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Eco-control and sustainability strategy: How organisations juxtapose tensions to enhance sustainability performance?

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ABSTRACT

Past research on the intersection of management control and sustainability has indicated that eco-controls play a key role in the successful implementation of sustainability strategies. Yet, evidence on how this eco-controls become effective considering the intertemporal tensions arising from a short- and long-term demands is limited. This study addresses this gap by examining the extent to which the use of eco-controls and temporal ambidexterity facilitate the implementation of sustainability strategies and exploring how eco-controls interact with temporal ambidexterity in determining sustainability performance. The study relies on data obtained via a survey completed by 201 hotel managers in Brazil. Partial least square regressions and fuzzy set qualitative comparative analysis (fsQCA) are used for assessing the proposed relationships. The study finds that eco-controls and temporal ambidexterity facilitate the implementation of proactive sustainability strategies. The influence of eco-controls on sustainability performance is amplified when organisations can respond to the intertemporal tensions between short- and long-term needs. FsQCA reveals that different eco-controls are complementary and jointly with sustainability strategies and the dimensions of temporal ambidexterity enhance sustainability outcomes. The study contributes to management accounting literature, providing novel evidence of the contingencies surrounding the effectiveness of eco-controls and showing how eco-controls interact with firm's intertemporal needs.

1. Introduction

Contemporary debate surrounding sustainability indicates that organisational activities involving energy consumption, materials transportation, and the use of natural resources have been implicated in contributing to climate change (UN, 2023). Facing the growing sustainability challenges and acknowledging their shared responsibility, firms implement strategies and management controls that support a more sustainable

behaviour (Ligonie, 2021). In this context, a critical challenge for firms is the tendency of emphasising the immediate gains, consequently underinvesting in activities that could yield sustainable returns in the future (Kim et al., 2019). The focus on short-termism leads to a myopic approach, overlooking potential endeavours that could offer long-term competitive advantages and increased returns on investment (Slawinski & Bansal, 2015).

The academic literature on how management controls support firms' sustainability performance has increased substantially (Heggen & Sridharan, 2021). Eco-controls are formal financial and strategic controls that organisations use to meet sustainability goals (Bouten & Hoozée, 2021; Henri & Journeault, 2018). These practices that include budgets, performance measurements and rewards associated with sustainability objectives, have proven to be instrumental for the reduction of environmental impacts (e.g. carbon emission and water waste). Eco-controls align employees' behaviours with organisational objectives (Heggen & Sridharan, 2021) and assist in the implementation of sustainability strategies (Wijethilake et al., 2017). In this study, we draw upon prior literature that defines sustainability strategy as a set of values and policies addressing internal and external demands and fostering responsible practices that are crucial for ensuring the long-term viability of organisations (Bastini et al., 2022; Lloret, 2016). Previous studies investigating the intersection of management control and sustainability have primarily concentrated on eco-controls as a central element influencing the successful implementation of sustainability strategies (Abdel-Maksoud et al., 2021; Bastini et al., 2022; Henri & Journeault, 2010). However, there is only scarce evidence regarding the mechanisms that explain the effectiveness of these controls in the face of the intertemporal tensions arising from conflicting short- and long-term demands. Exploring these issues is particularly important to hybrid organisations that are characterised for pursuing multiple logics and values (Bouten & Hoozée, 2022; Li et al., 2018; Smith & Besharov, 2019).[1]

In this study, we define temporal ambidexterity as an organisational capability that supports firms to manage temporal tensions between immediate and future needs concerning their objectives, resources, market demands and environmental uncertainty (Wang et al., 2019). Emphasising the temporal perspective is important, as organisations contend with the juxtaposition of diverse needs involved in seeking solutions for sustainability challenges (Kim et al., 2019; Slawinski & Bansal, 2015). Successful integration of sustainability into corporate routines requires top managers to balance conflicting temporal objectives, allowing firms to achieve financial stability while safeguarding the environment (Bouten & Hoozée, 2022). Although we focus on sustainability and account for its economic, environmental, and social dimensions, our study takes a narrow view of sustainability by addressing the organisational setting and examining the context where management controls are employed to pursue sustainability goals in face of pressures for profit maximisation.

This research places temporal ambidexterity theory at the forefront of the debate on the use of management controls to address sustainability concerns. The literature has long recognised that an organisation's ability to allocate efforts both in the short- and

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[1]Examples of hybrid organisations, include hotels that commonly address their hybrid mission by balancing socioenvironmental and financial objectives.

long-term is central to its sustainability (Slawinski & Bansal, 2015).[2] However, there have been limited efforts in the management control and environmental literatures to understand the interaction between temporal ambidexterity and organisational practices supporting sustainability initiatives (e.g. eco-controls). Hence, our research aims to address two interconnected questions: To what extent eco-controls and temporal ambidexterity facilitate the implementation of sustainability strategies? How do eco-controls interact with temporal ambidexterity in determining sustainability performance?

This research relies on survey data from 201 hotels in Brazil. It employs partial least square regression to analyse the proposed hypotheses. Complementarily, a fuzzy set qualitative comparative analysis (fsQCA) was applied to identify combination patterns and refine the results. The findings of this study indicate that eco-controls facilitate the effect of proactive sustainability strategies on sustainability performance. Additionally, the results indicate that temporal ambidexterity facilitates the effect of proactive sustainability strategy on sustainability performance and strengthens the effects of eco-controls on sustainability performance. FsQCA reinforces the complementarities of different eco-controls revealing that performance measurement is a core practice that compensates for the limitations of budgeting and reward controls in predicting high sustainability performance.

This research contributes to the management accounting literature by providing novel evidence of the contingencies surrounding the effectiveness of eco-controls (Abdel-Maksoud et al., 2021; Henri et al., 2021; Henri & Journeault, 2018). The study specifically focuses on the roles of temporal ambidexterity and eco-controls in facilitating the successful implementation of sustainability strategies and demonstrating how they interact in determining sustainability performance. The findings of this study highlight the complementarity of eco-controls, with performance measurement identified as a core practice, while budget and reward controls are considered peripheral. This insight contributes to the ongoing debate in management accounting, emphasising the need for organisations to balance conflicting objectives by simultaneously focusing on different control systems (Bouten & Hoozée, 2022). By examining the temporal ambidexterity, the paper illustrates the importance of juxtaposing temporal tensions in short- and long-term needs. In doing so, this study extends current understanding of ambidexterity in management accounting, moving beyond the scope of innovation (Bedford et al., 2019). It indicates that developing ambidextrous capabilities in relation to objectives, market demands and environmental uncertainty is key in explaining how eco-controls become effective.

