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What Drives Carbon-Reducing Investments? A Vignette Experiment on Managers' Decision-Making From a Multilevel Perspective

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ABSTRACT

Our study aims to shed light on the factors that drive managers' sustainability-related decision-making. We take a multilevel perspective, analyzing individual-, organizational-, and institutional-level factors, which allows us to present a coherent account of a complex environment of influential factors. Based on an explorative vignette experiment with professional managers in a setting related to carbon-reducing investments, we find that certain individual-level factors, such as managers' biospheric orientation or a strong belief in business ethics, are associated with higher carbon-reducing investments. However, these individual-level factors do not alter the overall influence of organizational- and institutional-level factors. The financial impact of carbon-reducing investments—at the organizational level—as well as the number of carbon-conscious investors and the regulatory disclosure regime in which a firm operates—at the institutional level—significantly drive managers' investment decisions. We find only a few instances in which specific factor combinations are decision-relevant. These findings have important implications for research and policymaking with regard to improving corporate sustainability in general and particularly reducing corporate carbon emissions.

1 | Introduction

The enduring debate between structure and agency (Cardinale 2018; Harmon, Haack, and Roulet 2019)—whether individual managers' actions or broader organizational and institutional constraints shape decision-making—has profound implications for understanding managerial behavior. This dichotomy, central to general management literature, has increasingly entered sustainability management research, where the tension between personal values and systemic pressures becomes especially pronounced (Glavas 2016; Gond et al. 2017). Our study contributes to this discourse, exploring how individual, organizational, and institutional factors collectively influence managers' sustainability-related decisions. By addressing these intertwined levels, we aim to illuminate how carbon-reducing investments, a pressing challenge for corporate leaders, are shaped by both the freedom and the constraints managers navigate.

At the individual level, personal values, beliefs (Glavas 2016; Gond et al. 2017; Lülfs and Hahn 2014), and risk preferences (Hossain, Saadi, and Amin 2023; Slawinski et al. 2017) shape managers' actions, often requiring alignment with broader organizational goals. Organizational factors, such as the

financial viability of sustainability projects (e.g., Griffin, Lont, and Sun 2017; Matsumura, Prakash, and Vera-Muñoz 2014), current sustainability performance (e.g., Trumpp and Guenther 2017; Yang, Zhu, and Albitar 2024), and management tools (e.g., Ott and Endrikat 2022; Yong et al. 2020), can either enable or constrain sustainable investments. Meanwhile, institutional pressures, including investor expectations and regulatory requirements, further shape managerial decisions (e.g., Durand, Hawn, and Ioannou 2019; Mittelbach-Hörmanseder, Hummel, and Rammerstorfer 2021).

Although prior research has provided important insights into these levels individually, less attention has been paid to their simultaneous and interactive effects. A simultaneous investigation would help to identify the relative importance of these factors and how they may interact with one another. Although the need for multilevel research is well acknowledged (Athanasopoulou and Selsky 2015; Felin, Foss, and Ployhart 2015), the literature offers limited approaches and insights in this regard (for an exception, see Muller and Kolk 2010). This is particularly important because the embedded nature of the different levels (Harmon, Haack, and Roulet 2019) influencing managerial decision-making suggests potential interactions or dependencies. Managers operate in an organizational context that shapes their decision-making, whereas both managers and organizations are embedded in an institutional context that further influences behavior (Athanasopoulou and Selsky 2015). Furthermore, although individual-level factors in managerial decision-making have gained increasing attention within the "microfoundations movement" (Felin, Foss, and Ployhart 2015) in management research (Glavas 2016; Gond et al. 2017), concerns persist that this area remains underexplored (Boone et al. 2022). Especially from a broader sustainability management research perspective, there have been recent calls to bring "values back in" (Risi et al. 2022) and to explore why managers, and consequently firms, act more or less sustainably. To address these shortcomings, our study seeks to answer the following research question: *How do individual, organizational-, and institutional-level factors drive managers' sustainability-related decision-making*?

To give our study a concrete setting, we examine decision-making related to carbon-reducing investments. Reducing carbon emissions is one of the most urgent societal imperatives of our times (Howard-Grenville et al. 2014), and this responsibility falls heavily on the corporate sector. Ultimately, it is managers who must decide whether to invest in carbon-reducing initiatives (He et al. 2022), making it crucial to understand the factors that drive these decisions. Thus, the decision to invest in carbon reduction serves as an ideal case to investigate how managers' sustainability-related decision-making may be influenced by factors at different levels.

In considering the factors that influence managerial decision-making, we examine whether individual-level factors, such as personal values, beliefs, and risk preferences, impact managers' investment decisions, and the extent to which these factors interact with institutional and organizational factors. For methodological and content-related reasons, we focus on five factors at the organizational and institutional levels: relative carbon performance, the financial impact of an investment, and incentive system design (organizational level), as well as investor orientation and carbon disclosure regime (institutional level). Given the potentially vast interactions across these three levels, we employ an exploratory research approach to answer the research question, as existing knowledge on these interactions is limited. To this end, we conducted a vignette experiment (also referred to as a "factorial survey experiment"; see Liebe, Bartczak, and Meyerhoff 2017) with professional managers as respondents.

Our multilevel analysis reveals that certain individual-level factors, such as a biospheric orientation or a strong belief in business ethics, clearly influence managers' decision-making. However, they do not significantly alter the overall influence of organizational- and institutional-level factors. In our study, the most important factors for managers' decision-making are the financial impact of carbon-reducing investments at the organizational level and the number of carbon-conscious investors in a firm and the regulatory disclosure regime in which the firm operates at the institutional level.

Our study makes several contributions. Theoretically, it engages with and connects to the microfoundations movement in strategy and organization theory (Felin, Foss, and Ployhart 2015) and the ongoing debate regarding the primacy of structure versus agency in explaining economic outcomes (Cardinale 2018). Reflecting on developments in these fields over the last decade, our multilevel approach acknowledges that "(...) giving any primacy to a level is an empirical question" (Felin, Foss, and Ployhart 2015, 587). Empirically, our exploratory approach thus considers influential factors across multiple levels, thereby extending previous research that has often focused on a single level of analysis. In particular, the inclusion of individual-level factors addresses recent calls in the literature (e.g., Risi et al. 2022) and provides insights on the role and importance of managerial characteristics in sustainability-related decision-making while accounting for organizational and institutional factors. Given the carbon-related context of our study, the findings also directly contribute to and inform ongoing policy discussions. Our results indicate that policy initiatives aimed at educating investors about companies' climate impact—such as the EU regulation on Sustainability-Related Disclosures in the Financial Services Sector (SFDR, EU 2019/2088) or the European Green Bond Standard (EUGBS, EU 2023/2631), as well as policies aimed at increasing carbon prices and initiatives to mandate climate-related disclosures, is likely to be effective in motivating managers to actively reduce their companies' climate impacts.

