Do Cultural Controls, Eco-learning and Environmental Strategy Lead to High Environmental Innovation?

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Abstract
Purpose – This study analyzes the effect of cultural controls and environmental strategy on environmental innovation. Second, we examine the role of eco-learning in environmental strategy.
Design/methodology/approach – The research sample was composed of 150 publicly traded Brazilian companies that participated in a survey. The hypotheses were analyzed through structural equation modeling (SEM) and fuzzy set qualitative comparative analysis (FsQCA).
Findings – The results showed that cultural controls have a negative effect on environmental strategy and a positive effect on environmental innovation. This study highlights the importance of environmental strategy and eco-learning in mitigating the negative impact of cultural controls. The results suggest that organizations adopt a high degree of eco-learning and environmental strategy to achieve high environmental innovation.
Originality/value – This study expands the understanding of the ambivalence of cultural controls and contributes to the literature by suggesting combining them with environmental strategy and eco-learning to generate environmental benefits.

Keywords: Cultural controls, environmental strategy, eco-learning, environmental innovation.

1. Introduction

Society's growing concern over the natural environment is rapidly transforming the characteristics of market competition, forcing companies to adopt strategies for environmental innovation. Environmental strategy (ES) allows companies to comply with the law, reduce internal barriers to environmental practices (Borges et al, 2010), and protect the environment (Hart, 1995; Bowen et al., 2001; Solovida and Latan, 2017). Furthermore, ES has become an important antecedent for innovation practices, as it allows the development of resources and competencies (Hart, 1995), among which the development of human resources with a focus on environmental innovation stands out.

For ES to become a reality, it is essential to inspire and motivate employees through a set of cultural values to channel efforts to achieve environmental goals.

Previous studies provide empirical evidence that companies that align company culture with environmental protection are more likely to implement policies and strategies to assist in sustainable development (Rosa et al., 2019) and leverage environmental innovation (Wang, 2019). Thus, a management control system (MCS) is important for directing ES (Rosa et al., 2020). Among the main mechanisms of an MCS, cultural controls can be highlighted (Merchant and Van der Stede, 2007; Malmi and Brown, 2008; Svensson and Funck, 2019; Janka et al., 2020), as they can direct companies toward sustainability (Gond et al., 2012) and work as mechanisms to better understand this concept (Goebel and Weißenberger, 2017). Cultural controls are defined as communicating wanted and unwanted behaviors and sharing values and norms that determine internal social conventions (Merchant and Van der Stede, 2007; Bedford and Malmi, 2015). They guide employees' behavior (Jaworski, 1988; Coelho et al., 2021) to ensure the achievement of the company's goals and strategies (Simons, 1995; Merchant and Van der Stede, 2007; Malmi and Brown, 2008).

However, despite the importance attributed to the MCS, the understanding of how cultural controls impact on ES and environmental innovation (EI) remains limited. To address this gap, this study seeks to advance the literature on the positive and negative effects (Janka et al., 2020) by studying issues related to the ambivalence of cultural controls and their combination with environmental strategy and eco-learning to generate environmental benefits. In this research, we explore whether the emphasis given to cultural controls—for example, the lack of direction for environmental aspects—can influence the adoption of ES and environmental innovation. Cultural controls can help guide the company in the development and integration of environmental objectives into organizational strategy. However, if these systems (cultural controls and ES) are not aligned (remain parallel), discrepant behaviors and attitudes can be generated. Studying the ambivalence between cultural controls and ES is important because the simultaneous existence and the same intensity that are mutually opposed in relation to environmental innovation can interfere with the company's environmental outcomes. The two systems can even send contradictory signals (for example, profit maximization vs. environmental protection) by building two parallel worlds and consequently generating conflicts in the company, since the managers' commitment to environmental issues or their commitment to short-term profit goals are very different orientations. If these two orientations are not managed properly, they can lead to conflicting goals. Cultural controls, with an emphasis on profit, can shape behavior and direct managers to immediate financial results. Moreover, as cultural controls may guide firms' strategy including its environmental aspects, we need to understand this relationship better and its impact on environmental innovation (EI).