2. Theoretical framework and hypothesis development

2.1. Organisational ambidexterity theory and sustainability

The organisational ambidexterity theory emerged from the need to explain how organisations develop exploration and exploitation activities, as well as dedicate managerial attention and organisational resources to support these activities (Raisch & Birkinshaw, 2008). In this regard, the trade-off between exploration and exploitation has become the main point of debate among academics who suggested the

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[2]Following Slawinski and Bansal (2015), the reconciliation of short and long-term needs is also understood as juxtaposition, which reduces the polarisation between these anchors.

reconciliation of these activities (Zimmermann et al., 2018). While exploitation activities emphasise efficiency and may lead to the achievement of short-term performance, exploration activities focus on effectiveness and thus enhance long-term performance (O'Reilly & Tushman, 2008). To resolve this tension, organisations combine mechanistic structures that rely on hierarchy and centralisation that support efficiency, with organic structures focusing on autonomy and decentralisation (Raisch & Birkinshaw, 2008). Despite the well-established understanding of how organisations reconcile exploration and exploitation activities, the temporal trade-offs associated with managerial decisions remain relatively underexplored (Tarba et al., 2020; Wang et al., 2019).

According to organisational ambidexterity theorists, the challenges arising from an exclusive focus on either exploitation or exploration can be managed by developing capabilities that reconcile intertemporal tensions (Ramus et al., 2021; Wang et al., 2019). In this context, temporal ambidexterity has been recognised as a mechanism that facilitates the achievement of apparently contradictory objectives (Wang et al., 2019). Ambidextrous organisations are able to strategically integrate and coordinate short- and long-term action simultaneously (Ramus et al., 2021), generating synergies that result in positive outcomes (Raisch & Birkinshaw, 2008). This means balancing the conflicting objectives of ensuring financial stability while concurrently striving to achieve sustainability targets (Bouten & Hoozée, 2022). The foundation of temporal ambidexterity lies in the assumption that tensions arising from organisational objectives, resource management, market dynamics, and environmental uncertainty can be alleviated by addressing their implications in time. According to Wang et al. (2019) each of the dimensions of temporal ambidexterity aims to measure the ability of the firm to manage different temporal demands involved in their business activities. Organisational objectives reflect the firm's ability to establish short- and long-term targets that aim to meet the demands of multiple stakeholders (Boesso & Kumar, 2009), such as quality expectations from customers, sustainability regulations from the government, and employees' concerns about organisational growth. Resource management refers to the firms simultaneously use of current resources (e.g. financial, human, and informational resource) while searching for future opportunities. The successful management of these resources enables firms to strengthen their capability to manage intertemporal tensions and achieve sustainable objectives. Another critical ability involves responding to market demands. Firms seek to identify unmet customers' needs while simultaneously addressing the current customer demands, thus enhancing their performance and efficiency. Finally, environmental uncertainty refers to the firm's ability to adapt to market changes, considering future risks. It also involves aligning activities with current uncertainties whereas taking into account the broader environment. As organisations are confronted with the challenge of meeting current market demands and charting pathways for future market expansion, it becomes essential facet of firm's strategy to proactively address uncertainties and reinforce resilience against potential risks (Wang et al., 2019).

Although the discussion of temporality in sustainability literature is growing (Kim et al., 2019; Ortiz-de-Mandojana & Bansal, 2016), empirical evidence on the effects of temporal ambidexterity on management control practices that support sustainability strategies is scarce.

2.2. Eco-controls and sustainability

Contemporary debates in society about the trade-off between environmental and social welfare and organisations' profit maximisation challenge managers to implement management controls that integrate sustainability concerns into strategic plans (Heggen & Sridharan, 2021; Wijethilake et al., 2017). In this regard, researchers in management and accounting have advocated for the implementation of management controls focused on sustainability rather than relying on traditional controls (Beusch et al., 2022). Management controls focusing on sustainability assist in sustainable action routinisation, increase employees' sustainability knowledge and facilitate the coordination of natural resources (Journeault, 2016). While traditional controls concentrate on financial outcomes (Otley, 2016), eco-controls entail diverse practices that act in an interconnected way, aiming to address economic, environmental and social performance (Arjaliès & Mundy, 2013; Wijethilake et al., 2017).

Eco-controls allow firms to incorporate environmental objectives into the organisational culture. They offer guidance on resource allocation, performance metrics, and improve coordination of firms' activities (Bouten & Hoozée, 2022). When integrated into an organisation's routine, sustainability practices, such as eco-controls, make sustainability issues more visible (Rodrigue et al., 2013) and more comprehensible by corporate actors. Consequently, these practices serve as organisational directives that enhance the transparency of information within the organisation and clarify responsibilities necessary for the implementation of sustainability values (Gond et al., 2012). Hence, eco-controls improve internal communication and the dialogue with partners and assist in measuring and integrating economic, environmental, and social data into decision-making (Journeault et al., 2016).

The empirical evidence in management accounting literature recognising the benefits of the implementation of eco-controls has associated the broad (rather than peripheral and ceremonial) use of those controls with desirable organisational outcomes (Abdel-Maksoud et al., 2021; Heggen, 2019; Heggen & Sridharan, 2021; Henri & Journeault, 2010; Journeault et al., 2016; Ligonie, 2021; Wijethilake et al., 2017). As eco-control information is used for attention directing and feedback response, it enables corrective sustainability actions (Henri et al., 2014). These controls support the implementation of sustainable actions (Ligonie, 2021) and benefit performance by triggering organisational changes oriented towards sustainability goals (Ligonie, 2021; Pondeville et al., 2013).

2.3. Proactive sustainability strategies, the use of eco-controls and sustainability performance

The importance of management controls in enabling the implementation of organisational strategies has been widely explored in management accounting literature (Bedford et al., 2016; Otley, 2016). Studies indicate that organisations become more competitive when financial and non-financial metrics align with organisational values (Monteiro et al., 2022). In this regard, the use of eco-controls has been recognised as an effective means to translate sustainability strategies into performance (Beusch et al., 2022; Heggen & Sridharan, 2021; Henri & Journeault, 2010; Journeault et al., 2016; Laguir et al., 2021; Wijethilake et al., 2017). A sustainability strategy consists of values and policies designed to meet internal and external expectations for better attitudes

regarding sustainability (Lloret, 2016). It is formed of economic, environmental, and social dimensions that define pathways that ensure the continuity of organisational operations. The current demand for social equity and the reduction of environmental impacts lead organisations to adopt proactive sustainability strategies (Wijethilake et al., 2017). Such strategies guide managers in defining organisational priorities (Rodrigue et al., 2013). Eco-controls enable organisations to monitor and align employees' behaviours with sustainability goals and broader environmental objectives (Heggen & Sridharan, 2021; Henri & Journeault, 2010; Journeault et al., 2016). Those controls encourage the involvement of managers in defining environmental performance indicators and lead to greater eco-efficiency (Journeault et al., 2016) by making conscious consumption of resources part of the organisation's daily routine (Passetti et al., 2018).

