commitment, according to the coefficients detected for control variables. Also, corporate size is detected to be another factor that fosters the implementation of environmental initiatives. The results are confirmed when the whole set of variables is included simultaneously (final column).

These findings provide evidence in favour of the Hypotheses 1, 2, 3, and 4. Therefore, having a diverse board in gender and cultural terms may promote undertaking environmental practices on behalf of companies. Likewise, the directors' experience can provide the board with perspectives favouring environmental commitment at the same time that long-tenured directors would complement this experience, leading to an increase in the pro-environmental conduct.

6 Discussion

The findings obtained reinforce previous evidence supporting the importance of some board features in order to promote environmental activities in organizations. The directors' diversity, experience, and tenure on the board are relevant factors that extend the boards' perspectives beyond the strictly financial perspective and encourage the implementation of environmental practices. As previous papers have suggested (e.g. Vitolla et al., 2020), the quality of environmental practices can be improved by the boards; therefore, their features are relevant drivers that may foster an environmental perspective in the boards' decision-making process. This approach towards sustainability and more responsibility in social and environmental issues may be encouraged by the directors' backgrounds and diversity.

First, concerning the impact of board gender diversity, our results are in line with Kassinis et al. (2016), Harjoto et al. (2015), Rehman et al. (2020), or Xie et al. (2020). For them, gender diversity has a positive effect on implementing a proactive environmental strategy and is one of the factors leading to a wider range of environmental activities. We extend this previous evidence by confirming that companies with a higher percentage of female directors are more aware of environmental issues. Complementarily to gender diversity, cultural diversity in the board also influences environmental perspectives. This diversity allows the boards to have a

Table 5 Estimation of results, Tobit regression

	Model 1 D.V. = Environ_practic Coef (*P* value)	Model 2 D.V. = Environ_practic Coef (*P* value)	Model 3 D.V. = Environ_practic Coef (*P* value)	Model 4 D.V. = Environ_practic Coef (*P* value)	Model 5 D.V. = Environ_practic Coef (*P* value)
Fmleboard	**0.6578089***** **(0.000)**				**0.622082***** **(0.000)**
Bculdiversity		**0.0231203***** **(0.000)**			**0.0199754***** **(0.000)**
Bspecskills			**0.0246804***** **(0.000)**		**0.0168893***** **(0.000)**
Btenure				**0.3585602***** **(0.000)**	**0.3196795***** **(0.000)**
Bsize	**1.085222***** **(0.000)**	**1.096165***** **(0.000)**	**1.072833***** **(0.000)**	**1.04063***** **(0.000)**	**0.9951195***** **(0.000)**
Bindependen	**0.7004307***** **(0.000)**	**0.7586583***** **(0.000)**	**0.7186715***** **(0.000)**	**0.6741858***** **(0.000)**	**0.5910155***** **(0.000)**
Bmeeting	**0.083466***** **(0.000)**	**0.0863744***** **(0.000)**	**0.074688***** **(0.000)**	**0.0771823*** **(0.000)**	**0.0681462***** **(0.000)**
Size	**0.2035098***** **(0.000)**	**0.194339***** **(0.000)**	**0.1370484***** **(0.001)**	**0.1764299***** **(0.000)**	**0.1555528***** **(0.000)**
Roa	−0.0016694 (0.857)	0.0010075 (0.914)	0.0003733 (0.968)	0.0009648 (0.917)	−0.0010004 (0.913)
Basic_materials	−2.088839 (0.165)	−2.248157 (0.136)	−2.320002 (0.122)	−2.459578 (0.100)	**−2.559972*** **(0.083)**
Consumer_cyclicals	−1.924097 (0.195)	−1.921791 (0.197)	−2.175743 (0.142)	**−2.471099*** **(0.094)**	**−2.605741*** **(0.074)**

Table 5 (continued)