Previous studies offer evidence that strategy leads to superior performance through the organization's resources and competencies (Barney, 1991; Journeault, 2016), and MCSs become important instruments for taking the desired direction (Goebel and Weißenberger, 2017). Therefore, if cultural controls emphasize profits, company objectives are designed to prioritize this result, and environmental objectives may become marginal. However, if the company's strategy is directed toward proactive environmental innovation, a win–win situation for concomitant financial and environmental performance may arise (Bhatia, 2021). Based on this context, this study aims to analyze the influence of cultural controls and ES on EI, and to examine the effect of eco-learning (ECOL) on ES. In addition, this study analyses how managers' characteristics such as age and gender and firms'size can influence on environmental innovation. Data collected

from 150 large Brazilian companies were analyzed through structural equation modeling (SEM) and fuzzy set qualitative comparative analysis (FsQCA).

The results contribute in different ways to studies on cultural controls, environmental strategy, and environmental innovation. First, we highlight that we extend the knowledge of previous research on MCS by analyzing the adoption of cultural controls. We contribute to filling the gap with a new study aiming at a more complete understanding of cultural controls (e.g., Malek et al., 2018) and to expanding knowledge by analyzing the ambivalence of cultural controls in ES and EI. By analyzing this issue of cultural controls, institutionalized under a traditional business view (with an emphasis on profit), this study contributes to the literature on MCS. The results below show that cultural controls can be "good" and "evil" at the same time. They can guide and inspire employees to maximize the company's profit, making it difficult to adopt ES. On the other hand, they can allow employees greater flexibility and autonomy, which is extremely beneficial to EI. We also show that the establishment of ES can minimize the direction of cultural controls, which can be beneficial for the construction of a balanced management system.

The study shows the importance of companies updating their value system by making their profit goals compatible with their environmental goals. Additionally, this study shows the importance of including environmental issues in strategic planning, which is more likely to occur when there are shared values and norms of environmental sustainability within the company. The results demonstrate that neglecting environmental issues in cultural controls hinders their inclusion in the information system and planning decisions. The lack of emphasis on environmental issues in cultural controls can affect the balance in decision-making between profit goals and environmental goals. Therefore, it is essential to consider environmental issues in cultural controls since values and norms exert influence over individual decisions and actions. Ignoring these concerns may have consequences that affect company performance. This points out that companies must be careful when reformulating their mission and core values, while considering the environmental aspects. The study also shows that companies minimize the negative impact of cultural controls by adopting ES and ECOL.

2. Theoretical background and hypothesis

2.1. Cultural controls and environmental strategy

Cultural controls are used to communicate a company's beliefs and values through mission and vision statements, motivating and inspiring employees (Merchant and Van der Stede, 2007; Janka et al., 2020; Einhorn et al., 2021; Jayantilal and Jorge, 2021). By emphasizing these controls, managers communicate and reinforce the company's values and delimited domains of acceptable and expected behavior (Malmi and Brown, 2008). However, the literature has pointed out that the mission is not always well understood by employees, which can lead to tensions in the organization. In this way, our study aligns with the study by Goebel and Weißenberger (2017) to understand whether the mission statement conveys core values, whether top managers communicate the values, and whether employees are aware of them.

These answers are relevant, as previous studies reveal that ambiguous cultural controls can generate tension in the organization, i.e., when it is not clear whether the direction is profit (Harris and Ogbonna, 2011; Coelho et al., 2021; Einhorn et al., 2021), the environment (Guenther et al., 2016; Journeault, 2016), or both (Rosa et al., 2019; Janka et al., 2020), there may be problems directing work efforts toward sustainability issues. Furthermore, studies show that cultural controls guide what management endorses and prescribes (Harris and Ogbonna, 2011), so if they focus only on the core business,

the priority may be profit goals (Coelho et al., 2021; Einhorn et al., 2021), leaving environmental objectives behind and hindering the adoption of sustainability practices. Alternatively, even if the controls do not make clear the priorities (environment or economy), there may be imprecise guidance to managers and employees, leading to uncertain or inaccurate results.