Additionally, firms use eco-controls to debate assumptions triggering positive changes and organisational learning (Gond et al., 2012). Hence, eco-controls assist the implementation of organisations' sustainability strategies (Henri & Journeault, 2010; Journeault et al., 2016) aiming to increase sustainability performance (Heggen & Sridharan, 2021; Wijethilake et al., 2017). Eco-controls support environmental capabilities by fostering eco-learning and continuous improvement (Albertini, 2019; Journeault, 2016). They promote the establishment of environmental targets in budget-related revenue (e.g. recycling waste or selling scrap targets) and expenses (e.g. energy and water consumption), compensation (e.g. bonuses based on sustainability criteria), and performance measurement (e.g. performance achievement based on sustainability metrics) (Bouten & Hoozée, 2013). Additionally, eco-controls support strategic priorities by helping organisations to implement strategic environmental planning to foster environmental initiatives (Heggen, 2019).

Despite the evidence suggesting that the successful implementation of a multifaced proactive sustainability strategy should occur through eco-controls, most research in this area have had a limited perspective on sustainability performance by considering either the environmental or economic dimensions of performance rather than accounting for the multidimensional aspect of sustainability (i.e. environmental, economic and social). A multi-dimensional approach to proactive sustainability strategy is needed as it shapes firms' behaviour towards resource efficiency and cost savings, enhances social reputation, and reduces waste (Wijethilake et al., 2017). Proactive strategies enable firms to explore opportunities for competitive advantage, drive organisational change by integrating sustainability values into decision-making, and align key organisational functions such as strategic planning, budgeting, investment, and communication (Gunarathne et al., 2023). Bui and De Villiers (2017) indicate that when firms aim for long-term sustainability, transitioning to a proactive strategy is a necessary condition, as such strategy establishes clear plans for climate change policies, pollution control, carbon disclosure, and the development of low-carbon products. Particularly, proactive strategies enable organisations to legitimise sustainability practices (Chan et al., 2022). We contend that, as firms move towards proactive strategies, the use of eco-controls increases, equipping firms to address more complex sustainability challenges.

Previous studies have shown that eco-controls influence environmental performance in terms of cost reduction in production and processes, increased productivity, and reduced emissions (Henri & Journeault, 2010). Henri and Journeault (2018) highlight the effects of eco-controls on environmental performance, particularly regarding cost

reduction associated with natural resources consumption (material, water, and energy). Additionally, Heggen and Sridharan (2021) measure environmental performance through eco-efficiency and organisational actions addressing environmental issues. Responding to calls for further research on the effectiveness of eco-controls and their potential to translate sustainability strategies into outcomes (Laguir et al., 2021), we add to prior literature by examining the mediating effects of eco-controls on the relationship between strategy and the sustainability performance understood in terms of its environmental, economic and social dimensions. Thus, we hypothesise:

> H1. The use of eco-controls mediates the positive effect of proactive sustainability strategy on sustainability performance.

2.4. Proactive sustainability strategies, temporal ambidexterity and sustainability performance

The literature on organisational ambidexterity highlights the need to balance competing activities to enhance firm performance (Junni et al., 2013; Maine et al., 2022). By achieving a high level of ambidexterity, the likelihood of organisations' survival in a dynamic environment increases (Luger et al., 2018; Raisch & Birkinshaw, 2008). Research suggests that sustained performance depends on whether organisations develop ambidextrous capabilities to reconcile contradictory institutional pressures over time (Lin & Ho, 2016; Raisch & Birkinshaw, 2008). Hence, organisations have been encouraged to develop temporal ambidexterity as a capability to address firms' objectives, market demands, uncertainties and resources in short- and long-term (Wang et al., 2019).

Management and environmental literature on the effectiveness of sustainability strategies have mainly focused on the proactive and reactive strategies. While a reactive sustainability strategy focuses on corporate compliance with environmental laws and regulations, a proactive sustainability strategy focuses on activities that prevent negative impacts on the economy, environment and society (Seroka-Stolka & Fijorek, 2020). For instance, Bui and De Villiers (2017) demonstrated that firms implement proactive strategies driven by market opportunities rather than mere regulatory compliance, illustrating that such strategies lead to better strategic orientation towards sustainability. We argue that by delineating actions and plans aimed at reducing emissions, increasing environmental innovation, improving social reputation, and saving environmental costs, firms implement proactive strategies that align with not only short-term needs but also long-term organisational goals, which in turn underpin ambidexterity capabilities. In this vein, proactive sustainability strategy has been associated with higher adoption of sustainability practices (Bastini et al., 2022) and higher economic and environmental performance (Laguir et al., 2021; Wijethilake et al., 2017). It has been shown that as firms adopt more proactive strategies, sustainability information (e.g. carbon emissions data) is regularly used for operational decisions (e.g. carbon credit purchases) as well as strategic decision-making (e.g. long-term investments) (Bui & De Villiers, 2017). In their attempt to voluntarily and consistently address different stakeholders, the successful implementation of proactive strategies requires accommodating short- and long-term demands (Lin & Ho, 2016; Seroka-Stolka & Fijorek, 2020). As institutional pressures are embedded

in organisations' strategic objectives, it is plausible to expect that organisations with better-developed temporal ambidexterity can more effectively translate proactive sustainability strategies into superior sustainability performance. Thus:

H2. Temporal ambidexterity mediates the positive effect of proactive sustainability strategy on sustainability performance.

2.5. The use of eco-control, temporal ambidexterity and sustainability performance

Despite evidence that the organisation's ability to devote short- and long-term efforts supports the achievement of sustainability goals (Ortiz-de-Mandojana & Bansal, 2016), management accounting literature has not associated such organisational capabilities with the effectiveness of eco-controls. Prior studies have reported that ambidexterity amplifies the involvement of organisations in sustainability initiatives, as managers devote considerable attention to sustainable management practices that avoid deviant environmental behaviours (Zhao et al., 2020). Temporal ambidexterity also encourages firms to focus on the hybridisation of multiple accounting measures to balance competing and complex organisational aims, which might lead to efficiency and flexibility (Bedford & Malmi, 2015). As firms respond to market opportunities and complexity, the use of eco-controls becomes essential in reconciling short-term needs with long-term organisational objectives (Bouten & Hoozée, 2022).