2 | Factors Influencing Managers' Decision-Making

The extant literature has analyzed and discussed various factors at the individual, organizational, and institutional levels, which potentially influence managers' decisions to invest in sustainable activities. In the following, we highlight the most significant and commonly discussed factors identified in the literature and outline our expectations regarding their relations to sustainable investments in general, and carbon-reducing investments in particular. Additionally, the embedded nature of the individual, organizational, and institutional levels suggests that factors from different levels interact with each other (Boone et al. 2022;

Harmon, Haack, and Roulet 2019). However, we deliberately do not formulate hypotheses because the many potential (and unexplored) interaction effects make such an approach unfeasible. Instead, we highlight the exploratory nature of our study, especially regarding how factors on different levels interact.

We identified a set of individual-level factors relating to managers' personal values, beliefs, and risk preferences; organizational-level factors (i.e., relative carbon performance, financial impact, and incentive system); and institutional-level factors (i.e., investor orientation and disclosure regime). Table 1 provides an overview of the different levels and factors, the related literature, and exemplary links to theories. Finally, we list the expected (isolated) direction in which the factors affect managers' decisions to invest in sustainable activities. The list of factors is not exhaustive but instead focuses on a set of important and well-researched factors with the aim of providing a suitable starting point for an exploratory analysis. Furthermore, the nature of our methodological approach (i.e., a vignette experiment, as detailed in the following section) warrants a focus on a smaller set of factors.

Regarding individual-level factors, a rich body of literature has explored how personal values, beliefs, and risk preferences impact managers' decisions to invest in sustainable activities (e.g., Boone et al. 2022; Gond et al. 2017; Hafenbrädl and Waeger 2017; Hossain, Saadi, and Amin 2023). Chin, Hambrick, and Treviño (2013), for example, showed that conservative-leaning CEOs in the United States invest less in sustainable activities and only do so when financial performance allows it, whereas liberal CEOs invest more and do so with less regard for financial performance. Hossain, Saadi, and Amin (2023) show that the risk-aversion of CEOs can lead to environmental degradation, especially in the form of higher carbon emissions. In general, moral or prosocial motives and a sustainable value orientation have been identified as important drivers of managers' sustainable behaviors (Gond et al. 2017; Lülfs and Hahn 2014). Consequently, we identified managers' personal values, beliefs, and risk preferences as individual-level factors that potentially play a role in their decisions to invest in carbon emission reductions. We expect that more altruistic and environmentally conscious managers with lower degrees of risk aversion tend to decide in favor of higher carbon-reducing investments.

Focusing on the organizational level, an important factor influencing managers' decisions about sustainable investments can be the current sustainability performance of a firm relative to its peers. Literature links higher carbon emissions to lower firm value (Clarkson et al. 2015; Griffin, Lont, and Sun 2017; Matsumura, Prakash, and Vera-Muñoz 2014; Ott and Schiemann 2023), which suggests that carbon-reducing investments increase firm value. Firms with poor sustainability performance might thus be able to realize stronger improvements in their sustainability performance with the same investment (i.e., by picking low-hanging fruit) compared to firms with an already superior sustainability performance. The resulting *inverse* U-shaped relationship between sustainability performance and profitability is empirically reported by Misani and Pogutz (2015) and Lopatta, Canitz, and Tideman (2022). However, specifically on the issue of carbon performance, Trumpp and Guenther (2017) and Lewandowski (2017) show that firms with lower levels of carbon performance experience a negative association between carbon and financial performance, whereas a positive relation has been documented for firms with high-level carbon performance. This U-shaped relation is emblematic of the "too little of a good thing" effect. Accordingly, although it seems prudent for managers to evaluate their firm's position in terms of carbon performance relative to that of their peers, it is unclear whether better or worse carbon performance ultimately motivates carbon-reducing investments. Thus, we do not formulate an expectation about the direction of this influence.

On the organizational level, carbon-reducing investment decisions are determined by whether and how quickly investment expenditures pay off financially—due to either decreased costs (e.g., cost savings under emission trading regimes with high carbon prices) or increased sales (e.g., reputational effects of improved carbon performance). The discussion on the financial benefits of environmentally responsible corporate behavior has evolved over time from the question of whether it pays to be green (Hart and Ahuja 1996; Stefan and Paul 2008) to the question of *when* it pays to be green (Albertini 2013; Dixon-Fowler et al. 2013; Hoang et al. 2020). Thus, the time horizon of potential financial benefits seems to play an important role. Consequently, we expect that the financial benefits of carbon-reducing investments are positively associated with managers' respective investment decisions and even more so if those benefits materialize in the short term.

The third organizational-level factor that we identified refers to how carbon performance is integrated into firms' incentive systems. Previous literature has discussed how incentive systems potentially influence managers' sustainable behavior (Renwick, Redman, and Maguire 2013; Yuriev et al. 2018). Incentive systems aim to align managers' objectives with the firm's goals and are based on rewards. Such systems can support a sustainability-related climate in a company through tangible measures, such as bonus payments or other monetary benefits (Cohen et al. 2023; Derchi, Davila, and Oyon 2023; Eccles, Ioannou, and Serafeim 2014). Such reward systems are considered a potentially powerful intervention, and empirical research has shown that integrating sustainability aspects into incentive systems fosters sustainability performance in general (Ott and Endrikat 2022; Velte 2016) and carbon performance in particular (Haque 2017). Accordingly, we identified firms' incentive system design, in which compensation is either based exclusively on financial performance or partly on carbon performance, as another potential factor influencing managers' decisions to invest in carbon emission reductions. We expect that an incentive system that is partly based on carbon performance increases managers' carbon-reducing investments.

Regarding institutional factors, there is ample evidence that institutional investors, just as retail investors, increasingly focus on sustainability-related issues when allocating their funds (Kerber and Jessop 2021; de Villiers, Cho, Turner, and Scarpa 2023) and managers likely adjust their sustainability-related investment behavior to the expectations of their investors. Beyond the normative considerations of retail investors (Cahan, Chen, and Chen 2017; Hong and Kacperczyk 2009), professional investors also experience regulatory pressure to become more transparent with regard to sustainability-related impacts and risks of

TABLE 1 | Overview of factors potentially influencing carbon-reducing investments.

