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Blending minds, balancing goals: TMT heterogeneity and sustainable-innovation in family firms

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ABSTRACT

Family firms often prioritize profitability and growth, but balancing these with environmental sustainability is challenging. While TMT heterogeneity shapes various performance outcomes, its role in addressing the profitability–environmental sustainability dilemma in family firms remains unclear. Building on the upper echelons theory, we investigate how TMT heterogeneity drives the simultaneous pursuit of financial and environmental performance, which we refer to as hybrid financial–environmental performance, through sustainable-innovation practices. Additionally, we examine how family-firm governance mechanisms influence these relationships. Analyzing data from two matched samples of CEOs and senior production managers of Australian family firms, we find not only that TMT heterogeneity enhances the adoption of sustainable-innovation practices and leads to hybrid financial–environmental performance but also that the strength of this relationship is contingent on family-member involvement in the TMT and participative decision-making with subordinates. These insights advance our understanding of how family firms balance financial success and environmental responsibility.

KEYWORDS

Family firm; financial performance; environmental performance; top management team heterogeneity; sustainable innovation; family involvement; participative decision-making

> Short-termist business culture, guided predominantly by financial indicators, is not only causing social and environmental distress but is also unsuccessful in pure business terms. . . . Achieving the apparent "best of both worlds"—sustainability and strong financial returns—requires considerable discipline at all levels of the organization. This is the very reason why owners, and in particular owners of family businesses and wealth, are best positioned to achieve this shift. (Kenyon-Rouvinez, 2018)

Growing environmental challenges, such as resource depletion and pollution, have led business leaders to recognize their environmental responsibilities and adopt more-sustainable operations (Çop et al., 2021; Lorenzen et al., 2024; Vesal et al., 2022). Given their strategic role, top management teams (TMTs) are central to implementing strategies that enhance

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environmental performance (Dhir et al., 2023; Xie et al., 2022). However, adopting sustainable practices often requires substantial resources and may compromise short-term financial performance (Makni et al., 2009; Xie et al., 2022). Thus, balancing environmental and financial objectives is vital (Aftab et al., 2024). TMTs must lead with solutions that integrate both aims—a concept we refer to as hybrid financial–environmental performance, defined as the simultaneous pursuit of high financial and environmental outcomes (Lu et al., 2023).

This dual pursuit is especially relevant for family firms compared to non–family enterprises, as family firms have traditionally prioritized profitability, growth, and market share (Cruz et al., 2014; Liew & Loo, 2024; Zaefarian et al., 2023). Yet, they increasingly face pressure to address environmental concerns, as they are significant contributors to issues like carbon emissions (Baù et al., 2021; Nikolakis et al., 2022). Unlike non–family firms, family firms must prioritize nonfinancial goals—such as preserving socioemotional wealth and ensuring continuity for future generations (Chirico et al., 2020; Gomez-Mejia et al., 2011). Additionally, stakeholder pressures from family members and local communities demand environmentally responsible behavior (Cruz et al., 2014; Saeed et al., 2023). Therefore, recent research has emphasized the need for long-term thinking in family-firm decisions, including sustainability considerations (Domańska et al., 2024; Lorenzen et al., 2024).

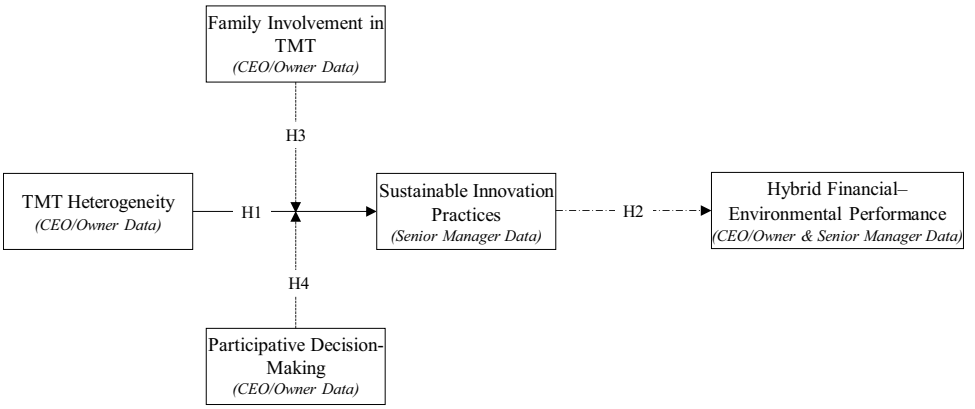
One promising path toward hybrid financial–environmental performance in family firms is through TMT heterogeneity—the diversity of team members' backgrounds, experiences, and cognitive perspectives (Wu & Park, 2019). Heterogeneous TMTs offer broader knowledge and perspectives, improving their ability to address complex challenges (Alexiev et al., 2010; Chirico et al., 2011; Su et al., 2022; Van Doorn et al., 2013). This aligns with upper echelons theory, which argues that strategic choices and performance outcomes reflect TMT characteristics (Hambrick et al., 1996, 2015). Prior research underpinned by this theory indicates that heterogeneity enhances creativity by bringing varied information and viewpoints (K. He et al., 2021; Schubert & Tavassoli, 2020).

Further, the family-business literature suggests that diverse TMTs can develop innovative strategies and explore unconventional approaches (Kraiczy et al., 2015). These strategies embed sustainability into core business practices and meet expectations from stakeholders—including shareholders, partners, customers, and society. Research shows that firms adopting sustainable innovations not only reduce pollution and energy use (Rusinko, 2007; Vesal et al., 2021) but also appeal to environmentally conscious consumers and improve brand image (Blenkhorn & MacKenzie, 2017; Yao et al., 2021). Despite these benefits, little is known about how TMT heterogeneity and sustainable-innovation practices jointly influence hybrid financial–environmental performance in family firms.

While TMT heterogeneity appears to support sustainability, successful implementation also relies on governance mechanisms. We focus on two: family involvement in the TMT and participative decision-making. Research shows that family-member executives enjoy more discretion (Skorodziyevskiy et al., 2023), which allows for better implementation of decisions. Moreover, strong mutual understanding and social bonds among these executives (Salvato & Melin, 2008) may encourage prioritization of a sustainability and environmental orientation. Participative decision-making—defined as TMTs involving subordinates in decisions (Carmeli et al., 2009)—broadens input and improves decision quality (Su et al., 2022; Zaefarian et al., 2023). In family firms, this inclusive approach builds ownership, encourages open dialogue, and supports creativity (Chirico et al., 2011). While prior studies highlight the benefits of both mechanisms (Hoffmann et al., 2016; Liew & Loo, 2024; Villani et al., 2023), their specific role in enabling TMTs to pursue sustainability and hybrid financial–environmental performance is underexplored.

This study examines two matched samples of CEOs and senior production managers from family firms to explore three key questions: (1) Does TMT heterogeneity positively affect hybrid financial–environmental performance in family firms? If so, (2) Is this relationship mediated by sustainable-innovation practices? and (3) How do family involvement in the TMT and participative decision-making facilitate the impact of TMT heterogeneity via sustainable innovation? Drawing on upper echelons theory, we propose and test a model (see Figure 1).