Another factor to consider is that, traditionally, the components of cultural controls, such as mission and values, focus on markets, products or services, customers, technology, survival, profitability, philosophy, image, and business concepts, for example (Pearce, 1982; Harris and Ogbonna, 2011; Einhorn et al., 2021). Furthermore, they may not make any reference or present elements related to environmental issues. If the direction pointed out by cultural controls is to maximize profits, the cultural control mechanisms used will be designed to prioritize this result, and environmental performance may become marginal. In this study, we defend those cultural controls that can direct the company to focus on profit goals, making it difficult or impossible to adopt an environmental strategy (ES). An ES refers to a set of company initiatives to reduce the impact of its activities on the natural environment (Bansal and Roth, 2000), such as the implementation of environmental management programs and systems to improve products, processes, and corporate policies and reduce the environmental impact, consumption, and waste of natural resources (Bansal and Roth, 2000, Lee and Maheswaran, 2011; Kim et al., 2019). ESs have contributed to achieving superior environmental performance (Pham et al., 2019) and environmental innovation (Wang, 2019). In this direction, some studies show that cultural controls can negatively affect ES. For example, Janka et al. (2020) suggest that stability values in organizational culture have a negative effect on managerial innovation. Based on this evidence, we formulate the following research hypothesis:

H1: The larger the effect of cultural controls is, the less firms adopt an environmental strategy.

2.2. Cultural controls and environmental innovation

Cultural controls include the management control system (MCS) and have become an important element in controlling organizational behavior and attitude (Merchant and Van der Stede, 2007; Ismail, 2016). This control expresses organizational purposes and values communicated through mission statements and codes of conduct (Simons, 1995; Langfield-Smith, 1997). Thus, cultural controls may be used to define and communicate a firm's overall strategic purpose concerning the environment (Guenther et al., 2016; Journeault, 2016; Heggen, 2019) and lead to innovation (Haustein et al., 2014, Fagerlin and Lövstål, 2020; Janka et al., 2020).

Previous researchers have suggested that innovation can benefit from informal control, such as cultural controls (Haustein et al., 2014; Fagerlin and Lövstål, 2020; Janka et al., 2020). For example, Haustein et al. (2014) propose that informal control enables employees to manage themselves and leaves space for action, so it is more suitable in innovative companies. Fagerlin and Lövstål (2020) found that informal controls, such as cultural controls, can be used by management to involve employees in innovation activities and interact with team members during the development process stages. In this regard, Janka et al. (2020) show that large hierarchical organizations benefit from clarifying the intended purpose of managerial innovation by setting influential cultural controls. Previous studies show that cultural controls are used in the search for new opportunities by encouraging employees' creativity (Ismail, 2016; Coelho et al., 2021)

and facilitating innovation (Ismail, 2016; Janka et al., 2020). Cultural controls allow greater flexibility and autonomy for employees and greater organizational commitment (Kleine and Weißenberger, 2014) and motivation (Van der Kolk et al., 2019), which creates an environment conducive to environmental innovation. These studies show evidence that cultural control influences creativity due to the flexibility and autonomy that it provides to employees. However, there are openings for new studies that also show its influence on environmental innovation. To fill this gap, we developed the second research hypothesis:

H2: In firms with a more comprehensive business vision, more cultural controls positively influence environmental innovation.

2.3. Eco-learning, environmental strategy, and environmental innovation

Eco-learning (ECOL) can be defined as a process whereby organizations change to adapt to their environments and is developed from the concept of organizational learning (Kloot, 1997, Latan et al., 2018). Kloot (1997) explains that organizations have to find ways to survive in the face of rapid environmental change, adapting to the context. ECOL benefits firms that adopt proactive environmental management measures (Epstein and Roy, 1997, Vidal-Salazar et al., 2012). Furthermore, ECOL provides information about the environment regarding the effectiveness of an organization's environmental activities, motivates environmental awareness, and assists decision-making toward the future application of processes (Latan et al., 2018).

Previous researchers provided preliminary evidence that ECOL can influence environmental strategy (ES) (Sánchez-Triana and Ortolano, 2001; Vidal-Salazar et al., 2012; Latan et al., 2018). ECOL addresses organizational awareness of climate change, waste reduction, and best practices in relation to sustainability activities (Latan et al., 2018; Borges et al, 2010) and therefore positively influences the development and adoption of ES when it involves employees in direct efforts to adopt higher education through procedures, key tools, and specific internal actions. This makes the company capable of neutralizing behavior resistant to change and encouraging the environmental commitment of employees to corporate objectives (Vidal-Salazar et al., 2012). Therefore, organizations that adopt ES can create more competitive advantage (Claver-Cortés et al., 2009, Banerjee, 2002, Chen et al., 2015), which requires organizational learning about the environment (Latan et al., 2018). This leads to the third hypothesis:

H3: Eco-learning positively influences environmental strategy.