Level	Factor	Related papers	Potential theory connection	Expected direction
Individual	Personal values and beliefs	Boone et al. 2022; Chin, Hambrick, and Treviño 2013; Gond et al. 2017; Hafenbrädl and Waeger 2017; Lülfs and Hahn 2014	Behavioral	Managers with stronger altruistic characters and who are more environmentally conscious tend to invest more in carbon-reducing activities.
	Risk preference	Hossain, Saadi, and Amin 2023; Slawinski et al. 2017	Behavioral	Managers with higher degrees of uncertainty avoidance tend to invest less in carbon-reducing activities.
Institutional	Investor orientation	Cahan, Chen, and Chen 2017; Dhaliwal et al. 2011; Hong and Kacperczyk 2009; Kerber and Jessop 2021	Agency, decision usefulness, signaling	Stronger carbon investor orientation can motivate carbon-reducing investments.
	Disclosure regime	Bauckloh et al. 2022; Downar et al. 2021; Jouvenot and Krueger 2020; Tomar 2023	Disclosure, institutional, legitimacy	(Stricter) Disclosure mandates increase carbon-reducing investments.
Organizational	Relative carbon performance	Clarkson et al. 2015; Griffin, Lont, and Sun 2017; Matsumura, Prakash, and Vera-Muñoz 2014; Misani and Pogutz 2015; Ott and Schiemann 2023; Trumpp and Guenther 2017	Legitimacy, signaling, stakeholder	Influence seems likely, but its direction is unclear.
	Financial impact	Albertini 2013; Dixon-Fowler et al. 2013; Hart and Ahuja 1996; Hoang et al. 2020; Stefan and Paul 2008	Agency, financial economics	Managers increase carbon-reducing investments if these investments lead to positive financial returns in the foreseeable future.
	Incentive system	Derchi, Davila, and Oyon 2023; Eccles, Ioannou, and Serafeim 2014; Haque 2017; Ott and Endrikat 2022; Renwick, Redman, and Maguire 2013; Yuriev et al. 2018; Velte 2016	Agency, behavioral, financial economics	Incentive systems, which integrate carbon performance, lead to more carbon-reducing investments.

their investments (for the European Union, see, e.g., the SFDR and the EUGBS). Consequently, they may pass on such pressure by demanding sustainability disclosures and, eventually, sustainability performance improvements from their investees (Dhaliwal et al. 2011). We thus expect that a stronger investor orientation toward climate-related issues will positively influence managers' decisions to invest in carbon emission reduction activities.

Furthermore, we identified the regulatory environment in which firms and their managers operate as another important institutional factor. Public demand for corporate transparency about sustainability performance has increased over the years and emanates from several sources. In the carbon context, numerous countries have established carbon emission-reporting schemes that mandate firms to report their carbon emissions on the facility level (e.g., Greenhouse Gas Reporting Program in the United States[1] or the EU ETS[2]) or on the firm level (e.g., the Companies Act 2006 [Strategic Report and Directors' Report] Regulations 2013 in the United Kingdom). Additional voluntary disclosure of firms' carbon emission and other climate-related information was encouraged by organizations such as the CDP and TCFD, and further developments on sustainability- and climate-related disclosures are manifold (e.g., the Corporate Sustainability Reporting Directive, CSRD, in the EU; climate-related disclosure standards from the ISSB; and proposals on climate-related disclosures from the SEC). Accordingly, managers face pressure directly from standards and regulations. When comparing voluntary and mandatory initiatives, voluntary reporting has often been accused of serving as a tool for impression management (i.e., to gain or safeguard legitimacy) without significantly changing firms' process structures (Deegan 2002; Delgado-Márquez, Pedauga, and Cordón-Pozo 2017; Haffar and Searcy 2020) and without leading to positive tangible outcomes (Haque and Ntim 2018; Qian and Schaltegger 2017). Mandatory carbon emission disclosure regimes, however, have been linked to improved sustainability performance in affected firms (Bauckloh et al. 2022; Christensen, Hail, and Leuz 2021; Downar et al. 2021; Fiechter, Hitz, and Lehmann 2022; Jouvenot and Krueger 2020; Tomar 2023). We thus identified the specific type of disclosure regulation environment as an institutional factor that potentially influences managers' decision to invest in carbon emission reductions. We expect that managers perceive increased institutional pressures in a mandatory disclosure regime and act accordingly (Christensen, Hail, and Leuz 2021) so that (stricter) disclosure mandates increase sustainable investments.

In sum, we account for managers' personal values, believes, and risk preferences as individual-level factors, firms' carbon performance, the financial impact of the investment, and the incentive system as organizational factors, and investor orientation and the regulatory environment as institutional factors. As described above, these factors have been studied individually in previous research. However, the complexity of the different factors on different levels that managers face (T. Hahn et al. 2014) warrants a simultaneous investigation to identify the relative importance of the various factors as well as how they potentially interact. Thus far, the literature has offered scarce insights in this regard. Muller and Kolk (2010), for example, gave some consideration to the simultaneous extrinsic and intrinsic motivations of managers to engage in sustainability activities from an international trade perspective. They found that both trade-related pressure and management commitment to sustainability increased firms' sustainability performance levels. Adding to this initial evidence, we employ a vignette experiment that allows for the simultaneous inclusion of individual-, organizational-, and institutional-level factors. This enables us to identify the decisive factors that lead to substantive action in terms of carbon emission reduction.

3 | Materials and Methods

3.1 | Vignette Experiment as a Research Approach

We employ a vignette experiment to explore which of the abovementioned factors influence managers' carbon-reducing investment decisions. Vignette experiments, also referred to as "factorial survey experiments" (Liebe, Bartczak, and Meyerhoff 2017), have their roots in sociological research (Wallander 2009), but the method has also become popular in business studies (Aguinis and Bradley 2014; Oll et al. 2018). Vignette experiments aim to uncover and understand the implicit judgments, preferences, and behaviors of individuals in decision-making processes (Aguinis and Bradley 2014; Auspurg, Hinz, and Sauer 2017). For this purpose, participants are confronted with "vignettes," "that is, carefully designed descriptions of hypothetical people, social situations, or scenarios" (Oll et al. 2018, 27). The vignettes differ from each other in a discrete number of attributes (or factors), the values of which are manipulated (Auspurg and Jäckle 2017). This manipulation results in a potentially large number of different vignette versions, representing the "vignette population" or "vignette universe" (Alexander and Becker 1978). Participants judge a predefined number of vignette versions through an evaluation task. After completing the evaluation task, participants typically provide respondent-specific information analogous to a traditional survey. This setup allows conclusions to be drawn about the respondents' preferences in the decision-making process (Jasso 2006; Rossi and Anderson 1982).

The systematic variation of the attributes within the vignette allows researchers to determine and separate the causal influence of each individual attribute. Including respondent-specific information in the analysis enables scholars to investigate "(a) the elements of information used to form judgments, (b) the weight of each of these factors, and (c) how different subgroups of the respondents agree on (a) and (b)" (Martin 2012, 525). In sum, a vignette experiment is perfectly suited to capture our exploratory research context as it allows for "complex evaluative judgments, which are grounded on a multitude of different factors that the respondents might not even be able to make explicit" (Oll et al. 2018, 33). In the following section, we describe the specific design of the vignette experiment employed to answer our research question.