Our study contributes to the intersection of family business and environmental sustainability in four ways: First, we demonstrate empirically how TMT heterogeneity helps family firms improve environmental performance without sacrificing profitability. This extends research grounded in upper echelons theory (Alexiev et al., 2010; D'Allura, 2019) and supports the growing



Notes: The dashed line denotes the mediation relationship, while the dotted lines denote moderation and moderated-mediation relationships.

Figure 1. Conceptual model.

need for firms to satisfy both societal and shareholder demands (Barth & Melin, 2018). Second, we examine the mediating role of sustainable innovation, deepening understanding of how TMT heterogeneity influences innovation outcomes (Alexiev et al., 2010; Su et al., 2022). The effect of TMT heterogeneity is especially pertinent for family firms that often struggle with resource constraints, making strategic decision-making around innovation and sustainability more complex. Third, while prior work has explored how family involvement enhances performance (Hoffmann et al., 2016; Le Breton-Miller & Miller, 2009), few studies have addressed this in the context of sustainable innovation. Our study responds to calls (e.g., Matzler et al., 2015) for studies that offers insight into how family participation in TMTs influences sustainability-related outcomes. Fourth, we investigate participative decision-making as a moderator in the link between TMT heterogeneity and sustainable innovation. This addresses recent calls for exploring its consequences (Carr et al., 2021; Eddleston et al., 2008, 2012) and illustrates how employee engagement can support a firm's sustainability transformation and hybrid financial–environmetal performance.

Theory development and hypotheses

Theoretical interest in TMTs can be traced back to the behavioral theory of the firm (Hambrick et al., 1996; March & Simon, 1958), which posits that due to bounded rationality, managers may not always make economically rational decisions, as they often operate with incomplete information and navigate a social context that is characterized by conflicting goals and organizational routines (Avtonomov, 2017). While the behavioral theory of the firm emphasizes bounded rationality and the impact of organizational routines and social contexts on managerial decision-making, Hambrick and Mason (1984) expanded on this concept in their upper echelons theory. They suggest that (a) the firm reflects the composition of its top managers and (b) TMT characteristics have a greater potential for predicting firm-level outcomes. Specifically, cognitive diversity, derived from TMT members' complementary skills and abilities, and ideological diversity, stemming from varied backgrounds and professional experiences, can enhance specific firm outcomes, such as innovation in the business model (Narayan et al., 2021). According to this theory, TMT heterogeneity in areas such as professional experience, functional background, education, skills, and expertise significantly influences cognitive processes, which are reflected in firms' decisions (Narayan et al., 2021, White & Borgholthaus, 2022).

The upper echelons theory has emerged as a dominant framework in management and organizational studies that are focused on improving various types of performance. For example, Cho et al. (2019) demonstrated how diversity in managerial attributes among upper echelons enhances corporate

environmental performance, and Shahab et al. (2020) found that CEOs with experience across various industries are positively associated with higher levels of sustainable performance. Additionally, Bendoly et al. (2021) revealed that top-level leaders with experience in diverse contexts can drive organizational performance across a wide array of proenvironmental objectives. In the context of family firms, numerous researchers have applied upper echelons theory to highlight specific pathways through which TMTs influence firm performance (e.g., D'Allura, 2019; Kammerlander et al., 2020). Consistent with this stream and in the context of innovation, family-business scholars such as Lee et al. (2017) suggest that TMTs with diverse expertise significantly affect the firm's explorative innovation activities, such as adopting new technologies to address sustainability challenges. In contrast, a conservative (or homogeneous) TMT is more likely to stick to traditional, less innovative practices that are inherently risky, because prioritizing environmental sustainability requires resource commitments that can potentially limit short-term financial performance (Alexiev et al., 2010) and reduce profitability (Lu et al., 2023; Xie et al., 2022).

While the literature on family businesses that is grounded in upper echelons theory has largely focused on how TMT characteristics influence various positive outcomes, there is a noticeable gap in exploring how diversity among the upper echelons enables family firms to simultaneously pursue the seemingly conflicting goals of enhancing financial and environmental performance. Specifically, the theory has yet to fully explain how heterogeneity within executive teams drives hybrid financial–environmetal performance through sustainable-innovation practices and how both family involvement in the TMT and participative decision-making further shape this relationship. Our research aims to address this theoretical gap in the current literature.

TMT heterogeneity and adoption of sustainable-innovation practices

Expanding on upper echelons theory, heterogeneous TMTs contribute a broader array of perspectives to decision-making (Narayan et al., 2021, White & Borgholthaus, 2022). Diversity in backgrounds, experiences, and viewpoints enriches the team's collective knowledge and capabilities (Lee et al., 2017; Schubert & Tavassoli, 2020), enabling them to address challenges from multiple angles and identify innovative solutions (Schubert & Tavassoli, 2020) that align with the sustainability challenges. At the micro-level, for example, a TMT member with environmental science expertise may identify sustainable technologies, while a financially savvy colleague can design cost-effective implementation strategies. A marketing expert may contribute customer insights that shape sustainable product features. This cognitive diversity fosters creative problem-solving and supports the exploration of

unconventional approaches (Narayan et al., 2021) that lead to innovative approaches that integrate sustainability into core business functions.

Moreover, heterogeneous TMTs are known for their effective communication with various professional communities (K. He et al., 2021) and draw on a broad range of stakeholder inputs to inform innovation (Arteaga & Escribá-Esteve, 2021; Chirico et al., 2011). This leveraging is especially relevant for the TMTs of family firms, as they tend to have a strong commitment to the firm's values and make decisions with a forward-looking approach (Gentry et al., 2016; Gottschalck et al., 2023). The family members of a family-firm TMT naturally prioritize intergenerational continuity and legacy preservation (Erdogan et al., 2020; Gomez-Mejia et al., 2011), while the non–family members of the family-firm TMT develop strong organizational identification (Mahto et al., 2019) and internalize the firm's values and strategic orientation (Calabrò et al., 2021). Together, these dynamics create a fertile context for supporting innovations aimed at long-term success even when such innovations require significant business-model shifts or upfront investment (Soluk et al., 2021). This alignment makes family firms with diverse TMTs especially open to adopting sustainable-innovation practices.

In contrast, homogeneous TMTs may suffer from limited perspectives (Calabrò et al., 2021) and are more prone to bounded rationality (Hambrick et al., 1996), which can reinforce the status quo. Heterogeneous TMTs help overcome such inertia by challenging conventional thinking and promoting sustainability-focused innovation. As a result, they contribute to building a more forward-looking, environmentally conscious organizational culture that facilitates long-term sustainable innovation. In summary, while previous studies suggest that TMT heterogeneity enhances decision-making (Carr et al., 2021), innovation (Narayan et al., 2021), and firm performance (Chirico et al., 2011), no studies have thoroughly examined how TMT heterogeneity influences a family firm's strategic orientation toward sustainable innovation. Building on upper echelons theory, we propose that a heterogeneous TMT will support family firms in transitioning toward sustainable-innovation processes, resources, and technologies. Therefore, we suggest the following hypothesis (H1):

H1: *TMT heterogeneity increases the adoption of sustainable-innovation practices in family firms.*

Mediating role of sustainable-innovation practices

Building on upper echelons theory, we argue that sustainable-innovation practices offer a strategic avenue for family firm TMTs to leverage their diverse expertise in ways that enhance both financial and environmental

performance. According to the theory, top executives' values and perspectives significantly influence strategic decisions, including those tied to efficiency and profitability (Vesal et al., 2022). In family firms, TMTs often emphasize long-term continuity (Chirico et al., 2011), which encourages sound financial planning and investment in growth. As the number of environmentally conscious consumers rises (Adrita & Mohiuddin, 2020), TMTs with diverse backgrounds are well equipped to recognize and seize such opportunities. Additionally, their prioritization of socioemotional wealth and emotional attachment to the firm (Gomez-Mejia et al., 2011; Salvato & Melin, 2008) fosters a strong commitment to environmental values. This combination enables family-firm TMTs to adopt sustainable-innovation practices that attract eco-conscious consumers, expand market share, and boost sales and profits.