ES is adopted in an attempt to focus on redesigning products and technologies to reduce the negative environmental impacts and anticipate future regulation (Sen et al., 2015; Wijethilake et al., 2017). This requires organizations to invest in technological development and evolve environmentally friendly products (Yang et al., 2019). In this regard, environmental innovation involves creating sustainability services or products that can reduce the impact on the natural environment (Asadi et al., 2020) or even innovate products and reduce costs (Christmann, 2000). ES and innovation can be characterized as a path that can lead organizations to a win–win situation, with environmental and financial benefits (Bhatia, 2021, Frondel et al., 2008).

Previous researchers provided empirical evidence that environmental strategy can influence innovation (Latan et al., 2018; Yang et al., 2019; Bhatia, 2021, Saether et al., 2021). Bhatia (2020) found that proactive ES is an important antecedent for green innovation practices. Yang et al. (2019) showed that proactive ES promotes innovation through organizational learning and cross-functional coordination. In this regard, implementing proactive ES requires organizational learning to drive environmental innovation (Latan et al., 2018). Knowledge assists in understanding the current context of the major change in which companies need to constantly develop dynamic capability, that lead to the development of environmental strategy which supports environmental innovation (Bhatia, 2021). Accordingly, Hypothesis 4 is:

H4: Environmental strategy positively influences environmental innovation.

Our underlying conceptual research model and its associated hypotheses are summarized in Fig. 1.

[Figure 1]

3. Method

3.1. Sample and population

The research population is composed of the 423 publicly traded companies listed on the Brasil, Bolsa, and Balcão (B3) stock exchange (https://www.b3.com.br/pt_br/). B3 presents on its website a list of companies that sell their shares on the only stock exchange in Brazil. The choice of the population is due to several factors, among which we highlight the following: i) they are large companies, which increases the possibility of them adopting formal control systems (Anzilago et al., 2022); and ii) they present public information such as financial and management results, in addition to data on their main directors, which was essential for the application of the questionnaire (Appendix A).

Prior to distribution, a data collection instrument was pretested on academic representatives to obtain face validity. A marketing company that specializes in academic studies was hired to conduct the survey. The marketing company was instructed to follow the recommendations of Dillman et al. (2014) for data collection. The company called the firms listed on B3, requesting that CEOs, directors, managers, coordinators, and supervisors participate in the survey. If they accepted the invitation, a link was sent, giving access to a data collection instrument that presented the research.

Data were collected from March through June 2020. A total of 150 valid responses to the data collection instrument were obtained, yielding an effective response rate of 36%. This response rate is comparable to the response rates of other studies in the same context (Vidal-Salazar et al., 2012; Wijethilake et al., 2017; Bortoluzzi et al., 2020; Bhatia, 2021; Monteiro et al., 2022). The responses cover several industries, such as industrial goods, communications, cyclical and noncyclical consumption, basic materials, petroleum, gas and biofuels, health, information technology, and public utilities. Table 1 presents the main descriptive characteristics of the managers and companies.

[Table 1]

3.2. Variable measurement and analysis procedures

The variables studied were cultural controls, environmental innovation (EI), environmental strategy (ES), and eco-learning (ECOL). Cultural controls were measured by an adapted version of the instrument used by Goebel and Weißenberger (2017). The participants were asked to respond to three items using a 7-point Likert scale (1 = strongly disagree to 7 = strongly agree) to determine whether the mission statement conveys core values, managers communicate organizational values to employees, and employees are aware of these values (Goebel and Weißenberger, 2017). ES was assessed using a scale developed by previous studies on environmental management (Journeault, 2016; Solovida and Latan, 2017; Latan et al., 2018) to identify whether environmental issues are explicitly considered within the company's strategic process. A 7-point Likert scale was applied (1 = strongly disagree to 7 = strongly agree). ECOL also was measured using a 7-point Likert scale (1 = never to 7= always), adapted from Journeault (2016) and Latan et al. (2018), and the participants were asked about their awareness of waste reduction, climate change, sustainable best practices, emissions, and recycling within their companies. The scales used to measure EI were developed by adapting items from previous studies (Bönte and Dienes, 2013; Bedford et al., 2019). The participants were asked to respond to three items using a 7-point Likert scale (1 = never to 7= always) concerning the creation or change of environmental products or services. Additional questions were asked to capture demographic variables, including gender, age, and company size (Mendes et al., 2017; Gomez-Conde et al., 2019).