3.2 | Design of the Vignette Experiment

For the experimental design, we followed best-practice recommendations from research in business studies (Aguinis and

Bradley 2014; Oll et al. 2018) and adjacent disciplines. The participants in the online vignette experiment first accessed introductory notes asking them to assume the role of a manager in a multinational capital market-oriented company in the manufacturing industry and stating that carbon emissions are an inevitable part of the company's business model. The participants were then confronted with the vignettes. Each vignette described a different scenario combining five attributes with different attribute levels. We chose the attributes and their levels in line with the considerations and prior evidence as presented above. Table 2 displays all attributes and attribute levels (two to three each).

As the first attribute, we focused on *investor orientation* and included information on the number (small or large) of the company's investors who considered corporate carbon emission information in their decision-making. This attribute accounted for the potential influence of the company's investor base. The second attribute captured the *relative carbon performance* and ranked the company among its sector peers in terms of current carbon performance (among the best or worst 30%). The third attribute (*financial impact*) specified the potential financial bottom-line effects of carbon emission-reducing investments (no significant effect or a positive effect within either 1 or 5 years). The fourth attribute (*incentive system*) captured the potential effects of bonus payments (bonus payments exclusively determined by financial aspects or partly determined by corporate carbon performance). Finally, the fifth attribute (*disclosure regime*) specified the company's carbon disclosure obligations as part of its annual reporting (entirely voluntary, mandated, or mandated reporting on carbon emission reduction strategies in different global warming scenarios).

Regarding the number of attributes, Auspurg and Hinz (2015) suggest a midlevel complexity of 7 (±2) to avoid overburden of respondents with too many attributes as well as boredom of respondents due to only few attributes (similar Auspurg, Hinz, and Liebig 2009; Auspurg et al. 2010; Rooks et al. 2000). Due to the general complexity of an investment decision, we deliberately opted for the lower boundary and chose five attributes. As smaller vignette universes "allow a more precise estimation of parameter values" (Auspurg and Hinz 2015, 19), we also limited the number of levels per attribute as much as possible. Having a balanced number of either two or three levels per attribute also helps to avoid a potential number-of-levels effect (Auspurg and Hinz 2015; Wittink, Krishnamurthi, and Nutter 1982). This was possible in our case as it still allowed us to construct realistic vignettes. All possible attribute-level combinations amount to 72 ($2\times2\times3\times2\times3$) different vignettes, representing the complete vignette universe. Figure 1 depicts one of the 72 vignettes as an example and illustrates the readability of the vignettes. The universe contained no illogical or implausible cases so that no vignette had to be excluded.

For a comparably low number of attributes (in our case five), Auspurg and Hinz (2015) recommend using only a few vignettes per responded to prevent boredom and fatigue due to limited variation between the vignettes, which could affect the reliability and validity of the vignette experiment (Aguinis and Bradley 2014; Auspurg and Jäckle 2017; Karren and Barringer 2002). Each respondent was thus consecutively confronted with eight vignettes that were randomly drawn without replacement from the 72 vignettes of the complete vignette universe. We opted for a random sample as the most resource-efficient and thus feasible approach for us. With eight vignettes

TABLE 2 | Attributes and attribute levels.

Label	Attributes	Attribute levels
Investor orientation	A "_____" of your company's investors use corporate carbon emission information in their decision-making.	1. small number 2. large number
Relative carbon performance	Your company is currently ranked among the "_____" in its sector regarding corporate carbon performance.	1. best 30% 2. worst 30%
Financial impact	Investments in carbon emission-reducing measures will have "__(1/2)__" effect on your financial bottom line "__(a/b)__."	1. no significant 2. a positive a) within the next year b) within the next 5 years
Incentive system	Your personal bonus payments are "_____."	1. partly determined by your company's carbon performance 2. exclusively determined by your company's financial performance
Disclosure regime	In its annual report, your company "_____."	1. can voluntarily disclose carbon emission information 2. is legally required to disclosure carbon emission information 3. is legally required to disclose carbon emission reduction strategies in different global warming scenarios

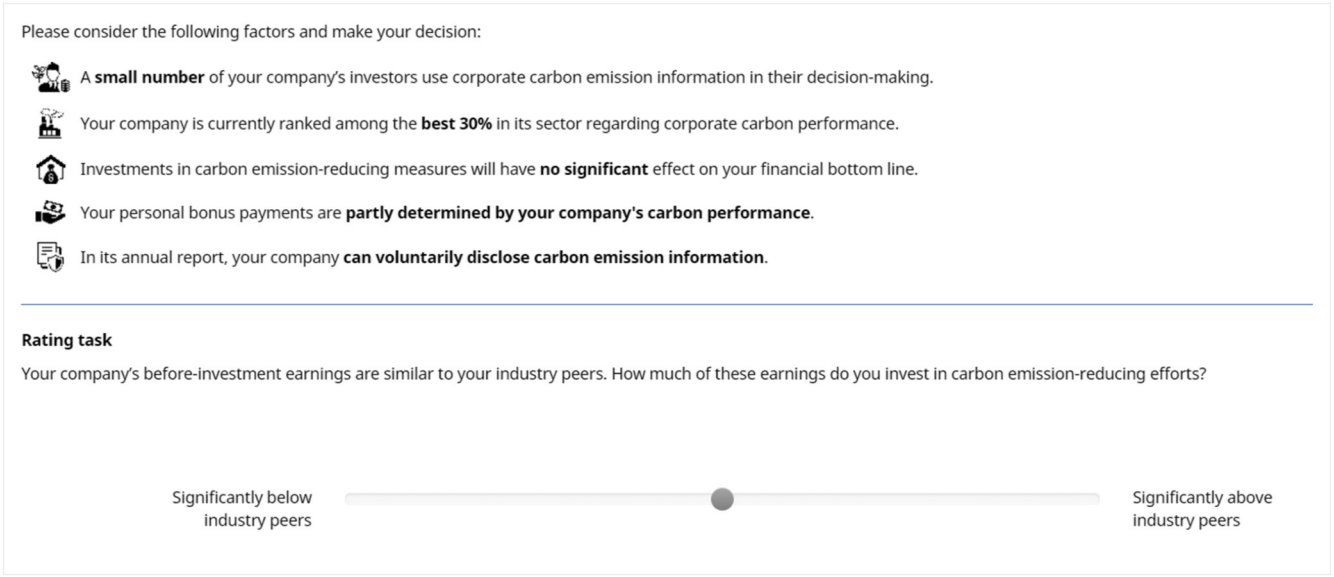

FIGURE 1 | Sample vignette.

per participant, we stayed well below the maximum recommended number of 20 suggested by Lauder (2002).