	Model 1 D.V. = Environ_practic Coef (*P* value)	Model 2 D.V. = Environ_practic Coef (*P* value)	Model 3 D.V. = Environ_practic Coef (*P* value)	Model 4 D.V. = Environ_practic Coef (*P* value)	Model 5 D.V. = Environ_practic Coef (*P* value)
Consumer_non_cyclicals	**−5.459267***** **(0.000)**	**−5.504162***** **(0.000)**	**−5.505895 ***** **(0.000)**	**−5.68226***** **(0.000)**	**−5.699612***** **(0.000)**
Energy	**−6.556068***** **(0.000)**	**−6.837883***** **(0.000)**	**−7.022594***** **(0.000)**	**−7.020011***** **(0.000)**	**−7.010815***** **(0.000)**
Healthcare	**−5.661952***** **(0.001)**	**−5.63893***** **(0.001)**	**−5.718095***** **(0.001)**	**−6.193162***** **(0.000)**	**−6.371113***** **(0.000)**
Industrials	0.5203114 (0.723)	0.3733816 (0.800)	0.1265717 (0.931)	−0.1294982 (0.929)	−0.2361357 (0.870)
Technology	−2.265115 (0.160)	−2.348188 (0.147)	−2.607017 (0.105)	**−2.787707*** **(0.082)**	**−2.898265*** **(0.067)**
Telecommunications_services	−3.459954 (0.150)	−3.515703 (0.145)	−3.708672 (0.122)	−3.688845 (0.123)	−3.771817 (0.111)
Utilities	0	0	0	0	0
_Intercept	**−2.970068**** **(0.028)**	**−2.371583*** **(0.079)**	−1.990139 (0.139)	**−2.574811*** **(0.055)**	**−2.93497**** **(0.027)**
Year effect	Yes	Yes	Yes	Yes	Yes
Sigma	10.36469	10.39824	10.33969	10.31314	10.19245
Number of obs	13,548	13,548	13,548	13,548	13,548
Pseudo R^2 rho	0.8315441	0.8312175	0.8301844	0.8311834	0.8297558
LR chi^2, Wald chi-square	8760.77	8623.2	8653.51	8815.82	8987.92
Log likelihood	−27,947.95	−27,990.26	−27,960.97	−27,898.9	−27,822.39

Table 5 (continued)

	Model 1 D.V. = Environ_practic Coef (*P* value)	Model 2 D.V. = Environ_practic Coef (*P* value)	Model 3 D.V. = Environ_practic Coef (*P* value)	Model 4 D.V. = Environ_practic Coef (*P* value)	Model 5 D.V. = Environ_practic Coef (*P* value)
Prob > chi^2 *p* value	0	0	0	0	0

*** significant at 1%; ** significant at 5%, * significant at 10%

wider knowledge base for making decisions about environmental issues, according to Golen and Zajac (2001), Post et al. (2011), and Westophal and Milton (2000). The analysis of the companies studied revealed a low degree of gender and cultural diversity. However, in view of the findings obtained, diversity is beneficial for organizations and should be encouraged. Our findings corroborate this evidence and add new evidence by analysing a very extensive and broad sample from multiple countries.

As for the effect of directors' experience, the results obtained also evidence a positive influence of this experience in order to promote an approach sustainability and environmental concerns. Our findings confirm previous literature (De Villiers et al., 2011; Fernández Gago et al. 2018; Ortiz de Mandojana et al., 2015) by analysing this impact through an additional variable in these studies, i.e. the percentage of board members who have an industry-specific background. Our analysis complements the results obtained by those studies, which have employed other measures of experience such as director's age (Ferrero-Ferrero et al., 2015) or the simultaneous presence on different boards (e.g. De Villiers et al., 2011). On the contrary, our findings do not corroborate the evidence obtained by other studies (e.g. Giannarakis, 2014; Hafsi & Turgut, 2013) which detect a negative or non-significant effect on environmental performance.

Regarding the influence of board tenure, our evidence extends previous studies that have detected a positive effect (e.g. Harjoto et al., 2015), leading to a more intense commitment with environmental perspectives. However, our findings are contradictory to many previous empirical studies (Ben-Amar et al., 2013; Hafsi & Turgut, 2013; Khan et al., 2020; Walls and Hoffman, 2013; Wellalage et al., 2018) which have found a non-significant influence of tenure or an inverse relationship with environmental performance. Our results suggest that long-tenured directors have better knowledge of the company and the industry, and they are more conscious of the strategic repercussions, involving a positive consideration of environmental issues.

We have also found that larger boards, with a high frequency of meeting and with a higher presence of independent directors, are more prone to consider environmental issues. Additionally, large companies exhibit a more profound environmental approach, probably derived from the public scrutiny and the pressures received to undertake environmental activities. On the contrary, we do not detect differences in terms of the impact of profitability.