Temporal ambidexterity drives firms to seize opportunities and adapt to changing context (Patel et al., 2013). It reinforces organisational commitment, which is observed through specific sustainable initiatives. Firms with well-developed temporal ambidexterity can achieve operational efficiency while pursuing strategic goals, such as process development and the design of sustainable products (Ortiz-de-Mandojana & Bansal, 2016; Slawinski & Bansal, 2015). This dual focus aligns with the role of eco-controls, which aid decision-making in areas such as pricing, purchasing and cost efficiency related to short-term sustainability needs and guide long-term objectives such as investment decisions and environmental risks (Gunarathne et al., 2023). Higher temporal ambidexterity is expected to enhance the impact of management practices on sustainability performance. This resonates with previous findings suggesting that management controls, given their dialectical nature, enable firms to integrate environmental values into their culture alongside financial goals that account for resource demand (Parker & Chung, 2018). Thus, organisations are better positioned to address multiple objectives (Bouten & Hoozée, 2022). Building on these arguments, this study posits that organisations capable of managing intertemporal tensions related to sustainability can make better use of eco-controls to achieve hybrid missions. Therefore, it is proposed that an organisation's ability to allocate resources strategically across temporal dimensions increases the effect of eco-controls on sustainability performance, leading to hypothesis H3.

H3. Temporal ambidexterity amplifies the relationship between the use of eco-controls and sustainability performance, such that the effect of eco-controls on sustainability performance is stronger for higher levels of temporal ambidexterity.

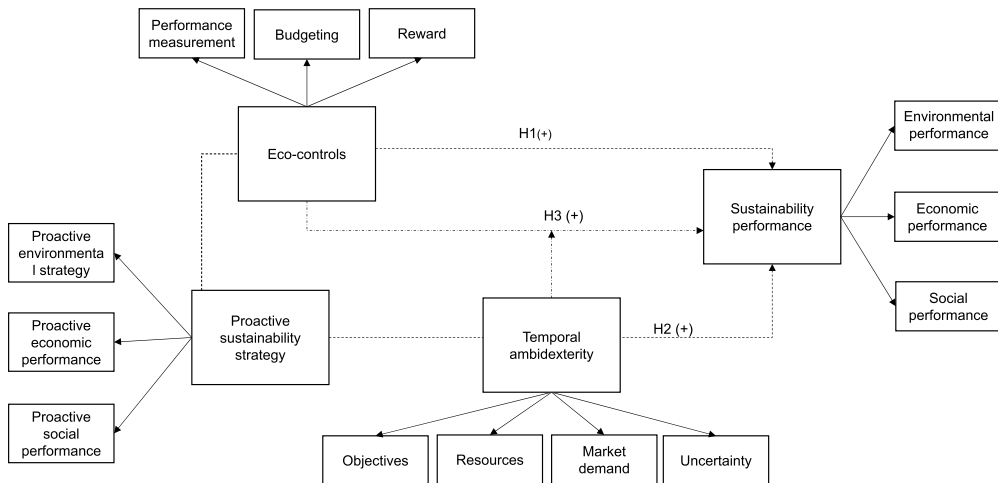The full theoretical model appears in Figure 1.

Figure 1. Theoretical model. Notes: Solid lines indicate relationships between latent constructs and their measurement items (——▶). Dashed lines indicate indirect effects (------▶ mediation –·–·–▶moderation).

3. Methodological procedures

3.1. Population and sample

The research population for this study comprises 1,423 medium and large hotels registered in the national hospitality sector database of the Brazilian Ministry of Tourism (Ministério do Turismo, 2021). Hotels are considered hybrid firms due to their characteristics of pursuing multiple objectives, including socio-environmental and economic goals (Bouten & Hoozée, 2022), making this setting suitable for our study. Furthermore, hotel operations impact the economic and socio-environmental activities since a considerable amount of food, water and energy are consumed on daily bases and a significant number of local people employed (Chung & Parker, 2010). The focus of the study is on medium and large hotels because they are more likely to have formal management control structures (Gomez-Conde et al., 2019) and formalised eco-controls (Heggen & Sridharan, 2021). Following previous studies (Monteiro et al., 2022), the number of rooms was the criterion used to define the size of the hotel (50 to 100 rooms = medium size, more than 100 = large size).

This research employs a survey method, with data gathered through a questionnaire. Whenever possible, questions addressing constructs from the academic literature remained faithful to their original versions. The questionnaire was originally designed in English and then translated into Portuguese. To ensure accuracy, the instrument was back-translated into English by scholars specialising in accounting. The revised version was pre-tested with five hotel managers and three academics with expertise in sustainability and management control. The suggestions obtained from the pre-test helped to improve the questions and adjust the questionnaire's size.[3] An e-mail was

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[3]The suggestions obtained from the pre-test were the following: (i) the inclusion of stakeholder definition in the questionnaire to make sure respondents know what they are answering; (ii) improvement of the readability (in Portuguese)

sent to the research population formed by hotel managers (e.g. CEO, CFO, general manager). This contained a link to access the questionnaire and a cover letter with the researchers' details, informing participants of the study's objective. After the questionnaires were sent, the potential participants were contacted (via telephone) by a professional survey organisation to encourage their participation.

To encourage a higher response rate (Graham et al., 2014; Heggen & Sridharan, 2021), respondents were informed they would receive a summary of the research findings upon the study's completion. Data collection occurred between July and September 2021 and resulted in 209 responses. Eight responses were excluded due to missing data. Thus, the final sample contained 201 valid responses (14.1% response rate), which is acceptable according to previous studies on environmental management accounting (Bastini et al., 2022; Heggen & Sridharan, 2021; Lisi, 2015; Pondeville et al., 2013).[4]

3.2. Common method bias and non-response bias

Preliminary tests were carried out to assess biases, starting with the mean comparison t-test to assess late respondent bias. There was no significant difference between the responses from early respondents (45 of the participants that first responded to the questionnaire) and those from late respondents (45 of the last respondents), except for the construct "proactive sustainability strategy" ($p < 0.01$). Two procedures were used to assess common method bias: the single Harman factor and the marker variable. The Harman factor presented an average explained variance below 50% (31.81%), indicating that common method bias is not a significant concern. For the marker variable test, a 5-point Likert scale item measuring whether the hotel provided personal protective equipment (PPE) to employees during the COVID-19 pandemic was used. The correlations between the marker and the variables of interest are low (proactive sustainability strategy, $\rho = 0.059$; eco-controls, $\rho = 0.040$; temporal ambidexterity, $\rho = -0.031$; hotel type, $\rho = 0.061$; revenue during COVID-19, $\rho = 0.081$; sustainability performance, $\rho = 0.031$). Additionally, the squared average of the correlations was 0.003, indicating no bias (Lindell & Whitney, 2001).