The participants had to respond to each vignette with a rating task. For this purpose, they were first informed that the company's before-investment earnings were similar to those of their industry peers. Then, they used a slider to indicate what proportion of their company's pre-investment earnings they would invest in carbon emission-reducing measures (see Figure 1). The slider could be freely set on a scale between the endpoints "significantly below industry peers" and "significantly above industry peers." The slider was centered by default, representing investments in carbon emission-reducing measures at the level of the peers' investments. The rating task was repeated for all eight vignettes.

Individual-level information on managers' personal values, beliefs, and risk preferences was gathered through a postexperimental questionnaire. Personal values and beliefs were queried using the Environmental Portrait Value Questionnaire (E-PVQ) by Bouman, Steg, and Kiers (2018), which allows the measurement of the personal values proven to underlie and predict individuals' environmental beliefs and behaviors. The E-PVQ measures values with a total of 17 items in four categories: *biospheric* (concern for the environment), *altruistic* (concern for others), *hedonic* (concern for pleasure and comfort), and *egoistic* (concern for personal resources). Additionally, we asked the respondents two questions about their opinions on businesses' ethical responsibilities (*business ethics*). In order to capture risk preferences, we followed Sharma (2010) and inquired about the participants' tendency to avoid risk (*risk aversion*) and their ambiguity tolerance (*uncertainty avoidance*). Additionally, we asked participants to provide sociodemographic information, such as age, gender, nationality, working experience in years, industry sector affiliation, and whether their job profile included budgetary responsibility. We use sociodemographic information as control variables in our analyses. Each of the measurements mentioned in this paragraph was captured on a seven-point Likert scale. Appendix A presents the complete E-PVQ and the questions for *business ethics*, *risk aversion*, and *uncertainty avoidance*.

3.3 | Sample and Descriptive Statistics

The vignette experiment was administered online to gain access to a sufficiently large pool of professional managers with several years of work experience. The invitation was distributed through various channels, such as the business network LinkedIn, newsletter mailing lists, or personal contacts. The respective link only granted access to the experiment once to reduce the risk of sampling biases. After completing the questionnaire, the participants could choose between two reward options for their participation: participation in a raffle for one of five €25 Amazon vouchers (in this case, an email address had to be provided but was kept separate from the answers and deleted after the raffle) or offsetting of 100-kg carbon emissions through a nonprofit organization.

A total of 102 professional managers completed the experiment. However, not all participants gave a complete set of judgments for all eight vignettes and/or answered the postexperimental questionnaire in full. In sum, we collected observations from 85 participants who completed the eight judgments and answered all the individual-level questions, leading to a sample of 639 observations. This large number of vignette observations helps to mitigate any potential weaknesses of random sampling. Auspurg and Hinz (2015) argue that, in practical setting, at least 200 vignettes are necessary to obtain efficient samples via random sampling. With more than three times this number, we err on the side of caution.

We also created two additional dummy variables, *gender_dummy* and *age_dummy*, which equaled 1 if the question was answered, and 0, otherwise. This procedure allowed us to control for gender and age while keeping observations of the participants in our sample who did not answer the age- and gender-related questions. Table 3 provides the descriptive statistics of the sample.

TABLE 3 | Descriptive statistics of our sample.

Panel 1—Investment decisions and overview of respondents

Variable	*N*	Mean	*SD*	Min.	Max.	p5	p50	p95
Investment	639	71.313	22.980	0.000	100.000	23.000	74.000	100.000
Experience	85	8.288	5.288	1.000	29.000	1.000	7.000	18.000
Gender	N	Female	Male	No answer				
	85	22	60	3				
Budget		Yes	No					
	85	59	26					
Reward		Offset	Raffle					
	85	76	9					
Age		Mean	Min.	Max.	No answer			
	85	37.802	21	57	14			

Panel 2—Individual-level factors.

Variable	*N*	Mean	*SD*	Min.	Max.	p5	p50	p95
Biospheric	85	5.803	1.015	2.000	7.000	4.000	6.000	7.000
Altruistic	85	5.986	0.740	3.800	7.000	4.600	6.000	7.000
Hedonic	85	5.387	0.942	3.000	7.000	4.000	5.333	7.000
Egoistic	85	4.220	0.983	2.000	7.000	2.600	4.400	5.800
Risk aversion	85	3.248	1.106	1.000	6.750	1.500	3.250	4.750
Uncertainty avoidance	85	2.977	1.183	1.000	6.000	1.250	3.000	5.250
Business ethics	85	5.945	1.134	2.000	7.000	3.500	6.000	7.000

Panel 1 shows the respondents' average age of 37.8 years (16.5% of respondents did not answer this question). Furthermore, 70% of the respondents were male, 26% were female, and 4% did not answer this question. In addition, 69% indicated that they had budget responsibilities in their job, and the average work experience in the respondents' current field of work was 8.3 years. In sum, the average participant in our sample was a middle-aged person with significant work experience and thus exactly a person who would typically engage in the decisions we included in our experiment.

Panel 1 also shows the average proportion of the company's pre-investment earnings that the participants chose to invest in carbon emission–reducing measures. Given that the slider that the participants used to make their investment decisions was set to the center by default (i.e., at a value of 50, representing an investment similar to that of their industry peers), the reported average *investment* value of 71.31 shows that overall, the participants tended to invest more of their company's pre-investment earnings than their firm's industry peers. Panel 2 of Table 3 shows the descriptive statistics regarding the personal values, beliefs, and risk preferences of the participants in our sample, indicating relatively high scores for biospheric and altruistic orientation and, to a lesser extent, also for egoistic and hedonistic values. Furthermore, on average, the respondents believed that the responsibilities of businesses extend beyond pure financial responsibilities. Risk aversion and concern about uncertainties were at the medium level.

4 | Results

Each participant provided eight investment-related decisions based on eight vignettes. The answers are thus clustered at the participant level, resulting in potentially biased standard errors (Snijders and Bosker 2012; Wallander 2009). We therefore employed a multilevel regression model, taking into account the data's hierarchical structure (Sauer et al. 2011) to avoid biased results. The results of our multilevel regression model approach are reported in Table 4.

Columns (1)–(5) of Table 4 present the effect of the measured individual-level variables (*biospheric*, *altruistic*, *hedonic*, *egoistic*, *business ethics*, *risk aversion*, and *uncertainty avoidance*), each of the manipulated attributes individually, and control variables (*age*, *gender*, *experience*, *budget responsibility*, and *reward choice*). Column (6) shows the results of the full model, estimating the effects of all the manipulated attributes on the institutional and organizational levels simultaneously with the effects of the individual-level variables.

TABLE 4 | Base analyses of all the attributes and control variables.