Moreover, as sustainable-innovation practices enable firms to position themselves as sustainability leaders (Blenkhorn & MacKenzie, 2017; Olsen et al., 2014), family firms with greater TMT heterogeneity can cultivate a market reputation for sustainability and social responsibility by introducing innovative products and services. This is especially true for family TMT members who are strongly committed to the firm's values and are more inclined to champion environmental initiatives as a form of competitive differentiation. This commitment creates a positive brand image and boosts customer loyalty (Vesal et al., 2021). The resulting improved reputation attracts more customers, strengthens the firm's market position, and leads to higher financial performance.

In addition to financial gains, sustainable innovation also contributes to environmental performance. Such practices help reduce emissions, conserve energy, and promote waste recycling (Huang & Li, 2017). When heterogeneous TMTs integrate these practices into a firm's operations and production systems, they not only improve resource efficiency but also reduce environmental impact. This often results in greener products that help lower air pollution and wastewater discharge (Zhu & Sarkis, 2004; Zhu et al., 2012). In sum, we propose that heterogeneous TMTs in family firms, by adopting sustainable-innovation practices and implementing resource-efficient processes, can effectively reduce environmental impact while maintaining product functionality and profitability. Therefore, we suggest that Hypothesis 2 (H2) may be true:

H2: *Sustainable-innovation practices mediate the relationship between TMT heterogeneity and hybrid financial–environmetal performance.*

Moderated mediation: family involvement in TMT

Drawing on upper echelons theory, which suggests that executives' characteristics shape strategic outcomes (Hambrick & Mason, 1984; Lee et al., 2017), we argue that family involvement in the TMT moderates the indirect effect of TMT heterogeneity on hybrid financial–environmetal performance through sustainable-innovation practices. A defining feature of family executives is their substantial discretionary power, derived from ownership rights and legitimate authority to direct and shape firm strategy (Skorodziyevskiy et al., 2023). This discretion allows them to filter, interpret, and selectively act upon the diverse inputs and ideas generated by a heterogeneous TMT, particularly in complex decision-making domains such as sustainable innovation. In such situations, family executives can rely on intuition and tacit judgment—especially in an uncertain context—granting them the flexibility to navigate ambiguity and support unconventional strategies (Carr et al., 2021; Penney & Combs, 2013; Stewart & Hitt, 2012). As a result, family involvement amplifies the capacity of heterogeneous TMTs to experiment with, adapt to, and implement sustainability-oriented initiatives that balance strategic risk with long-term opportunity.

This effect is further reinforced by the long-term orientation commonly observed among family executives who are motivated not only by financial returns but also by the preservation of legacy, continuity, and reputation (Erdogan et al., 2020; Gomez-Mejia et al., 2011). Sustainable-innovation practices, by their nature, often require significant upfront investment and extended time horizons before yielding visible outcomes (Schaltegger & Burritt, 2018). In TMTs with high family involvement, the long-term strategic outlook aligns with the logic of sustainable innovation, facilitating the conversion of diverse viewpoints into strategic initiatives that address both environmental responsibilities and financial objectives.

Moreover, family-involved TMTs are more likely to demonstrate heightened stakeholder orientation, as family members' identification with the firm increases their sensitivity to broader social and environmental expectations (Hoffmann et al., 2016; Marques et al., 2014). This heightened stakeholder focus amplifies the potential for the heterogeneous TMT to develop sustainable innovations that simultaneously address environmental concerns and market demands. Family executives are also often deeply committed to preserving the firm's core values and traditions (Chirico, 2008; González-Cruz & Cruz-Ros, 2016), which allows them to integrate diverse ideas into innovation strategies that remain aligned with the firm's established identity. Such alignment enables more-effective orchestration of sustainable-innovation initiatives, which ensures that these innovations serve both immediate market

needs and enduring environmental objectives. Therefore, we suggest that the following may be true (Hypothesis 3 [H3]):

H3: *The indirect effect of TMT heterogeneity on hybrid financial–environmetal performance through the adoption of sustainable-innovation practices is moderated by family involvement in TMT, such that the effect is stronger when family involvement in TMT is higher.*

Moderated mediation: participative decision-making

We further propose that the mediating effect of sustainable-innovation practices in the relationship between TMT heterogeneity and hybrid financial–environmetal performance in family firms is moderated by participative decision-making. According to upper echelons theory, strategic decisions made through participative mechanisms are less constrained by bounded rationality and more likely to reflect comprehensive, multidimensional thinking (Hambrick et al., 1996). Participative decision-making, as a key governance mechanism (Arteaga & Escribá-Esteve, 2021), plays a particularly important role in family firms, wherein flexible control systems and informal communication are common (Eddleston et al., 2008; Liew & Loo, 2024). The relaxed structures and minimal bureaucracy in these firms naturally support participative approaches (Su et al., 2022), enabling employees to contribute meaningfully to strategic decisions. This involvement fosters a culture of continuous improvement (Zaefarian et al., 2023) and allows employees who are closely connected to day-to-day operations to offer valuable insights into the firm's practices (Todaro et al., 2022) that enhance the practical relevance and economic viability of sustainable-innovation practices. Such input not only improves the alignment of sustainability initiatives with financial objectives but also strengthens their capacity to deliver hybrid performance outcomes. Open communication within participative structures facilitates the integration of diverse perspectives across organizational levels (Liew & Loo, 2024; Zareeimatin et al., 2014), resulting in innovation solutions that more effectively contribute to both environmental and financial performance.

Research further shows that collaborative decision-making fosters a sense of ownership among employees (Eddleston et al., 2008; Zaefarian et al., 2023). The family-business literature suggests that employee participation in daily decisions enhances their commitment to implementing those decisions (Kidwell et al., 2020; Zaefarian et al., 2023). When subordinates feel that their voices are valued by the TMT, they are more likely to support and champion such decisions (Todaro et al., 2022). Accordingly, by improving organizational receptiveness and readiness for change, participative decision-making increases the likelihood that sustainable innovations will be effectively

adopted and translated into tangible performance outcomes. These outcomes include reduced environmental impact, enhanced cost efficiency, improved brand reputation, and stronger customer engagement, all of which collectively enhance hybrid financial–environmetal performance.