3.3. Measurement of variables

The proactive sustainability strategy was measured with twelve items based on prior studies (Wijethilake et al., 2017). Respondents were asked to express their agreement with statements regarding environmental, economic, and social policies and plans in their organisations (Likert scale, 1 = strongly disagree; 7 = strongly agree). For example, one of the items was assessed by asking if hotels promote and preserve biodiversity.

The use of eco-controls was evaluated with ten items assessing the performance measurement, reward and budgeting practices used for environmental control (Henri

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of the three items that form the first-order of the construct reward controls – adding "to what extant" in the question, and (iii) amending the cover letter by updating the information regarding the duration of the questionnaire completion from 20 to 25 min.

[4]The pretested questionnaires were not included in the final sample. Consent was obtained from participants. The paper was granted ethical approval from one of the institutions leading the project.

& Journeault, 2010). Four items were employed to capture the use of the performance measurement. Managers were asked about the extent to which the hotel uses such practices (1 = not used at all; 7 = used extensively). The reward controls were assessed with three items evaluating the extent to which the hotel uses environmental indicators for reward (1 = not used at all; 7 = used extensively). Budgeting controls were measured with three items assessing the extent to which the hotel uses a detailed budgeting considering environmental issues (1 = not detailed at all; 7 = very detailed).

Temporal ambidexterity was evaluated with eight items that assessed the hotel focus on sustainability issues in the short- and long-term (Slawinski & Bansal, 2015; Wang et al., 2019). A 7-point Likert scale was adopted to assess the level of the managers' agreement with statements such as whether the hotel was able to implement short- and long-term sustainable goals (1 = strongly disagree; 7 = strongly agree). This construct is measured as second-order construct involving the dimensions of objectives, resources, market demand and environmental uncertainty (Wang et al., 2019). The first dimension assesses how short- and long-term objectives attend to multiple interests, while the second captures the efficient use of current resources and the development of new resources. The third, assesses how firms address the current market needs and prospect new customers. Lastly, the fourth dimension evaluates whether firms simultaneously deal with environmental uncertainty and take preventive action against future risks.

Sustainability performance was captured with thirteen items that assessed environmental, economic, and social performance (Asadi et al., 2020; Lisi, 2015; Ramanathan, 2018). A 7-point Likert scale measured the degree of agreement regarding the items (1 = strongly disagree; 7 = strongly agree). For example, managers were asked to express the level of agreement on whether their hotels' overall environmental performance has improved over the past three years.

Hotel type and the effect of the coronavirus pandemic on firm's revenue were included as control variables. Hotel type captures whether the hotel belongs to a chain or if it is an independent organisation (Monteiro et al., 2022). Hotels that are part of chains have standardised managerial controls (Cruz et al., 2011) and are usually larger than independent hotels. The detrimental effect of the crisis caused by the coronavirus pandemic on firms was measured by asking managers to indicate the percentage of potential revenue decrease during the COVID-19.

3.4. Analysis procedures

Data were analysed using partial least square structural equation modelling (PLS) (Hair et al., 2017). The technique was chosen due to its ability to control measurement error and to understand complex relationships between constructs. PLS is frequently used in management control and sustainability research (Abdel-Maksoud et al., 2021; Monteiro et al., 2022; Wijethilake et al., 2017). The application of PLS involves the steps of measurement evaluation and structural modelling, assessing the constructs' reliability and validity. The structural model seeks to examine the relationships between variables according to the proposed theory (Hair et al., 2017). Additionally, fsQCA (Ragin, 2009) was performed to complement and refine the PLS analysis. Prior studies in management accounting suggested the application of fsQCA to evaluate configurations that predict sustainability performance (Gond et al., 2012). FsQCA is one of the main tools in

asymmetric analysis that relies on logical associations to predict an outcome through the combination of different inputs. This approach was employed in three steps as follows: (i) calibration, (ii) necessary analysis and (iii) truth table (sufficiency analysis) (Ragin, 2009). This analysis is helpful to the study because it can provide evidence of management control complementarity (Bedford, 2020; Bedford et al., 2016).

4. Analysis of results

4.1. Measurement model

The first step of the PLS regression consisted of evaluating the measurement model, which includes assessing constructs' reliability and validity. The appendix shows the results confirming adequate reliability of the constructs (Cronbach's alpha and composite reliability > 0.70) and adequate convergent validity since the average of variance extracted (AVE) of all the constructs present indices above 0.50. Also, Table 1 depicts heterotrait-monotrait (HTMT) indices below the 0.85 thresholds demonstrating adequate discriminant validity (Henseler et al., 2016). The variance inflation factors (VIFs) for the constructs are below the acceptable threshold (Inner VIF < 5.00) (Hair et al., 2017), indicating that multicollinearity is not a concern in this study.

4.2. Structural model

The structural model followed the recommendations in the literature on PLS, applying the bootstrap technique with a resampling of 5,000 (Hair et al., 2017). The results in Table 2 show a significant and positive mediation effect of eco-controls in the relationship between proactive sustainability strategy and sustainability performance (Model 1: $\beta = 0.275$, $p < 0.01$; Model 2: $\beta = 0.271$, $p < 0.01$), demonstrating that hotel strategies implemented to deal with sustainable issues are translated into sustainability performance through the use of eco-controls, which supports H1. This study recognises the double role of temporality in explaining sustainability performance. First, the role of temporal ambidexterity in facilitating the relationship between proactive sustainability strategy and

Table 1. Correlation and validity.

	1	2	3	4	5	6
Panel A – Correlation						
1. Proactive sustainability strategy	**0.820**					
2. Eco-controls	0.681	**0.728**				
3. Temporal ambidexterity	0.620	0.656	**0.820**			
4. Sustainability performance	0.692	0.691	0.622	**0.873**		
5. Hotel type	0.189	0.329	0.183	0.209		
6. Revenue (Covid-19)	−0.048	−0.056	−0.020	−0.075	−0.145	
Panel B – Heterotrait-Monotrait (HTMT)						
1. Proactive sustainability strategy	–					
2. Eco-controls	0.822					
3. Temporal ambidexterity	0.664	0.750				
4. Sustainability performance	0.790	0.834	0.665			
5. Hotel type	0.178	0.353	0.194	0.239		
6. Revenue (Covid-19)	0.098	0.059	0.086	0.129	0.120	-

Notes: In Panel A are presented the correlation coefficients and, in the diagonal (in bold) the square root of AVE. The indices reported in Panel B – Heterotrait-Monotrait (HTMT) are below the 0.85 threshold.