Our findings are in accordance with previous theories that have supported the role played by boards and their characteristics. The adoption of environmental practices is currently essential to achieve societal legitimacy, and boards of directors, especially when they are diverse and experienced, are conscious of the pressures exerted by other stakeholders in order to face environmental concerns. Thus, our results are in line with legitimacy theory, stressing the role played by boards in promoting environmental conduct in corporations. Also, by taking into consideration the requirements made by a diverse set of stakeholders, the boards are key to balance and meet the demands of the different interest groups. Building positive relationships with these stakeholders is essential to compete in the current corporate context. By developing environmental initiatives, boards respond to different stakeholders. Consequently, our findings are in accordance with stakeholder theory.

In summary, the positive effects of board diversity, experience, and tenure may have direct repercussions on the development of environmental activities. Whereas the role played by boards in implementing environmental practices has been underlined by previous studies, we extend earlier evidence by stressing how some features of the board, such as diversity, experience, and tenure, are relevant drivers in this positive relationship.

7 Conclusions

The search for social legitimacy and the need to meet stakeholders' expectations and demands make companies more conscious of the environmental repercussions from their activities. The concerns over the environmental matters lead organizations to implement proactive strategies in response to society's awareness. In this context, these environmental policies may be encouraged by the corporate governance mechanisms, especially by the board of directors. Previous literature has discussed how some features, such as their size, activity, independence, or gender diversity, may incentivize the undertaking of environmental practices (e.g. De Villiers et al. 2009; Jo and Harjoto 2012; Nielsen & Huse, 2010; Roy & Gosh, 2017; Vitolla et al., 2020).

This study extends previous literature by analysing the role played by other characteristics of the board that have been less studied, such as cultural diversity and board members' experience and tenure. These features can make boards be more prepared to advise and monitor management in the current competitive context and be more concerned about environmental matters. This can result in better corporate governance, and, according to earlier evidence (Chan et al., 2014; Fiandrino et al., 2019; Harjoto et al., 2015), organizations with better governance are more responsible from the environmental perspective.

Our results confirm that these features have a positive effect on implementing a broader range of environmental activities and should be promoted given the low presence evidenced in the sample of companies analysed. By analysing the impact on an index made up of 55 potential initiatives, we found that those companies whose boards are more diverse in terms of gender and cultural background carry out more practices. Also, the boards whose members have more experience in the industry are more prone to undertake these environmental activities. Likewise, when their members have served the board with long tenure positions, the effect over environmental perspectives is also positive. Therefore, these characteristics promote an approach towards sustainability and environmental concerns. The advantages derived from a wider knowledge base and diversity in the board lead to a pro-environmental vision on behalf of the company.

This study has some limitations but at the same time it can provide many potential extensions to future research avenues. First, there are alternative measures for experience and cultural diversity whose constructs may be especially complex to reflect empirically. The variable used in this study can be considered as a reasonable proxy for actual environmental action. However, the potential existence of noise derived from greenwashing practices implemented by organizations cannot be ruled out. Second, we focused on large companies from a broad sample of countries; however, extending the study to small-sized companies and countries may offer interesting insights into the topic analysed. Third, the research focused on environmental practices but can be extended to each of the areas individually: resource use, emissions and innovation, and even some of the practices in these groups: policy energy efficiency, renewable energy use, emissions reduction, climate change, or clean energy products. Fourth, the analysis of the reasons behind the implementation of environmental practices by boards, and specifically the use of them as greenwashing tools, may offer helpful insights. Fifth, the role played by boards in different systems of corporate governance and institutional settings (e.g. common vs code law, Anglo-Saxon vs continental models of corporate governance) or in countries with high/low environmental commitment may add interesting perspectives to the implementation of these practices. Similarly, there are

many other aspects that may influence the relationship between the characteristics of the board and the implementation of environmental practices, such as legal forms and corruption levels, whose effects are worthy of in-depth study.

Authors' contributions The authors have contributed to the development of the study in a similar and equivalent way. Both IGA and LRD contributed to the conception and design of the study. Material preparation and data collection were performed by IGA. The analysis and the first draft of the manuscript were written by LRD. All authors commented on the subsequent versions of the manuscript. All authors read and approved the final manuscript.

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Data availability Our sample was obtained from the Thomson Reuters database. This database includes all countries in targeted global indices (FTSE All World, Dow Jones Global, MSCI World, MSCI EMF, SandP Global, SandP/Citigroup), and it is the financial industry's premier source of detailed financial statement data and profile data on public companies.

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