Finally, participative decision-making enables firms to harness the diverse perspectives of employees from various functional areas, amplifying the ability of heterogeneous TMTs to pursue sustainable innovations that are both strategically sound and performance enhancing. The open dialogue and collaboration typical of family firms (Chirico et al., 2011; Zaefarian et al., 2023), when combined with broad employee engagement in the design and implementation of sustainable practices, support the development of products that simultaneously address environmental challenges and meet the expectations of environmentally conscious consumers. Moreover, the collaborative and inclusive nature of these processes fosters innovations that are embedded, difficult to imitate (Alam et al., 2022), and capable of delivering sustained competitive advantage. These uniquely configured practices cocreated by a diverse TMT and an engaged workforce enhance product differentiation, organizational adaptability, and long-term cost savings, ultimately driving superior hybrid financial–environmetal performance. Therefore, we state our fourth hypothesis (H4)

H4: *The indirect effect of TMT heterogeneity on hybrid financial–environmetal performance through the adoption of sustainable-innovation practices is moderated by participative decision-making, such that the effect is stronger when participative decision-making is higher.*

Methodology

Sample and data

To examine the hypotheses, we gathered data from two distinct sources through separate surveys: one administered to CEOs (or owners) of family firms and another to senior production managers of family firms. This research-design choice aligns with established research practices (Chirico et al., 2011; O'Cass & Sok, 2015) and was particularly advantageous because individuals in specific positions were better equipped to provide accurate responses that were relevant to certain variables rather than all the variables within our research model. Our sample consisted of Australian family-owned businesses in the manufacturing sector drawn from the Family Business Australia database. According to the Constitution of Family Business Australia (Family Business Australia, 2020), a family business is defined as one in which related family members control the strategic direction of the

business through ownership, governance, and management and can sustain it across generations, which aligns with well-established definitions in the literature (Baù et al., 2021; Chirico & Baù, 2014). Therefore, all businesses registered in this database meet these criteria. We focused on the manufacturing sector because of their intensive use of natural resources and observed environmental impact (Vesal et al., 2022).

Initially, we contacted 285 CEOs via an e-mail that included a cover letter that outlined the study's purpose. In the e-mail invitation, we requested the CEO's approval for their firm's participation and asked them to provide contact information for their senior production managers. To encourage CEOs to participate in the survey, we guaranteed they would receive a summary of the research findings. Ultimately, 168 CEOs agreed to participate and provided their senior production managers' names and e-mail addresses. We conducted two separate surveys, one for CEOs (or owners) and another for senior production managers. Each survey included two attention-check questions to identify inattentive responses (for example, "please select strongly agree here"). Additionally, the CEO survey featured two screening questions to ensure that the participating firms met the definition of a family firm—that is met the following criteria: (1) the majority of equity is owned by a family rather than other shareholders and (2) at least one family member serves on the board of directors.

We used phone calls to follow up and motivate participants to finish and return the surveys. Surveys were excluded from consideration if the respondents failed to answer at least one of the attention-check questions correctly or if the firm did not meet both screening criteria. Following O'Cass et al. (2014), to assess the quality of responses, we asked respondents about their knowledge of the business processes in their firm and their confidence in completing the survey. Surveys with responses rated below four on a 5-point scale were discarded. The remaining CEO and senior production manager data were matched using a common identification code on both surveys. After addressing nonresponses and missing data, the final sample comprised 117 matched CEO–senior production manager surveys that represented 117 family firms. These firms had an average of 76 employees and an average age of 29 years. We conducted comparisons between respondent firms and nonrespondent firms (the data for which were obtained from the ZoomInfo professional database) regarding size, age, and industry type and found no significant differences. In addition, there were no significant differences between early and late respondents.

To mitigate the potential common method bias, we implemented several recommended strategies (Chirico & Nordqvist, 2010; Podsakoff et al., 2003). First, to reduce single-source bias and strengthen the robustness of

our theory testing, we developed two separate surveys to collect data for different variables in the model. Second, to enhance anonymity and reduce the likelihood of social-desirability bias, participants were assured that their responses would remain strictly confidential. Third, we conducted Harman's one-factor test on the items included in the regression model, which revealed that no single factor explained a dominant share of the variance. Finally, we emphasized to participants that there were no right or wrong answers, which helped to alleviate any information apprehension.

Variables and measures

In developing both surveys, we adhered to standard scale-development procedures that involved conducting a thorough literature review and seeking input from academics and practitioners in the field. Existing scales were modified as needed to ensure their relevance to the study context. The resulting surveys underwent a pretest phase and were refined accordingly. A complete list of construct items and the corresponding respondents can be found in Table 1. We utilized 5-point Likert scales to measure all the items.

The CEO survey included four items adapted from Su et al. (2022) that measured participative decision-making. CEOs also responded to four items adopted from Van Doorn et al. (2013) that measured TMT heterogeneity and four items adopted from Naldi et al. (2007) that measured financial performance: profit, sales growth, cash flow, and growth of net worth. While the validity of perceptual measures of performance has been criticized, we opted for this approach because many family firms were reluctant to share objective financial data due to confidentiality concerns (see Liu et al., 2016). Moreover, several studies have demonstrated a strong correlation between perceptual and objective measures, which supports the reliability of our chosen method (Atuahene-Gima & Ko, 2001). Additionally, we asked CEOs to report the number of family and nonfamily members in their TMT. To calculate the degree of family involvement in the TMT, following Chirico and Baù (2014) and Matzler et al. (2015), we divided the number of family executives by the total number of TMT executives. The senior production managers were given eight items in their survey adapted from Aftab et al. (2022) that measured sustainable-innovation practices and six items taken from Zhu et al. (2010) that measured environmental performance.

Hybrid financial–environmetal performance captures the degree of balance between financial performance and environmental performance, where both components simultaneously operate at a higher level. This concept avoids a singular focus on financial performance, which can lead to short-term gains at the expense of environmental degradation, or prioritizing environmental performance alone, which might neglect economic viability (Xie et al.,

Table 1. Reliability results and factor loading.

Constructs and items	Loading
CEOs/Owners survey	
Participative decision-making (α = .85; AVE = .62). Adopted from Su et al. (2022)	
In considering involving subordinates in the decision-making process, our TMT …	
… actively encourages and values the participation of subordinates in decision-making	.70
… proactively seeks input, comments, and suggestions from subordinates before making decisions	.82
… demonstrates a genuine commitment to considering and incorporating comments and suggestions from subordinates when making decisions	.79
…consistently involves subordinates in the decision-making process, ensuring their perspectives are represented	.84
TMT heterogeneity (α = .84; AVE = .58). Adopted from Van Doorn et al. (2013)	
The members of my TMT …	
… possess diverse areas of expertise	.73
… come from varied backgrounds	.77
… have complementary skills and abilities	.75
… exhibit professional experience diversity	.80
Financial performance (α=.84; AVE = .60). Adopted from Naldi et al. (2007)	
Over the three years, compared to your competitors our …	
… net profit has been …	.78
… sales growth has been …	.81
… cash flow has been …	.71
… growth of net worth has been …	.79
Competition intensity (α=.85; AVE = .61). Adopted from Jansen et al. (2006)	
Over the last three years, …	
… we faced intense competition in our market	.78
… our firm encountered strong competitors	.75
… the level of competition in our market was exceptionally high	.83
… price competition was a prevalent characteristic of our market	.77
Technological turbulence (α=.87; AVE = .69). Adopted from Troilo et al. (2014)	
Over the last three years, in our industry …	
… forecasting technology development was challenging	.85
… the technology environment was characterized by high uncertainty	.76
… technology developments were highly unpredictable	.88
Senior production managers survey	
Sustainable-innovation practices (α=.90; AVE = .56). Adopted from Aftab et al. (2022)	
The following items capture the extent to which the organization incorporates sustainability principles into its innovation practices. My firm …	
… focuses on producing products that generate the least pollution	.80
… strives to develop products that consume less energy and resources	.78
… aims to design products that are environmentally friendly	.71
… prioritizes the use of materials that are easy to recycle, reuse, and decompose	.75
… takes measures to minimize hazardous substances or waste in our processes	.70
… actively seeks ways to reduce the consumption of coal, oil, electricity, or water in our operations	.74
… promotes the efficient use of raw materials in our production processes	.79
… focuses on producing products that generate the least pollution	.71
Environmental performanc*e* (α=.88; AVE = .59). Adopted from Zhu et al. (2010)	
Over the last three years, our firm has …	
… reduced its air emissions	.79
… reduced its wastewater	.72
… reduced its solid waste	.74
… decreased its consumption for hazardous/harmful/toxic materials	.78
… decreased its frequency of environmental accidents	.80
… improved its environmental situation	.78