Table 2. Structural model.

	Model 1			Model 2		
	Eco-controls *B(t-stat)*	Temporal ambidexterity *B(t-stat)*	Sustainability performance *B(t-stat)*	Eco-controls *B(t-stat)*	Temporal ambidexterity *B(t-stat)*	Sustainability performance *B(t-stat)*
Proactive sustainability strategy	0.730 (17.335***)	0.591 (11.367***)	0.417 (5.275***)	0.730 (16.801***)	0.591 (11.225***)	0.416 (5.287***)
Eco-controls			0.376 (4.177***)			0.371 (4.167***)
Temporal ambidexterity			0.153 (2.099**)			0.150 (2.085**)
Proactive sustainability strategy → Eco-controls			0.275 (3.877***)			0.271 (3.883***)
Proactive sustainability strategy → Temporal ambidexterity			0.091 (1.978**)			0.088 (1.965**)
Eco-control x Temporal ambidexterity			0.123 (1.840**)			0.115 (1.651**)
Hotel type						0.011 (0.096)
Revenue (Covid-19)						−0.043 (1.098)
R^2	0.533	0.349	0.628	0.533	0.349	0.629
Adjusted R^2	0.531	0.346	0.620	0.531	0.346	0.618
Q^2	0.523	0.339	0.517	0.523	0.339	0.510
Max. VIF	1.000	1.000	2.640	1.000	1.000	2.871

Note: Standardised coefficients are presented. The structural path is reported with their coefficient and *t*-value. *** and ** indicate 1% and 5% significance levels, respectively (two-tailed test).

sustainability performance was supported (Model 1: $\beta = 0.091$, $p < 0.05$; Model 2: $\beta = 0.088$, $p < 0.05$) (H2). Second, the result supports H3 as temporal ambidexterity amplifies the effect of eco-controls on sustainability performance (Model 1: $\beta = 0.123$, $p < 0.05$; Model 2: $\beta = 0.115$, $p < 0.05$), such that the effect of eco-controls on sustainability performance is stronger when short- and long-term tensions are reconciled (temporal ambidexterity) (see Figure 2). This evidence reinforces the predicted double role of temporal ambidexterity in intervening in the effects of strategy and eco-controls on sustainability performance.

4.3. FsQCA for eco-controls complementarity analysis

4.3.1. Calibration and necessary condition analysis

FsQCA was applied to explore the combinations of antecedents that might predict higher hotel sustainability performance. The calibration was the first step and consisted of rescaling the constructs in a ranking from 0 to 1 (Ragin, 2009). The calibration process used the following anchor: full non-membership (25th), crossover point (50th), and full membership (75th). The next step involved necessary condition analysis in identifying each condition's predictive power. Given that a broadened understanding of how different eco-control practices complement each other and their combination with contingencies surrounding sustainability is needed, in addition to temporal
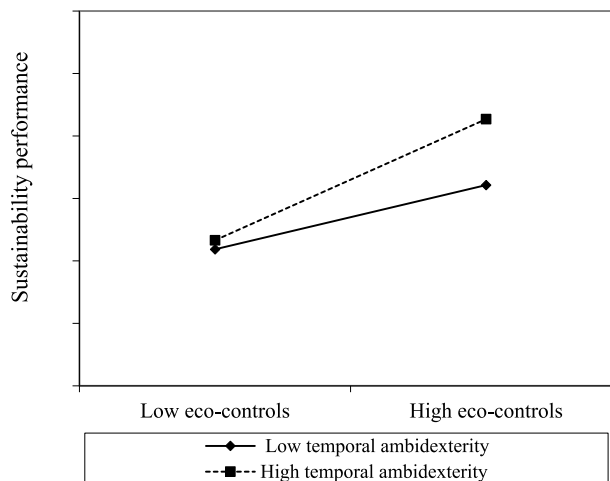
Figure 2. Moderating role of temporal ambidexterity.

ambidexterity, this analysis considered the first order of eco-control and temporal ambidexterity. The fsQCA was motivated by recent studies in management accounting that explored management control complementarity (Bedford, 2020; Bedford et al., 2016; Müller-Stewens et al., 2020). The results presented in Table 3 show the necessary condition for eco-controls, including performance measurement (Consistency = 0.739), reward (Consistency = 0.706) and budgeting (Consistency = 0.700), as well as for proactive sustainability strategy (Consistency = 0.785). Other antecedents, such as objectives, resources, marked demand and uncertainty (dimensions of temporal ambidexterity), showed consistencies ranging from 0.611 to 0.681 (see Table 3). Results suggest that

Table 3. Necessary analysis for sustainability performance prediction.

Conditions	Consistency	Coverage
Proactive sustainability strategy	0.785	0.800
∼ Proactive sustainability strategy	0.321	0.327
Performance measurement	0.739	0.739
∼Performance measurement	0.348	0.362
Reward	0.706	0.726
∼Reward	0.410	0.414
Budgeting	0.700	0.667
∼Budgeting	0.400	0.438
Objectives	0.677	0.734
∼Objectives	0.391	0.377
Resources	0.607	0.757
∼ Resources	0.471	0.406
Marked demand	0.681	0.719
∼ Marked demand	0.405	0.399
Uncertainty	0.611	0.774
∼ Uncertainty	0.480	0.409

Notes: The nontabulated necessary analysis shows that eco-controls (as a second-order construct) is an "almost always necessary condition", as the consistency is 0.80, meaning that it is an essential condition for sustainability performance, reinforcing the importance of the combined usage of performance measures, budgeting and reward for solving sustainability issues. In addition, the results also reveal that (1) "Proactive sustainability strategy + Eco-controls" and (2) "Proactive sustainability strategy + Temporal ambidexterity" are "always necessary", as the observed consistencies are at the value of 0.90.

Table 4. Configurations for high sustainability performance.