The analysis was performed by applying partial least squares structural equation modeling (PLS-SEM), followed by SmartPLS, as proposed by Hair Jr. et al. (2016). This technique was chosen as previous studies in management (Bönte and Dienes, 2013; Lunkes et al., 2020; Monteiro et al., 2022) and environmental accounting (Wijethilake et al., 2017; Latan et al., 2018) have been frequently applied. The PLS consists of two models; the first is a measurement model that investigates the relationships between latent variables and associated manifest variables, and the second is a structural model that examines the relationships among latent variables (Hair et al., 2016). Furthermore, a fuzzy set qualitative comparative analysis (fsQCA) was performed using fsQCA 3.0 software (Ragin, 2009) to complement the PLS-SEM analysis (Crespo et al., 2019; Rasoolimanesh et al., 2021). This technique has become the standard tool for asymmetric analysis (Rasoolimanesh et al., 2021). According to Bedford et al. (2016, p.8), "the basic objective of fsQCA is to determine which sets, if any, result in an outcome of interest."

4. Results

4.1. Measurement model

The measurement model was obtained using the PLS algorithm technique, which tests the reliability and validity of the research variables. The composite reliability allows confirming the reliability criteria as one of the main indices, as recommended by Hair et al. (2017). Additionally, the convergent and discriminant validity were corroborated by AVE, Fornell–Larcker, and the heterotrait–monotrait ratio (HTMT) (Table 2).

[Table 2]

All research variables presented composite reliability higher than 0.70 and AVE higher than 0.50, indicating the reliability and convergent validity of the variables (Hair et al., 2017). Furthermore, Fornell–Larcker shows a high correlation among the items that compounded the constructs, and thus HTMT reinforces discriminant validity (Henseler, Ringle and Sarstedt, 2015).

4.2. Structural model

Structural modeling allowed assessing the proposed hypotheses. Bootstrapping (5000 resamples) was applied, as recommended in the literature (Hair et al., 2017). The results showed that the larger the effect of cultural controls, the less firms adopt an environmental strategy (ES) (β=-0.143, $p< 0.05$), confirming H1.

[Table 3]

The second hypothesis is supported, as the relationship between cultural controls and environmental innovation is positive and significant (β=0.226, $p<0.05$). The results also supported H3, demonstrating a positive effect of eco-learning on environmental strategy (β=0.631, $P<0.01$). For H4, the findings confirm that environmntal strategy positively leads to environmental innovation (β=0.235, $p<0.05$). Furthemore, the effects of control variables such assize, age, and gender on environmental innovation were not confirmed. Moreover, the interaction effects of cultural controls and eco-learning on environmental strategy and environmental innovation were not supported.

4.3. Fuzzy set qualitative comparative analysis FsQCA

FsQCA analysis allows the identification of combinations of conditions that lead to an outcome. According to the literature (Ragin, 2009), it requires calibrating the constructs and analyzing necessity and sufficiency. The variables were calibrated following the study by Ordanini et al. (2014) for variables ranked on a 7-point Likert scale. Based on the scale used to measure the constructs, the calibration assigned membership as follows: full membership (6), crossover point (4), and full nonmembership (2) for cultural controls, ECOL, ES, and EI. Control variables such as gender as a dummy were calibrated: full membership (1), crossover point (0.5), and full nonmembership (0). The manager age and firm size were calibrated: 90^{th}, 50^{th}, and 10^{th} as full membership, crossover point, and full nonmembership, respectively (Navarro et al., 2016).

[Table 4]

The necessity analysis reveals that cultural controls are “always necessary” conditions for firms to achieve high EI. Additionally, ECOL and ES present consistency higher than 0.90, demonstrating that these conditions are always necessary (Ragin, 2009). In all other cases, the control variables were lower than 0.80, meaning they are not “necessary.” Thus, sufficiency analysis is needed to identify configurations that lead to high EI.