Variables	Relative carbon performance (1)	Financial impact (2)	Incentive system (3)	Investor orientation (4)	Disclosure regime (5)	Full model (6)
Biospheric	3.710**	3.668**	3.642**	3.791**	3.810**	3.896**
	(1.773)	(1.735)	(1.771)	(1.780)	(1.757)	(1.735)
Altruistic	2.579	2.121	2.558	2.333	2.429	1.790
	(2.555)	(2.496)	(2.551)	(2.564)	(2.530)	(2.493)
Hedonic	0.849	1.320	0.799	0.977	0.815	1.345
	(1.692)	(1.654)	(1.690)	(1.698)	(1.676)	(1.653)
Egoistic	−0.805	−1.589	−0.846	−1.110	−0.802	−1.986
	(1.700)	(1.665)	(1.699)	(1.708)	(1.684)	(1.664)
Business ethics	2.720*	3.072**	2.756*	2.888**	2.759*	3.254**
	(1.462)	(1.429)	(1.461)	(1.468)	(1.448)	(1.428)
Risk aversion	3.743**	3.444**	3.622**	3.454*	3.721**	3.154*
	(1.771)	(1.732)	(1.769)	(1.778)	(1.752)	(1.732)
Uncertainty avoidance	0.807	0.646	0.936	1.032	0.754	0.712
	(1.708)	(1.670)	(1.707)	(1.714)	(1.691)	(1.670)
Relative carbon performance	−1.402					−1.368
	(1.429)					(1.269)
Financial impact 5 years		11.850***				11.908***
Financial impact 1 year		(1.652)				(1.596)
		16.819***				17.226***
Incentive system		(1.634)				(1.582)
			−1.936			−2.009
			(1.455)			(1.293)
Investor orientation				6.901***		7.041***
				(1.424)		(1.288)
Disclosure Regime_1					3.267*	
					(1.783)	
Disclosure Regime_2					2.773	
					(1.791)	
Disclosure Regime_combined						3.725***
						(1.383)
Age	0.323	0.208	0.325	0.326	0.302	0.177
	(0.329)	(0.322)	(0.329)	(0.330)	(0.326)	(0.322)
Age_dummy	−10.673	−5.105	−10.937	−10.127	−10.024	−3.709
	(13.292)	(13.004)	(13.278)	(13.343)	(13.165)	(12.993)

(Continues)

TABLE 4 | (Continued)

Variables	Relative carbon performance (1)	Financial impact (2)	Incentive system (3)	Investor orientation (4)	Disclosure regime (5)	Full model (6)
Gender	5.044	5.797	4.860	4.169	4.991	4.760
	(3.699)	(3.619)	(3.696)	(3.717)	(3.663)	(3.620)
Gender_dummy	−6.797	−11.544	−6.064	−5.894	−6.526	−10.107
	(11.471)	(11.233)	(11.467)	(11.520)	(11.355)	(11.234)
Experience	−0.467	−0.343	−0.474	−0.489	−0.478	−0.376
	(0.375)	(0.366)	(0.374)	(0.376)	(0.371)	(0.366)
Budget responsibility	0.510	−0.399	0.330	0.064	0.498	−1.128
	(3.638)	(3.557)	(3.636)	(3.653)	(3.603)	(3.556)
Reward choice	6.074	4.245	6.090	5.909	5.742	3.342
	(5.345)	(5.232)	(5.339)	(5.366)	(5.295)	(5.232)
Constant	−2.337	−5.651	−1.214	−4.591	−4.228	−6.079
	(20.719)	(20.237)	(20.728)	(20.786)	(20.528)	(20.256)
Observations	639	639	639	639	639	639
Number of groups	85	85	85	85	85	85

Notes: Table 4 presents the results of our base analyses. Columns (1)–(5) contain the results of each individual attribute estimation, including control variables. Column (6) shows the results of the full model, including all the attributes and control variables. Standard errors in parentheses.
***$p < 0.01$,
**$p < 0.05$,
*$p < 0.1$.

Regarding the managers' personal values, beliefs, and risk preferences, Columns (1)–(6) consistently show that a positive *biospheric* attitude, a belief in *business ethics*, and a high level of *risk aversion* are positively related to a manager's carbon-reducing investments. All of these main effects are robust throughout our different analyses in terms of both effect size and significance. None of the other personal values, beliefs, and risk preferences attain significance.

Focusing on organizational-level factors, carbon-reducing investments are higher when they have a positive *financial impact*. As shown in Column (2), when the financial benefits materialize within 5 years, the investments are 11.850 points higher ($p < 0.01$), and in cases in which the financial benefit materializes within 1 year, investments are 16.819 points higher ($p < 0.01$) than in the absence of positive effects on the firm's financial bottom line. However, *relative carbon performance* and *incentive system* are not significantly related to carbon-reducing investment decisions. The results remain robust in the full model as shown in Column (6).

For institutional-level factors, *investor orientation* shows significant coefficients. As reported in Column (4), we find that managers' carbon-reducing investments are, on average, 6.901 points higher ($p < 0.01$) when firms have a large number of investors who incorporate carbon emission information into their decision-making on investments compared with the investments of managers whose firms have a small number of these investors. The *disclosure regime* also affects managers' carbon-reducing investments. When faced with the legal requirement to disclose climate-related information (*Disclosure Regime_1*), investments are 3.267 points higher ($p < 0.1$; Column [5]) than investments in a voluntary disclosure regime. At the same time, mandatory forward-looking reporting of reduction strategies (*Disclosure Regime_2*) does not seem to impact the investment decision despite a positive (but insignificant; $p > 0.1$) coefficient. For our further analyses, we combined these two attribute levels into one binary variable: *disclosure regime combined* ("0" for voluntary disclosure regimes and "1" for mandatory disclosure regimes). In Column (6), we see a positive and significant coefficient of 3.725 ($p < 0.01$).

Table 5 reports a set of interaction analyses among organizational- and institutional-level factors while accounting for the individual-level factors. We report a reduced set of five interactions that we believe to be the most relevant. We also tested all the other combinations of the five factors, but all were statistically insignificant. In general, the results for the five attributes and for personal values, beliefs, and risk preferences are consistent with the results of our baseline analyses in Table 4. Regarding the interaction effects, we report two positive and significant interactions, indicating an additional strengthening effect on managers' investments that comes with specific combinations of manipulated attributes.

TABLE 5 | Analyses of interactions between attributes.