		Outcome: sustainability performance		
	Conditions: inputs	C1	C2	C3
Strategy	Proactive sustainability strategy	●	●	●
Eco-control	Performance measurement	●	●	●
	Reward	•	•	
	Budgeting	•		•
Temporal ambidexterity	Objectives	●	●	●
	Resources		•	•
	Marked demand	●	●	●
	Uncertainty	●	●	●
	Consistency	0.954	0.950	0.912
	Raw Coverage	0.225	0.207	0.244
	Unique Coverage	0.044	0.027	0.064
	Overall Coverage		0.316	
	Overall Consistency		0.929	

Notes: Black circles indicate the presence of a specific condition and blank spaces indicate that the condition has a redundant impact. Larger circles represent that the condition has a relevant role in the configuration, whereas small circles indicate a peripheral role. C = configuration. The fsQCA result provides three configurations that are effective for higher sustainability performance. These configurations are effective, as the overall consistency observed is above 0.8 (and the overall coverage is also above 0.30) (Ragin, 2009).

these factors may contribute to desirable sustainability outcomes when combined with other conditions.

4.3.2. Sufficiency analysis

As pointed out in prior management accounting literature (see Bedford et al., 2016), after the necessary condition analysis, sufficiency analysis is required to ensure the presence, absence, or redundancy of a condition (Ragin, 2009). This may provide evidence of complementarity of eco-controls. More specifically, this procedure aims to assess how the combination of eco-controls and other contingencies surrounding sustainability can lead to higher performance. The results depicted in Table 4 show three effective configurations leading to high sustainability performance.

The fsQCA results indicate that sustainability performance can be achieved through three possible configurations. In the first solution, the core presence of a proactive sustainability strategy, performance measurement, and three dimensions of temporal ambidexterity (i.e. objectives, market demand, and uncertainty) are combined with the peripheral presence of reward and budgeting controls. Meanwhile, resources (a dimension of temporal ambidexterity) appear to be a redundant condition. This solution provides evidence of eco-control complementarity, demonstrating that environmental performance measurement is core condition in predicting sustainability performance and compensates the peripheral impact of budget and reward controls. Previous studies have shown that a set of control practices can mitigate the weaknesses of other controls, highlighting the importance of exploring the complementary approach in this literature to better understand which action must be taken to enhance the effectiveness of management controls (Henri & Wouters, 2020). The second solution shows proactive sustainability strategy, performance measurement and objective, marked demand and uncertainty as essential conditions and reward controls and resources as peripheral conditions, while budgeting controls appear as the redundant condition. The third configuration indicates that even when reward controls are redundant, the peripheral presence of budgeting and resources and the core

presence of proactive sustainability strategy, performance measurement, objectives, marked demand and uncertainty lead organisations to high sustainability performance. This evidence contributes to the debate on management control complementarity, particularly in terms of substitution effects (Bedford, 2020). Furthermore, these solutions suggest that the inherent rigidity of reward and budgeting controls may constrain their effectiveness in fostering the comprehensive development of sustainability initiatives. Finally, these results emphasise the importance of firms carefully managing their rewards systems and align budgeting practices to organisational routines to achieve sustainability goals.

5. Discussion of results

This study focuses on management control and environmental management in hotels. It uses survey data to explore the role of eco-controls and temporal ambidexterity in facilitating the implementation of sustainability strategies and examines the interaction between eco-controls and temporal ambidexterity and their relationship with sustainability performance. The research advances prior studies on environmental management accounting (Abdel-Maksoud et al., 2016; Bouten & Hoozée, 2022; Heggen & Sridharan, 2021; Pondeville et al., 2013) by connecting organisational ambidexterity theory and management control theory and shedding light on how firms manage sustainability concerns. In this vein, this study introduces temporal ambidexterity as a growing research avenue to be further explored in management accounting.

The results support H1, which predicted the central role of eco-controls in the management of sustainability, demonstrating that management controls facilitate the implementation of successful proactive sustainability strategies. Whereas prior literature acknowledges the benefits of eco-controls in implementing environmental objectives (Abdel-Maksoud et al., 2021; Henri & Journeault, 2010; Journeault, 2016), this study examines how eco-controls drive sustainability outcomes, improving economic, environmental and social performance. In organisations with highly committed managers, the implementation of sustainable management controls tends to be more successful, as managers are more sensitive to internal and external demands (Lisi, 2015). As managers embrace eco-friendly values, their commitment to environmental protection is mirrored in the incorporation of sustainability policies (Bouten & Hoozée, 2022). This integration seeks to balance financial considerations with environmental goals, thereby facilitating a harmonious transition towards adopting environmentally conscious practices. This aligns with the ongoing debate on eco-control literature, emphasising the interconnection of financial and environmental aspects within organisational scope. Eco-controls allow organisations to detail budgets considering sustainable action, use performance measures to evaluate sustainable organisational behaviour, and encourage managers to accomplish sustainable goals. For example, the inclusion of environmental cost information in the budget prompts managers to heighten their awareness regarding the environmental impact of organisational activities (Henri et al., 2014), highlighting the importance of eco-controls for the management of firms' daily operations. These eco-controls reflect waste reduction, recycling, and reuse (Journeault et al., 2016) and are relevant in a contemporary context where sustainable agendas have been frequently discussed. Our results reinforce the role of eco-controls in facilitating the relationship between proactive sustainability strategy

and sustainability performance. The predicted mediation effect of eco-controls was supported, which informs the role of eco-controls in continuous improvement (Journeault, 2016), environmental initiatives (Heggen, 2019), eco-efficiency (Heggen & Sridharan, 2021), and environmental performance (Laguir et al., 2021). The results of this study demonstrate the importance of management controls in supporting firms' efforts to achieve sustainable goals. This evidence indicates that eco-controls contribute to organisations' hybrid mission, simultaneously addressing multiple demands (Bouten & Hoozée, 2022). Also, these findings encourage the implementation of procedures that nurtures the environmental knowledge sharing and cultivates employee's commitment with firms' sustainability objectives (Gond et al., 2012). Moreover, this study advances prior evidence of management control complementarity (Bedford, 2020) by demonstrating that eco-controls, such as performance measurement, budgeting and reward controls, are interconnected. The lower impact of one (e.g. rewards) is compensated by others (e.g. performance measurement), facilitating the involvement of different areas in the organisation and leading to great sustainability outcomes.