[Table 5]

The sufficiency analysis presented two effective solutions that lead to high EI. First, the combination of cultural controls, ECOL, and ES had consistency higher than 0.90 and coverage of 0.95, indicating a strong causal relation. Likewise, the second solution suggests the presence of cultural controls, ES, manager's gender, and firm size. This configuration had raw coverage of 0.19 and consistency of 0.99, which demonstrate the same effectiveness as the first solution.

5. Discussion

H1 was confirmed and demonstrated that the larger the effect of cultural controls, the less firms adopt an environmental strategy (ES). These results reveal that the firm's mission conveys core values and top managers communicate them to their employees, generating greater awareness of these values in the organization. However, the greater the adoption of cultural controls, the lower the adherence to ES, such as addressing environmental issues in the strategic planning, mission statement, and proactive and prospective decisions of top management based on an environmentally correct posture. This result is in line with studies that found that cultural controls direct what management endorses and prescribes (Harris and Ogbonna, 2011). Therefore, if cultural controls focus only on the core business, the priority may be solely profit (Coelho et al., 2021; Einhorn et al., 2021), leaving environmental innovation behind, even if there is a defined strategy for sustainability issues. This result causes some concern, as neglecting environmental issues in cultural controls, or even making them ambiguous, can lead companies to difficulties translating ES into desired behaviors for sustainability (Wang, 2019; Janka et al., 2020). A scenario where strategic objectives direct the organization toward sustainability and cultural controls toward profit is likely to present conflicts and greater ambiguity in decision-making processes. The results introduce two important reflections. First, environmental sustainability becomes secondary in traditional companies that focus primarily on their core business (profit). Additionally, environmental sustainability is not yet a protagonist in the business world with a traditional strategy, which may explain the delay in reaching the global goals of reducing environmental impacts and risks. Thus, this study recommends that managers address the sustainability issues in the strategy and in the cultural controls to promote effective advances on firms' environmental innovation.

Also, the results reveal that cultural controls lead to environmental innovation (EI), which confirms H2. This shows that although cultural controls direct the company to profit, the characteristic of "inspiring and directing" employees' habits generates a flexible and autonomous work environment suitable for innovation initiatives. This self-controlled environment allows employees to participate in new work practices, engage in the launch of new products/services, and improve products/services for the benefit of the environment. The confirmation regarding the positive relationship between controls and innovation reveals two interesting findings. First, traditional controls (e.g., cultural controls) are important to promote environmental innovation, as they allow employees to self-manage (Haustein et al., 2014) and become engaged (Fagerlin and Lövstål, 2020). Second, the company's intention to promote continuous improvement of its processes and products can generate environmental benefits and be an important driver to improve EI (Bönte and Dienes, 2013, Gomez-Conde et al., 2019, Rosa et al., 2019, Rosa et al., 2020). Furthermore, these findings corroborate previous studies that point out that cultural controls allow employees to be creative and innovative (Ismail, 2016; Janka et al., 2020; Coelho et al., 2021). The results suggest that promoting self-management and employee involvement can increase a company's ability to innovate, and when sustainability is incorporated into this process, it can lead to an increase in environmental innovation.

We also observed that eco-learning (ECOL) positively influences ES (confirming H3). ECOL leads managers to a better understanding of the company's ES (Vidal-Salazar et al., 2012), so when managers are aware of environmental issues related to climate change and practices to reduce/reuse/recycle materials, there is greater adherence to sustainability practices (Latan et al., 2018). This knowledge also allows managers to make decisions that enable organizations to adapt to rapid environmental changes (Kloot, 1997; Latan et al., 2018) and help decision-making processes that facilitate the implementation of environmental indexes (Epstein and Roy, 1997; Vidal-Salazar et al., 2012). Thus, it may imply the need for continued learning and training so that the environmental strategy is achieved.

Finally, the results confirm our hypothesis that ES positively influences EI (H4). When environmental issues are explicitly considered in strategic processes, are addressed in the mission statement, and support top managers' proactive and prospective decisions, this strategy can lead to better EI contributing to the systematic innovation of work practices, and launching and improving new products/services to generate environmental benefits. Therefore, when ESs are adopted to focus on the redesign of products and technologies, they can contribute to reducing negative environmental impacts (Sen et al., 2015; Wijethilake et al., 2017) and lead organizations to invest in the technological development processes of new products and processes (Yang et al., 2019) to generate environmental benefits. Companies that implement environmental strategy are also more likely to create, adopt, and implement environmental innovation practices (Saether et al., 2021). The practical implication is that the company needs to direct its strategy toward sustainability so that environmental innovation become an effective outcome.