Variables	Investor orientation and relative carbon performance (1)	Financial impact and incentive system (2)	Investor orientation and disclosure regime (3)	Relative carbon performance and disclosure regime (4)
Biospheric	3.878**	3.921**	3.899**	3.886**
	(1.741)	(1.747)	(1.736)	(1.737)
Altruistic	1.966	1.824	1.803	1.815
	(2.503)	(2.510)	(2.495)	(2.496)
Hedonic	1.404	1.315	1.358	1.346
	(1.659)	(1.664)	(1.655)	(1.654)
Egoistic	−2.077	−2.053	−1.970	−1.951
	(1.671)	(1.676)	(1.667)	(1.667)
Business ethics	3.178**	3.158**	3.251**	3.258**
	(1.433)	(1.438)	(1.429)	(1.429)
Risk aversion	3.252*	3.050*	3.150*	3.146*
	(1.739)	(1.744)	(1.733)	(1.734)
Uncertainty avoidance	0.652	0.839	0.723	0.707
	(1.677)	(1.683)	(1.672)	(1.672)
Investor orientation	3.738**	7.128***	7.429***	7.016***
	(1.771)	(1.284)	(2.246)	(1.288)
Relative carbon performance	−4.730***	−1.457	−1.372	−0.171
	(1.771)	(1.259)	(1.269)	(2.241)
Financial impact 5 years	12.022***	9.399***	11.911***	11.916***
	(1.586)	(2.275)	(1.596)	(1.596)
Financial impact 1 year	17.209***	12.502***	17.234***	17.162***
	(1.571)	(2.282)	(1.582)	(1.584)
Incentive system	−1.774	−6.669***	−2.014	−1.987
	(1.287)	(2.281)	(1.293)	(1.293)
Disclosure Regime_combined	3.752***	3.594***	4.003**	4.613**
	(1.374)	(1.374)	(1.911)	(1.947)
Interact*: Investor orientation*Relative carbon performance*	6.856***			
	(2.540)			
Interact*: Financial impact 5 years*Incentive system*		4.624		
		(3.174)		
Interact*: Financial impact 1 year*Incentive system*		9.046***		
		(3.175)		
Interact*: Investor orientation*Disclosure Regime_combined*			−0.579	
			(2.743)	

(Continues)

TABLE 5 | (Continued)

Variables	Investor orientation and relative carbon performance (1)	Financial impact and incentive system (2)	Investor orientation and disclosure regime (3)	Relative carbon performance and disclosure regime (4)
Interact*: Relative carbon performance*Disclosure Regime_combined*				−1.798
				(2.773)
Age	0.184	0.162	0.179	0.176
	(0.323)	(0.324)	(0.322)	(0.322)
Age_dummy	−3.992	−3.100	−3.760	−3.630
	(13.041)	(13.083)	(13.001)	(13.007)
Gender	4.466	4.911	4.782	4.786
	(3.635)	(3.646)	(3.623)	(3.624)
Gender_dummy	−9.884	−10.233	−10.162	−10.398
	(11.277)	(11.315)	(11.242)	(11.255)
Experience	−0.374	−0.344	−0.378	−0.372
	(0.367)	(0.369)	(0.366)	(0.366)
Budget responsibility	−1.395	−0.899	−1.123	−1.095
	(3.570)	(3.581)	(3.558)	(3.560)
Reward choice	3.025	3.408	3.354	3.484
	(5.253)	(5.271)	(5.235)	(5.242)
Constant	−4.333	−3.676	−6.499	−6.907
	(20.337)	(20.411)	(20.363)	(20.318)
Observations	639	639	639	639
Number of groups	85	85	85	85

Note: Table 5 presents the results of our four interaction analyses. Columns (1)–(4) show the results of the simultaneous estimation of all the attributes and four specific interactions as indicated in the column title. The estimations also contain control variables. Standard errors in parentheses.
***$p < 0.01$,
**$p < 0.05$,
*$p < 0.1$.

First, we found an additional positive effect of 6.856 points ($p < 0.01$) for the combination of poor carbon performance and a large number of investors who consider carbon information. This means that a manager confronted with a large number of investors focusing on climate-related issues and poor carbon performance increases emission-reducing investments by 5.864 points (3.738−4.730 + 6.856) compared to a manager faced with a small number of investors focusing on climate-related issues and good carbon performance.

Second, we find an additional positive effect of 9.046 points ($p < 0.01$) when the firm's incentive system partly considers its carbon performance alongside its financial performance when, at the same time, carbon-reducing investments positively affect the firm's financial bottom line within 1 year. This means that a manager faced with an investment project with a positive financial impact within 1 year and an incentive system that considers nonfinancial alongside financial performance will increase the amount of carbon-reducing investments by 14.879 points (12.502−6.669 + 9.046) compared to managers facing investment opportunities with longer term financial impacts and incentive systems that only consider financial performance. However, we found no significant interaction effect of a mandatory disclosure regime combined with either a large number of carbon-conscious investors or poor relative carbon performance. In other words, the effect of a mandatory disclosure regime on managers' carbon-reducing investments is relatively stable across firms with an inferior or superior carbon performance and across firms with a strong or weak investor orientation toward climate change.

Finally, we interacted the answers to each of the individual-level questions on values, beliefs, and risk preferences with each organizational- und institutional-level factor. Table 6 summarizes the results of these interactions with the direction of the coefficient and the significance. We found a significant effect for five separate interactions in total. However, due to the large number of tests (35) that we performed and given the required level

TABLE 6 | Interactions between individual-level factors and vignette attributes.

	Investor orientation	Relative carbon performance	Financial impact	Incentive system	Disclosure regime
Biospheric	−*	−	−*	−	+
Altruistic	+	−	−	+	−
Hedonic	−	−*	+	+	−
Egoistic	−	−	−	+*	−
Business ethics	+	+	−	−	+
Risk	+	+	−	−	−
Uncertainty	−	+*	−	−	+

Note: Table 6 contains the results of our analyses of interactions between managers' personal values, beliefs, and risk preferences and organizational- and institutional-level factors. We show the coefficient direction with + and −.
*Significance level of at least $p < 0.1$.

of $p < 0.1$, we cannot rule out the possibility that these results are mostly driven by Type 2 errors. This is emphasized by the fact that no clear pattern of significant results exists. Significant results were found for separate cases stretched over four out of seven personal values, beliefs, and risk preferences (biospheric, hedonic, egoistic, and uncertainty) and over four out of five attributes (investor orientation, relative carbon performance, financial impact, and incentive system). Accordingly, we conclude that personal values, beliefs, and risk preferences do not strongly interact with institutional- and organizational-level factors.

5 | Discussion

Two relevant shortcomings in the literature on sustainability-related managerial decision-making motivated this study: The still underexplored role of individual-level factors and the fact that institutional-, organizational-, and individual-level factors have mostly been studied separately in the past, despite contextual complexity that warrants simultaneous investigation. Consequently, this study explored a variety of factors and how they interact in shaping managers' decisions in the context of a potential investment in carbon emission-reducing measures. As part of our experimental design, we exposed our professional participants to different scenarios through vignettes. These vignettes included five manipulated factors on the organizational and institutional levels that previous literature has (separately) linked to managerial decision-making in the realm of climate change. To account for individual-level factors, we measured managers' personal values, beliefs, and risk preferences. Our results show that the most important factors for managers' decision-making were the number of carbon-conscious investors in a firm, the financial impact of carbon-reducing investments, and the regulatory nonfinancial disclosure regime in which a firm operates. The firm's initial carbon performance relative to its peers and the design of managers' incentive systems were not significantly factored into the decision-making in our setting. These findings are robust across different personal values, believes, and risk preferences of managers. In the following, we theoretically reflect upon those findings, and we discuss potential implications for corporate practice and policymaking.