α = Cronbach's alpha; AVE = average variance extracted.
Each of the measures was rated on a scale whereby 1 = *strongly disagree* and 5 = *strongly agree*; except financial performance was measured via − 2 = much worse and + 2= much better.

2022). To operationalize hybrid financial–environmetal performance as a singular construct that ensures family firms' business strategies are both economically and ecologically sound, we followed the approach proposed by Gligor et al. (2021) and employed the degree-symmetry value (DSV)—that is,

hybrid financial–environmetal performance = (DV + SV)/2, where DV is the degree value and SV is the symmetry value, both ranging from 0 to 1. The degree value is the average of the financial performance (FP) and environmental performance (EP) scores, calculated as (FP + EP)/2, while the symmetry value is a ratio index defined as SV = EP/FP if FP ≥ EP, or SV = FP/EP if FP < EP. Unlike previous research that employed the absolute difference approach (Z.-L. He & Wong, 2004) or the relative dimension approach (Wei et al., 2014) to calculate the balance dimension of the two components, our approach using DSV considered both the magnitude and the balance between financial performance and environmental performance, which aligns with our conceptualization of hybrid financial–environmetal performance. The DSV ranges from 0 to 1, with lower values indicating imbalance or lower levels of balance between financial and environmental performance and higher values indicating higher levels of balance between the two.

To consider the impact of contextual factors on our dependent variables (that is, sustainable-innovation practices and hybrid financial–environmetal performance), we incorporated a set of control variables that were collected through the CEO (or owner) surveys. At the firm level, we controlled for firm size (measured as the natural logarithm of the number of full-time employees) and firm age (measured as the natural logarithm of the number of years since establishment) because these factors can influence family firms' capabilities and performance (Chirico & Baù, 2014). Furthermore, we considered research and development (R&D) investment (measured as the natural logarithm of R&D expenses) as an additional control variable, given its potential impact on firms' innovation activities (Wang & Li, 2023). At the individual level, we included controls for age (log-transformed in years), organizational tenure (log-transformed in years), gender (dummy variable: 1 = male, 0 = female and nonbinary/other), and education measured on a 4-point scale that reflected the highest degree attained (1 = high school, 2 = bachelor's, 3 = master's, 4 = PhD). At the industry level, we accounted for competition intensity using a four-item scale adapted from Jansen et al. (2006), and technological turbulence was controlled using a three-item scale adapted from Troilo et al. (2014).

Results

Descriptive statistics

We conducted an exploratory factor analysis to calculate the reliability and validity of the scales. The results are presented in Table 1. They indicate that the Cronbach's alpha coefficients for all constructs exceeded the threshold of 0.7 (Nunnally, 1978), which indicates satisfactory reliability. Additionally, the average variance extracted (AVE) for each construct surpassed the minimum requirement of 0.5 (Bagozzi & Yi, 1988), which confirms adequate convergent

Table 2. Mean, standard deviation, and correlations.

Variables	α	*M*	*SD*	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
1. Hybrid financial–environmetal performance	–	.69	.08	–														
2. Financial performance	.84	3.62	.80	.39**	**.78**													
3. Environmental performance	.88	3.93	.51	.36**	− .09	**.77**												
4. Sustainable-innovation practices	.90	3.30	.67	.32**	.15*	.30**	**.75**											
5. TMT heterogeneity	.84	4.05	.69	.27**	.09	.16*	.23**	**.76**										
6. Participative decision-making	.85	3.94	.50	.18*	.08	.15*	.21**	.12	**.79**									
7. Family involvement in TMT	–	.41	.27	.09	.07	.16*	.15*	.10	.02	–								
8. Competition intensity	.85	4.06	.54	.02	− .07	.06	.05	− .01	.03	.03	**.78**							
9. Technological turbulence	.87	3.93	.48	.04	.03	.07	.04	.01	.06	− .04	.08	**.83**						
10. Firm size	–	1.88	1.80	.08	.14*	.03	.07	− .04	.01	− .07	.02	.04	–					
11. Firm age	–	1.46	1.31	.06	.08	.04	.17*	.05	.01	.05	− .01	.03	.15*	–				
12. R&D investment	–	4.60	2.50	.03	.09	.05	.10	.03	.01	.04	− .04	.06	.08	.07	–			
13. CEO's age	–	1.65	.70	.10	.05	.11	.05	.04	− .09	.01	.07	.09	− .05	.08	− .02	–		
14. CEO's organizational tenure	–	.96	.47	.07	.09	.09	.06	.10	− .15*	− .03	.03	.10	.03	.04	.04	.39**	–	
15. CEO's gender	–	–	–	− .04	.04	.12	.06	.02	.03	− .06	− .04	− .07	− .01	.06	.08	.08	.02	–
16. CEO's education	–	–	–	.11	− .02	.08	.00	.03	.12	.09	.06	.10	.02	.16*	.04	.07	.27**	.10

The diagonal of the table displays the square root of the average variance extracted (AVE); *M* = mean; *SD* = standard deviation. *$p < .05$. **$p < .01$, two-tailed significance levels

Table 3. Test of main and mediation effects.

		Mediator model	
		Sustainable-innovation practices	
Direct effects		*b*	SE
TMT heterogeneity	H1	0.620***	0.140
		Dependent variable model	
		Hybrid financial–environmetal performance	
		b	SE
TMT heterogeneity		0.034	0.017
Sustainable-innovation practices		0.029**	0.010
Bootstrapping analysis		Effect (*SE*)	CI
Direct effect		0.034 (.017)	(– .001, .068)
Indirect effect	H2	0.018 (.008)	(.006, .037)

N = 117. Bootstrap sample size = 5,000.
CI = 95 percent confidence interval.
SE = Standard error.
Bootstrapped estimates for the standard error are shown.
***$p < .001$, **$p < .01$.

validity. Furthermore, all items showed factor loadings greater than the benchmark of 0.50, which provided evidence of convergent validity.