In addition, this study explores the role of temporal ambidexterity in converting proactive sustainability strategy into sustainability performance. The results of this study show that as firms pursue their mission, temporal ambidexterity facilitates the implementation and management of financial and socioenvironmental goals. It is likely that the effective management of financial, human and informational resources enhances firms' ability to address intertemporal tensions and achieve sustainable outcomes. The reconciliation of competing priorities over time leads to resource orchestration, which may influence the impact of firm strategy on the organisational outcomes (Wang et al., 2019). This study demonstrates that the influence of proactive sustainability strategies on sustainability performance is facilitated when organisations can juxtapose the temporal tensions between short- and long-term needs, supporting H2. As firms delineate their short- and long-term objectives, they should consider internal and external demands (e.g. customers, employees, and regulators) for increased responsibility and high-quality service. Adapting to market conditions, such as implementing green technology through partnership, introducing new processes, products, and services to meet sustainability demands, may enable firms to address current market needs while exploring opportunities in new markets.

Finally, the research explored the moderating role of temporal ambidexterity in the relationship between eco-controls and sustainability performance. The study finds that the more developed the temporal ambidexterity is, and consequently, the more able an organisation is to manage short- and long-term needs, the more eco-controls influence sustainability performance, supporting H3. We provide in-depth results (see fsQCA) that extend previous literature demonstrating that among the dimensions of temporal ambidexterity, reconciling firm objectives, market demands, and environmental uncertainties is essential for achieving sustainability performance. Moreover, our results show how organisations achieve successful results by implementing eco-controls. Hence, we expect that firms striving for high sustainability performance will align their performance measurement, budgeting, and rewards with organisational objectives, market demands, and environmental uncertainties, even when faced with organisational resource constraints. This evidence contributes to the existing management accounting literature by connecting sustainability management practices and organisational ambidexterity theory (Maine et al.,

2022). Also, our study encourages organisations in the hospitality sector to develop capabilities, such as temporal ambidexterity to enhance sustainability outcomes. By reinforcing the environmental commitment through more concrete initiatives that simultaneously focus on operational and strategic sustainable actions, organisations reduce resource waste and increase eco-efficiency. This result supports prior studies that emphasise the important of directing efforts towards organisational goals in both the short- and long-term (Wang et al., 2019). Among the conditions examined, temporal ambidexterity stands out for its predictive capacity regarding sustainability performance. Our study illustrates the relevance of temporality in organisations that aim to maintain strong ties with stakeholders and create sustainable value.

6. Conclusion

This study highlights the contingencies associated with the effectiveness of eco-controls and the managerial mechanisms through which sustainability strategies affects sustainability performance. Eco-controls are brought into this study as a core management practice that generates financial and socio-environmental benefits, supporting sustainable organisational values outlined in the firm's strategy. This study advances the literature suggesting that by integrating financial and environmental metrics, eco-controls stand out as a mechanism that facilitates the monitoring of behaviour and stimulates the implementation of sustainability agendas. It shows that eco-controls enable firms to debate sustainability issues, triggering the aimed organisational changes that lead to increased efficiency, rational natural resource usage and reduction of waste. This research deepens the knowledge of the effectiveness of management controls in attending to desirable sustainability outcomes, highlighting the eco-control role of converting proactive strategy into concrete sustainability action, facilitating the implementation of sustainability goals. This shows that when management controls focused on sustainability are mobilised to address internal and external demands, sustainability performance improves. Rather than emphasising a firm's corporate social responsibility through environmental disclosure, this study brings eco-controls to the forefront of discussion as an organisational response mechanism to the contemporary demands for more responsible and sustainable behaviours. Additionally, this study advances the prior literature, providing evidence of eco-control complementarity, which adds to the debate on the interdependence of management accounting practices supporting that environmental performance measurement, budgeting and reward controls are interconnected and the absence or peripheral presence of one practice (e.g. rewards or budgeting) is compensated by others (environmental performance measurement).

The study also uncovers the temporality dimension revealing organisational objectives, market demands and environmental uncertainties as core conditions for the expected reconciliation of short- and long-term sustainability needs. Furthermore, the study contributes to management accounting area by bringing light on the complementary approach to eco-controls and temporal ambidexterity dimensions. Our findings suggest that under resources scarcity firms should integrate performance metrics, budgeting and reward control, accounting for the balance of intertemporal tensions

associated with organisational objectives, market demands and environmental uncertainties. Whereas prior literature indicates that traditional strategic orientations drive intertemporal tensions between short- and long-term needs, the results of this study suggest that proactive sustainability strategies assist organisations in juxtaposing those temporal tensions. Moreover, this research advances the management control literature by introducing temporal ambidexterity as a capability that reinforces the influence of eco-controls on sustainability performance. Finally, this study extends the literature by connecting management control theory and ambidexterity theory to broaden the knowledge of sustainability management.

The paper provides practical managerial insights around how organisations can successfully implement sustainability strategies through eco-controls. First, the study encourages managers to use eco-controls as a bonding mechanism to align organisational participants' behaviour to the firm's sustainability goals. The effective use of eco-controls is commonly associated with the reduction of energy and water waste, cost reduction and eco-efficiency; thus, organisations should invest on eco-controls. The study shows configurations of eco-controls that are associated with sustainability performance, illustrating how managers could use different practices that complement each other. Managers are advised to embrace eco-controls as facilitators of environmental, economic, and social strategies, responding to both internal and external demands. Secondly, the paper demonstrates that effective eco-controls necessitate juxtaposing tensions between short- and long-term demands. Consequently, managers should recognise that successful eco-controls depend on the development of temporal capabilities.

The results of this study present a few limitations. First, the presented evidence refers to the perception of the managers who participated in a survey. Future studies could gather archival data to measure a specific type of management control. For instance, incorporate the carbon footprint as a sustainability management practice (Hartmann et al., 2013) to understand the role of these controls in reducing environmental impacts (e.g. pollution and waste). Other approaches to management controls that are based on their use, rather than design (e.g. enabling and coercive use), could enhance the understanding of how these support organisational sustainability goals. Second, this study explored the meaningful impact of structural source and organisational capability; instead, future research should adopt resource orchestration theory to explore how firms reconcile exploration and exploitation activities surrounding the sustainability spectrum. Additionally, a qualitative approach for in-depth exploration of how organisations reconcile firm objectives in the face of resource scarcity and stakeholder pressure could offer a broader understanding of sustainability within the organisational setting. Third, this study marginally commented on the importance of fomenting the organisations' hybrid mission but did not delve deeply into this theme. Thus, future research may consider exploring the interwoven effect of management control and temporal ambidexterity in the context of hybridity, analysing its impact on organisational results, and ensuring that firms do not shift away from their hybrid mission. Finally, the presented hypotheses suggest associations between variables and the design of this study is unable to confirm causal relationships between variables.

Acknowledgements

Disclosure statement

Funding

Data availability statement

The data that support the findings of this study are available from the corresponding author, RM, upon reasonable request.

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