Furthermore, we suggest that companies combine cultural controls, ES, and ECOL to improve EI, as presented in the FsQCA analysis. Organizations that invest in knowledge about environmental aspects (climate change, waste reduction, and sustainability practices) and adopt ES (strategic processes, mission statement, and subsidize top managers' decision-making) and flexible cultural controls are more likely to present better EI (for example, systematically innovating products, launching new products/services or even continuously improving products/services that already exist in the organization). These suggestions can be useful when adopting new sustainable practices, such as the principles of a circular economy, which are based on the dissemination of a culture oriented to sustainable values. This shows the importance of adapting value controls to incorporate environmental issues, monitor ES, and foster knowledge in search of benefits for society.

6. Conclusion

This research analyzed the influence of cultural controls on environmental strategy (ES) and environmental innovation (EI) and examined the effect of eco-learning (ECOL) on ES. We analyzed data collected from 150 listed Brazilian firms using PLS/SEM and FsQCA.

The results show that the use of cultural controls broadly elaborated and directed mainly to profit generates a negative impact on ES. This finding shows that incorporating environmental issues into cultural controls is essential for companies, since these controls direct the organizational goals and managers' actions and decisions. If this direction is mainly focused on traditional elements such as profit, environmental issues take a back seat within the company and do not receive due attention. Cultural controls form the basis for communicating environmental values and familiarizing employees with the culture of sustainability. Without this incorporation of values, it is impossible to create a commitment to environmental results. Establishing ES may not be enough to strike a

balance between profit goals and environmental goals, asfocusing on dominant established cultural controls to achieve financial performance (e.g., profit) can generate resistance to adopting ES.

The results also show the importance of ES and eco-learning (ECOL). When a company does not incorporate environmental issues into its cultural controls, having ES supported by ECOL influences the organizational goals and targets, incorporating environmental issues into the planning process. Additionally, the inclusion of environmental issues in strategic planning is more likely to occur when there is a shared understanding of climate change, materials reduction, reuse, and recycling, and of environmental sustainability practices within the company. The study results reinforce the finding that companies that target environmental issues generate improvements in EI. This result shows that although cultural controls inspire and motivate employees toward the financial result, adopting ES and ECOL is crucial to balance the strengths.

Although the study presents solid results and contributions, it also has some limitations. Data collection was carried out with top managers about their perceptions of cultural controls, ES, ECOL, and EI. Thus, these responses may be biased due to external factors not controlled in the study. In addition, we focused on large listed Brazilian companies, which means that the results may not apply to the reality of small and medium-sized companies. Thus, recommendations for future studies include researching small and medium-sized companies that tend to have more informal cultural controls, often associated with the company's founder. Additionally, studies showing how companies can incorporate environmental aspects into cultural controls will contribute to advancing knowledge on the subject.

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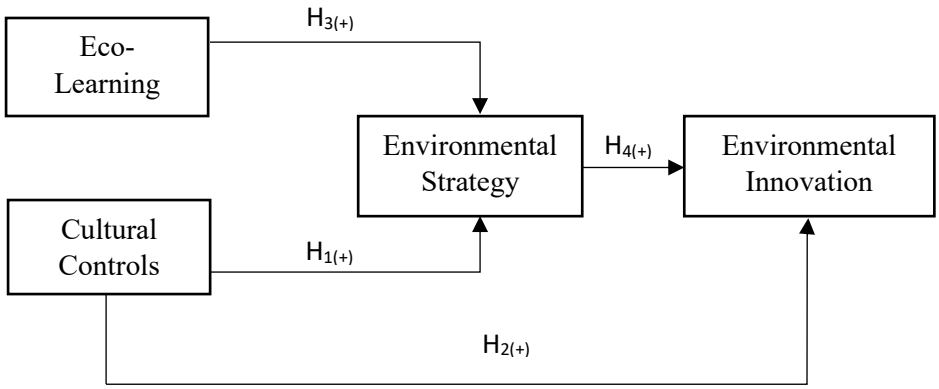