Discriminant validity was evaluated using two methods. First, we compared the square root of AVE values to the correlations between the constructs (Fornell & Larcker, 1981). As depicted in Table 2, the square root of the AVE values (diagonal elements) consistently exceeded the corresponding correlations (off-diagonal elements), which supports discriminant validity. Second, following the approach of Ngo and O'Cass (2012), we compared individual correlation scores to their respective reliability scores. The results shown in Table 2 indicate that none of the individual correlations exceeded their respective reliabilities, which confirms satisfactory discriminant validity. Table 2 also displays the mean, standard deviation and square root of AVEs for each construct. Overall, the findings demonstrate that the measures employed in the study exhibited acceptable reliability and validity.

Regression analysis

Test of direct and indirect effects

Because the hypotheses included mediation and moderated mediation, we tested the hypotheses using Hayes's PROCESS Macro v4.2–Model 4 with 5,000 bootstrap samples (Hayes, 2018). For the analysis, TMT heterogeneity was the independent variable, sustainable-innovation practices was the mediating variable, and hybrid financial–environmetal performance was the dependent variable. H1 proposed that TMT

heterogeneity is positively associated with sustainable-innovation practices. To evaluate this hypothesis, we analyzed the mediator variable model using PROCESS output, which explored the connection between the independent variable and the mediator variable. The results in Table 3 show a positive effect of TMT heterogeneity on sustainable innovation practices ($b = 0.620$; $p < 0.001$), which supports H1. Importantly, the analysis revealed significant indirect effects of TMT heterogeneity on hybrid financial–environmetal performance via sustainable-innovation practices ($b_{indirect} = 0.018$, 95 percent *CI* [0.006, 0.036]) and thereby supported H2.

The moderating effects of family involvement in TMT and participative decision-making

To test the moderated mediation hypotheses (H3 and H4), we mean centered all variables and applied Hayes's PROCESS Macro (Model 7, with 5,000 bootstrap samples), following the methodological approach used in comparable studies (e.g., Casidy et al., 2022; Mehmood et al., 2024). In the analysis, TMT heterogeneity was the independent variable, sustainable-innovation practices was the mediator, hybrid financial–environmetal performance was the dependent variable, and family involvement in TMT and participative decision-making were the moderators, respectively.

Table 4. Results for the moderated-mediation analysis.

	Mediator model	
	Sustainable-innovation practices	
Direct effects	*b*	*SE*
Family involvement in TMT	0.120	0.075
Participative decision-making	0.172*	0.084
TMT heterogeneity × family involvement in TMT	0.304*	0.151
TMT heterogeneity × participative decision-making	0.817*	0.367
	Dependent-variable model	
	Hybrid financial–environmetal performance	
Mediator: sustainable-innovation practices	Effect (*SE*)	CI
H3:		
− 1 *SD* family involvement in TMT	0.003 (.005)	(− .007, .013)
Mean family involvement in TMT	0.011 (.004)	(.003, .019)
+ 1 *SD* family involvement in TMT	0.027 (.009)	(.006, .041)
Index of moderated mediation	0.009 (.003)	(.003, .015)
H4:		
− 1 *SD* participative decision-making	0.006 (.008)	(− .005, .027)
Mean participative decision-making	0.018 (.008)	(.005, .037)
+ 1 *SD* participative decision-making	0.031 (.013)	(.010, .060)
Index of moderated mediation	0.026 (.014)	(.002, .057)

N = 117. Bootstrap sample size = 5,000.
CI = 95 percent confidence interval.
SE = Standard error.
Bootstrapped estimates for the standard error are shown.
*$p < .05$.

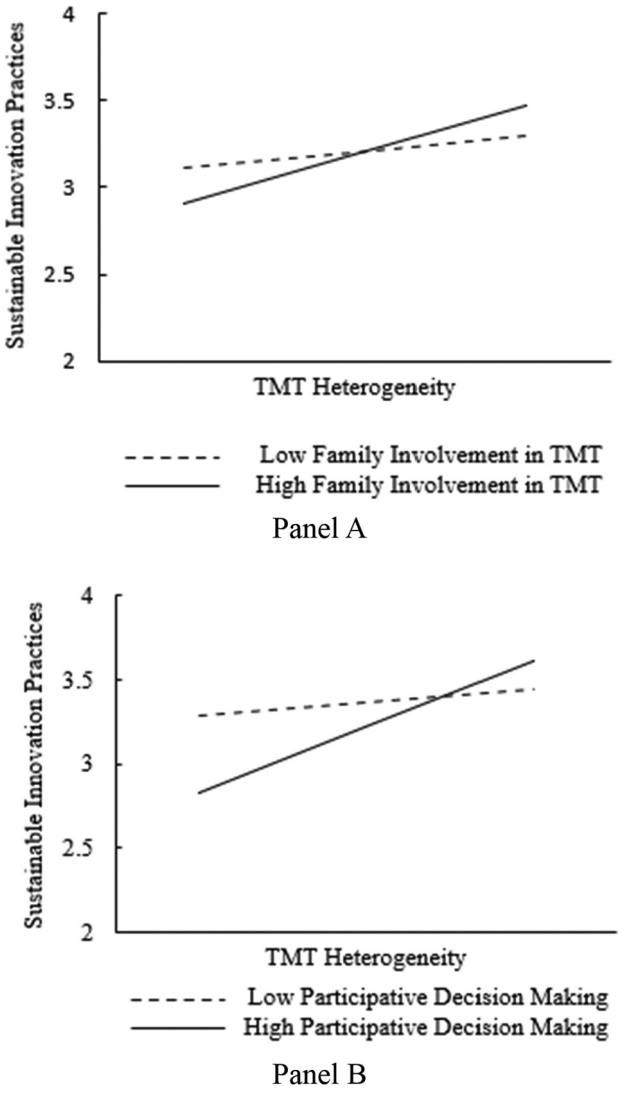


Figure 2. Plots illustrating the moderating effects on sustainable-innovation practices.

H3 proposed that family involvement in the TMT moderates the indirect relationship between TMT heterogeneity and hybrid financial–environmetal performance via sustainable-innovation practices. To test this first-stage moderated mediation model, we examined the interaction effect between TMT heterogeneity and family involvement in TMT. The analysis revealed that the interaction term (i.e., the product of TMT heterogeneity and family involvement in TMT) was statistically significant ($b_{interaction} = 0.304$, $p < 0.05$, $\Delta R^2 = 0.027$; see Table 4). Spotlight analysis indicated that TMT heterogeneity had no significant effect on sustainable-innovation practices when family involvement in TMT was low (1 *SD* below the mean; $b = 0.131$, $p = .192$) but was significant when family

involvement in TMT was high (1 *SD* above the mean; $b = 0.490$, $p < .05$; see Figure 2, Panel A).

We examined the conditional indirect effect at different levels of family involvement in TMT. The indirect effect was not significant at low levels of family involvement in TMT (−1 *SD*) [indirect effect = 0.003, 95 percent *CI* (− 0.007, 0.013)] but became significant at high levels (+1 *SD*) [indirect effect = 0.027, 95 percent *CI* (0.006, 0.041), see Table 4]. Furthermore, Hayes's PROCESS offers a more conclusive test of moderated mediation, known as the index of moderated mediation (IOMM; Hayes, 2015), which is considered significant when the bootstrap confidence interval for the IOMM excludes zero. In our analyses, the IOMM was significant [*Index* = 0.009, *SE* = 0.003, 95 percent *CI* (0.003, 0.015)] and thereby supported H3.