Figure 1. Theoretical model

Table 1. Demographic characteristic

Age		**Education**	
20-40	61	Bachelor's degree	98
40-60	87	Specialization/MBA	43
Over 61	3	Master's degree	9
Gender		**Firm size (number of employees)**	
Male	95	Less than 100	6
Female	55	101-500	62
		500 and over	82

Table 2. Measurement model

Variables	CR	AVE	1	2	3	4	5	6	7
1. Cultural controls	0.806	0.583	0.763	0.224	0.225	0.257	0.038	0.115	0.070
2.Eco-learning	0.814	0.594	-0.068	0.771	0.859	0.219	0.076	0.372	0.055
3.Environmental strategy	0.856	0.666	-0.169	0.640	0.816	0.266	0.155	0.189	0.085
4.Environmental innovation	0.852	0.657	0.173	0.060	0.145	0.811	0.087	0.069	0.056
5.Size	-	-	-0.001	0.016	0.131	0.024	1.000	0.046	0.027
6.Gender	-	-	0.059	-0.302	-0.174	-0.057	-0.046	1.000	0.332
7.Age	-	-	0.007	0.018	0.003	0.014	-0.027	-0.332	1.000
	R^2	R^2Adj	Q^2						
3.Environmental strategy	0.430	0.418	0.263						
4.Environmental innovation	0.071	0.026	0.026						

Note: Composite Reliabilities (CR), Average Variance Extracted (AVE)

Table 3. Structural model

Variable	B	T-stat	P-value
Cultural controls →Environmental strategy	-0.143	1.869	0.031**
Cultural controls →Environmental innovation	0.226	1.808	0.035**
Eco-learning →Environmental strategy	0.631	14.707	0.000***
Eco-learning →Environmental innovation	-0.093	0.573	0.567
Environmental strategy →Environmental innovation	0.235	1.671	0.047**
Cultural controls x Eco-learning →Environmental strategy	0.079	0.847	0.397
Cultural controls x Eco-learning →Environmental innovation	-0.075	0.656	0.512
Size →Environmental innovation	-0.005	0.078	0.937
Gender →Environmental innovation	-0.058	0.593	0.553
Age →Environmental innovation	-0.006	0.060	0.952

Note: Standardized coefficients are presented. *** denotes 1% significance level, and ** denotes 5%. One-tailed for predicted signal and two-tailed otherwise.

Table 4. Necessary condition analysis

Conditions	Consistency	Coverage
Cultural controls	0.988	0.951
~ Cultural controls	0.041	1.000
Eco-learning	0.969	0.958
~ Eco-learning	0.068	1.000
Environmental strategy	0.986	0.952
~Environmental strategy	0.045	1.000
Size	0.439	0.978
~Size	0.620	0.983
Gender	0.397	0.966
~Gender	0.644	0.962
Age	0.508	0.974
~Age	0.546	0.977

Table 5. Factors that lead to environmental innovation

Solutions	Cultural Controls	Eco-learning	Environmental Strategy	Gender	Size	Raw Coverage	Consistency
1	●	●	●			0.953	0.966
2	●		●	●	●	0.192	0.993
Solution coverage			0.960				
Solution consistency			0.965				

Note: Black circles (●) indicate the presence of a condition and a blank space means "redundant." The control variable age was included in the truth table fsQCA analysis; however, it was redundant in both solutions.

Appendix A

Cultural controls	**Factor Loading**
Our mission statement conveys the organization's core values to our employees	0.677
Top managers communicate the organization's core values to employees	0.789
Our employees are aware of the organization's core values	0.816
Environmental strategy	
Environmental issues are explicitly considered within the company's strategic planning process	0.796
Consideration for the environment is addressed within the company's mission statement or statement of business principles	0.858
When environmental issues are considered within the strategic planning process, the top management team makes proactive, forward-thinking decisions	0.791
Eco-learning	
Aware of trends on climate change	0.806
Aware of trends on reducing, reusing, and recycling	0.768
Aware of best practices on business sustainability	0.736
Environmental innovation	
Systematically innovates work practices to generate environmental benefits	0.869
In the last three years, we launched new products/services to generate environmental benefits	0.789
Over the past three years, we have improved existing products/services to generate environmental benefits	0.756