H4 posited that the indirect effect of TMT heterogeneity on hybrid financial–environmetal performance through sustainable-innovation practices is contingent on the level of participative decision-making. The analysis revealed a statistically significant interaction between TMT heterogeneity and participative decision-making ($b_{interaction} = 0.817$, $p < 0.05$, $\Delta R^2 = 0.034$; see Table 4). A spotlight analysis revealed that the effect of TMT heterogeneity did not significantly influence sustainable-innovation practices when participative decision-making was low (1 *SD* below the mean; $b = 0.192$, $p = .424$). However, this effect was significant when participative decision-making was high (1 *SD* above the mean; $b = 0.929$, $p < .01$; see Figure 2, Panel B). Consistent with our theorized mechanism, the indirect effect of TMT heterogeneity on hybrid financial–environmetal performance via sustainable-innovation practices was not significant at low levels of participative decision-making (−1 *SD*) [indirect effect = 0.006, 95 percent *CI* (− 0.005, 0.027)]. In contrast, the effect was significant at high levels of participative decision-making (+1 *SD*) [indirect effect = 0.031, 95 percent *CI* (0.010, 0.060); see Table 4]. Moreover, the index of moderated mediation was statistically significant [*Index* = 0.026, *SE* = 0.014, 95 percent *CI* (0.002, 0.057)], providing support for H4.

We also performed analyses while including control variables. The results were largely consistent with those reported here and provided support for all four hypotheses. However, as none of the control variables emerged as significant predictors, in line with best practices for the use of control variables (Bernerth & Aguinis, 2016), we decided to exclude them from our final analyses.

Robustness checks

We conducted several checks and analyses to ensure the robustness of our findings. First, we addressed potential endogeneity concerns between hybrid financial–environmetal performance and sustainable-innovation practices. It was plausible that higher financial performance could provide the necessary resources and incentives for investments in R&D, including sustainability-

oriented innovations. Similarly, commitment to environmental performance might lead to the adoption of innovative processes, technologies, and products in family firms that incorporate environmental concerns. We utilized a two-stage least squares regression with instrumental variables to address this concern. R&D investments, managerial discretion, and external collaboration were chosen as potential instrumental variables[1] because they met the relevance and exclusion conditions reported in the literature (see Liao & Zhang, 2020; Parrilli et al., 2023). In the first stage, we conducted a regression of sustainable-innovation practices on the assumed exogenous variables to derive the predicted value. This predicted value was then incorporated as an independent variable into the second stage of our study. The *F*-statistic from the first stage and the under- and overidentification and weak instruments tests supported the appropriateness of the instrumental variables and confirmed the robustness of the first-stage regressions. The results of the second stage revealed a positive and significant relationship between the predicted value of sustainable-innovation practices and hybrid financial–environmetal performance. Additionally, we employed the Durbin–Wu–Hausman postestimation test for endogeneity, which indicated that sustainable-innovation practices were exogenous.

Second, as the financial and environmental performance data were derived from two distinct sources (CEOs or owners for financial performance and senior production managers for environmental performance), we conducted a post hoc analysis to test the model separately for each outcome. This approach ensured that the findings were not influenced by potential biases that stemmed from the data-collection source. As presented in Table 5, sustainable-innovation practices significantly mediated the relationship between TMT heterogeneity and both financial and environmental performance individually. These results confirm that the mediating role of sustainable-innovation practices holds true for each dimension independently, which strengthens confidence that the observed relationships were not merely artifacts of combining the two variables into a composite measure.

Third, we included different industries within the manufacturing setting (clothing and footwear, food and beverage, chemicals, electrical, metal products, wood products, machinery and equipment, and others) as additional control variables. In this way, we were able to determine whether the outcomes for major industries in the sample differed from one another or from the "other" group. The main findings of our analysis remained largely consistent, with minimal changes in effect sizes and significance levels. Furthermore, we

[1]In the CEO survey, we assessed managerial discretion using a four-item scale adapted from Liao and Zhang (2020). Some sample items were "The firm's TMT has access to abundant resources that can be utilized" and "The firm's TMT enjoys considerable decision-making autonomy." Moreover, external collaboration was assessed by inquiring about the family firm's involvement with suppliers, customers, competitors, and consultants. If any of these activities or types of cooperation were present, the variable was assigned a value of 1; otherwise, it was set to 0.

Table 5. Results of post hoc analysis.

	Mediator model			
	Sustainable-innovation practices			
Direct effects	*b*		*SE*	
TMT heterogeneity	0.620***		0.140	
	Dependent variable model			
	Financial performance		Environmental performance	
	b	*SE*	*b*	*SE*
TMT heterogeneity	0.068	0.098	0.364**	0.112
Sustainable-innovation practices	0.140*	0.061	0.171**	0.067
Bootstrapping analysis	Effect (*SE*)	CI	Effect (*SE*)	CI
Direct effect	0.068 (.098)	(−.025, .362)	0. 364 (.112)	(.142, .584)
Indirect effect	0.087 (.032)	(.014, .077)	0.106 (.051)	(.019, .222)

N = 117. Bootstrap sample size = 5,000.
CI = 95 percent confidence interval.
SE = Standard error.
Bootstrapped estimates for the standard error are shown.
***$p < .001$, **$p < .01$, *$p < .05$.

observed no significant industry-specific effects on our findings at $p < .05$. These additional checks and analyses reinforced the robustness and validity of our findings.

Discussion

Balancing financial and environmental performance poses a distinct challenge for family-firm TMTs, as investments in environmental initiatives are often perceived to come at the expense of profit margins (Lu et al., 2023; Xie et al., 2022). Drawing on upper echelons theory and insights from both family-firm CEOs and senior production managers, our study demonstrates that TMT heterogeneity can empower family firms to pursue environmental and financial goals in tandem through the implementation of sustainable-innovation practices. Furthermore, the findings highlight the critical role of two governance mechanisms—family involvement in the TMT and participative decision-making—in strengthening the effectiveness of TMTs in executing these practices. Together, these mechanisms enhance the firm's ability to achieve hybrid financial–environmetal performance. These insights offer valuable theoretical contributions and practical implications for managing sustainability in family-business contexts.

Theoretical implications

First, while prior research grounded in upper echelons theory has primarily emphasized how individual executive characteristics influence strategic decisions and outcomes in family firms (Chandler et al., 2023; Skorodziyevskiy

et al., 2023), our study offers a novel team-level perspective. Specifically, we shift the focus to TMT heterogeneity, theorizing that diversity within the executive team expands the firm's collective knowledge base and shapes more future-oriented corporate values, which, in turn, promotes strategic orientations that favor investment in sustainable innovation. The presence of diverse experiences, expertise, and viewpoints equips family firms with the cognitive resources required to engage with the complexity of sustainability challenges. Our research contributes to the growing body of family-business literature that advocates for greater diversity within upper-echelon teams (Su et al., 2022; Van Doorn et al., 2013), while also extending upper echelons theory into the domain of sustainability-related innovation.

Second, while the existing literature highlights the value of TMT diversity in fostering improved decision-making (Carr et al., 2021), enhanced innovation (Narayan et al., 2021, Penney & Combs, 2013), and superior firm performance (Chirico et al., 2011), our study extends this line of inquiry by illustrating that heterogeneous top management teams can also reconcile competing strategic priorities. Specifically, we show how the diverse backgrounds and expertise within TMTs enable family firms to effectively balance environmental and financial objectives through the implementation of sustainable-innovation practices. By highlighting this capability, our findings contribute to the literature on sustainability-oriented innovation, particularly in demonstrating how such efforts can simultaneously strengthen market distinctiveness and enhance firm reputation (Santa-Maria et al., 2022; Vesal et al., 2021).

Third, prior studies have documented both the positive and negative implications of family involvement in TMTs, with the primary focus on its impact on financial-performance outcomes (e.g., Chirico & Baù, 2014; González-Cruz & Cruz-Ros, 2016; Hoffmann et al., 2016). However, less empirical attention has been devoted to innovation outcomes, particularly in the context of sustainable development. Our study addresses this gap by illustrating how the unique discretionary authority held by family members within TMTs can serve as a catalyst for the adoption of sustainable-innovation practices. Although prior work (e.g., Matzler et al., 2015; Wong & Lee, 2023) has examined family involvement in TMTs in relation to R&D investment and managerial capabilities, we extend this research by showing that family-influenced TMTs are more likely to translate team heterogeneity into improved hybrid financial–environmetal outcomes through sustainability-driven innovation. This contribution is particularly valuable as it shifts the conversation beyond traditional innovation and financial metrics to highlight how family TMTs can orchestrate the complex interplay between executive team diversity, sustainability practices, and hybrid performance goals.

Fourth, prior research noted the critical role of engaging subordinates in strategic decision-making processes (Chirico et al., 2011; Liew & Loo, 2024; Villani et al., 2023). However, much of this focus has been on engaging

responsible executives to mitigate relational conflicts "by offering a context that encourages family members to voice their input" (Chirico et al., 2011, p. 312). In contrast, our study broadens this perspective by considering the role of nonexecutive employees in shaping sustainability-oriented outcomes. We demonstrate that involving subordinate employees in strategic decision-making fosters a collaborative and empowering organizational environment—one that encourages the contribution of ideas and expertise to sustainability initiatives. Our theoretical point of departure focuses on how participative strategies cultivate a sense of ownership among employees that motivates them to embrace sustainability practices in their daily operations. This boundary condition aligns with earlier research that views the firm's human capital as a valuable resource in organizational functioning (Eddleston et al., 2012; Kidwell et al., 2020). Our study extends this concept into a new theoretical domain: the intersection of sustainable innovation and hybrid financial–environmetal performance. Through our analysis, we highlight the importance of recognizing employees' expertise, knowledge, and commitment and consider it a key factor in leveraging the benefits of TMT heterogeneity to drive sustainable-innovation practices and hybrid performance.

Managerial implications

Our findings offer a strong reminder to CEOs and owners of family firms about the critical importance of assembling TMTs with diverse backgrounds and experiences. The data indicate that recruiting individuals with varied skills, experiences, and perspectives, whether when forming or restructuring, the TMT can significantly enrich team capabilities, stimulate innovative thinking, and enhance strategic decision-making. In addition, CEOs and owners are encouraged to implement practices such as job rotation and cross-functional projects, which allow TMT members to collaborate across departments and broaden their understanding of the business. These efforts not only strengthen individual competencies but also foster a culture of collaboration, ultimately supporting more innovative and effective decisions. Our findings on the mediating role of sustainable-innovation practices also point to actionable strategies for family firms. Owners should consider adopting eco-design principles to reduce the environmental impact of products across their life cycles. Investing in R&D to explore sustainable materials and technologies that align with environmental goals is likewise essential for long-term success.

The study further highlights the value of involving family members in TMTs, especially those with relevant expertise and diverse skill sets. Their intrinsic understanding of the firm's values and long-term vision can be a strategic asset. Also, to enrich the TMT's capabilities, CEOs should proactively seek out candidates who can bring fresh perspectives and expertise to the team. Finally, our research underscores the importance of participative

decision-making. Family-firm leaders are encouraged to cultivate inclusive environments where employees at all levels are invited to contribute ideas particularly through structured mechanisms like regular feedback sessions focused on sustainability initiatives. Empowering senior managers to actively engage with employees and incorporate their input into decision-making enhances employee ownership and commitment. This inclusive approach not only improves decision quality but also strengthens the firm's ability to achieve hybrid financial–environmetal performance.

Limitations and future research directions

Several avenues for future research emerge from this study. First, in addressing growing environmental concerns, our research focused on how family firms can drive both environmental and financial performance. However, given the evolving nature of customer needs and the importance of explorative innovation for long-term survival, future research could examine how TMT characteristics influence family firms' pursuit of such strategies. Specifically, investigating how TMT diversity affects the evaluation and adoption of novel, disruptive technologies would be valuable. Research indicates that high social cohesiveness and strong interpersonal bonds within teams may hinder critical discussion and reduce openness to alternative ideas (Cuijpers et al., 2011), potentially undermining exploratory innovation. Thus, future studies could explore how factors like TMT tenure and the length of interpersonal relationships shape explorative innovation strategies. Second, in today's rapidly changing business environment, examining how CEO power dynamics and TMT composition affect strategic agility and adaptability would offer important insights into how family firms respond to uncertainty and capitalize on emerging opportunities. Third, existing literature highlights that senior managers' environmental attitudes significantly influence sustainable-innovation strategies. Future research could investigate how TMTs' pro-environmental values facilitate the implementation of sustainability practices and identify boundary conditions that shape such strategies within family firms. Fourth, acknowledging that self-reported data can introduce bias, future studies should consider incorporating objective performance indicators. For example, financial performance could be assessed using actual financial data, while environmental performance might be measured through tangible metrics such as energy use or raw material consumption. Fifth, although our study tested the moderating role of family executives within TMTs, it is important to recognize that an individual's familial status may influence their decision-making. Future research should explicitly identify whether respondents are family members and examine how this role affects the firm's commitment to sustainable innovation and dual performance outcomes. Finally, while this study focused on internal team heterogeneity as

a driver of sustainable innovation, future research should also consider external influences. Investigating the role of regulatory environments, industry trends, and competitive pressures could provide a more holistic understanding of what drives sustainability-oriented innovation and performance in family firms.

Conclusion

In conclusion, this study advances upper echelons theory by demonstrating how diversity among TMTs enables family firms to pursue the dual objectives of financial and environmental performance, which are often perceived as being in conflict. By emphasizing the critical role of heterogeneity within TMTs, we reveal how diverse perspectives and experiences contribute to a rich reservoir of the knowledge and skills that are crucial for driving sustainable-innovation practices, which, in turn, enhance hybrid financial–environmetal performance. Furthermore, our research underscores the importance of both family involvement in the TMT and participative decision-making in amplifying the impact of TMT heterogeneity on sustainable-innovation practices and hybrid financial–environmetal performance. Ultimately, our findings encourage family firms to prioritize the recruitment of diverse senior managers and to implement strategies that promote collaboration, mutual learning, and an inclusive environment where open dialogue and collaborative decision-making are encouraged across all levels of the organization.

Disclosure statement

No potential conflict of interest was reported by the author(s).

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