5.1 | Theoretical Reflections

For a long time, there have been competing positions on the role and existence of managerial agency (Cardinale 2018). Proponents of such an agency perspective argue that organizational actions and performance are to a certain extent reflections of managerial attributes. In other words, differences in managerial attributes would allow to explain heterogeneity in firm-level outcomes. Others, however, argue that managerial attributes do not really matter because managers are primarily constrained by their organizational and/or institutional structure. Such a deterministic view would thus give primacy to structure over agency. However, as Cardinale (2018, 132) argues, "... institutional theory seems to be converging toward the view that both agency and structure matter." Our findings support that view.[3]

Considering the underexplored role of individual-level factors, our findings support the agency perspective with evidence that managers' personal values, beliefs, and risk preferences indeed play an important role in shaping their sustainability-related actions (Bouman et al. 2020; Muller and Kolk 2010). In our setting, a positive attitude toward the biosphere, a strong belief in business ethics, and a high level of risk aversion explain a higher likelihood of managers' decisions to invest in carbon emission reductions. These findings support the notion that corporate carbon emission reductions will be easier to achieve if the responsible managers' values, beliefs, and risk preferences match the idea of fighting against climate change (Boone et al. 2022). Notably, we found no or, at best, only sparse and weak evidence for interactions among these individual-level factors with the organizational- and institutional-level factors in our setting. In other words, managers' personal values, beliefs, and risk preferences are robust drivers of their decisions to invest in carbon emission-reducing measures, regardless of the organizational or institutional structure the decision-making is embedded in.

However, considering the (separate) influence of factors at the organizational and institutional levels, several of our findings also speak to the importance of structure in decision-making, thus also confirming and complementing previous findings in the literature. This applies to our findings on the

influence of the financial impact of carbon-reducing investments (Albertini 2013; Dixon-Fowler et al. 2013; Hart and Ahuja 1996; Hoang et al. 2020; Stefan and Paul 2008), the number of carbon-conscious investors (Cahan, Chen, and Chen 2017; Dhaliwal et al. 2011; Hong and Kacperczyk 2009; Kerber and Jessop 2021), and the regulatory carbon disclosure regime in which a firm operates (Bauckloh et al. 2022; Downar et al. 2021; Fiechter, Hitz, and Lehmann 2022; Jouvenot and Krueger 2020; Tomar 2023). For these factors, the direction of the influence is also in line with our expectations, as summarized in Table 1, and further serves as evidence supporting the structure-dominated theories mentioned therein.

It is noteworthy though that not all the structural factors in our vignette study show a significant relation with the carbon-reducing investment decisions. Namely, the organizational-level factors of relative carbon performance and incentive system are insignificant and, accordingly, do not fully support the conclusions of the previous empirical literature, but they are nevertheless (theoretically) plausible in the setting of our experiment. First, previous empirical studies have indicated that an incentive system that rewards nonfinancial performance leads to improved nonfinancial outcomes (Baraibar-Diez, Odriozola, and Fernández Sánchez 2019; Ott and Endrikat 2022). However, we did not find support for such an effect. This might be due to managers' uncertainty regarding the personal financial returns they could gain through the incentive system. Even if an investment in carbon reduction measures is financially rewarded by the compensation scheme (i.e., by linking compensation partly to carbon performance), an overall negative effect on the personal financial reward could still prevail, for example, in cases when the carbon reduction measures have no immediate positive or even a negative (short-term) financial impact. Usually, financial performance continues to be a dominant element of managerial incentive schemes, even if nonfinancial measures are included, which implies that managers seem to be reluctant to invest in carbon-reducing efforts if they do not see (short-term) positive financial impacts.

Second, we find no evidence for the influence of relative carbon performance on managerial decision-making in our setting. Although we refrained from formulating an expectation regarding the direction of this influence, this finding contrasts nonetheless with our expectation that an influence (of any direction) exists, as we discussed above and highlighted in Table 1. However, previous literature has reported different non-linear directions for this relationship. For example, some scholars argue and demonstrate that for the worst carbon performers in a sector, carbon-reducing investments might negatively affect financial profitability (Clarkson et al. 2011), especially if such efforts are only driven by compliance or regulatory requirements (King and Lenox 2002; Lankoski 2008), whereas others show that carbon emissions in general are negatively related to firm value (Griffin, Lont, and Sun 2017; Matsumura, Prakash, and Vera-Muñoz 2014). Accordingly, the overall insignificant results might be due to managers' different reactions to relative carbon performance. However, the inconsistency in prior literature could also stem from different frame conditions that previous research did not or could not control for. Indeed, we found that managers of firms with inferior carbon performance invested significantly more in carbon emission-reducing efforts in our experiment under the condition that the number of carbon-conscious investors was high. Accordingly, investor orientation toward carbon emission reduction seems to provide a sufficiently strong motivation for managers of firms with inferior carbon performance to invest in carbon emission-reducing efforts.

We can corroborate these findings with arguments based on sociopolitical theories (e.g., Delgado-Márquez, Pedauga, and Cordón-Pozo 2017) suggesting that poorly performing firms do not necessarily invest more resources in emission reduction. Only when external pressures increase and, thus, legitimacy is at risk, do managers seem to act. This interaction between an organizational-level factor (relative carbon performance) and an institutional-level factor (investor orientation) supports our claim that a simultaneous investigation of factors on different levels is warranted. Further support for this claim is provided by our finding of a significant interaction effect between a firm's incentive system design and short-term financial impact as two organizational-level factors. If managers were partially rewarded for carbon performance and were more certain about the short-term positive financial impact of such an investment, they invested significantly more in carbon emission reductions. The uncertainty about the financial impact of carbon-reducing investments might thus contribute to managers' focus on short-term pressures instead of long-term goals. This reasoning is also in line with the literature on managerial decision-making in complex situations (Kleinknecht et al. 2020).

Overall, we find clear support for three influential factors at the organizational and institutional levels (i.e., investor orientation, financial impact of carbon-reducing investments, and regulatory disclosure regime) and no empirical support for two further factors (i.e., relative carbon performance and incentive system). However, we show that the latter two factors are important as well because they interact with some of the aforementioned influential factors. The complexity of different institutional pressures and organizational characteristics in the realm of carbon reduction investments thus indeed warrants a simultaneous investigation, and we strongly encourage future research in this and related areas to account for this structural complexity in research approaches. Interestingly, however, our results do not show that the individual level, via managers' personal values, beliefs, and risk preferences, warrants such a simultaneous approach. The individual level instead seems to 'act' on its own. Picking up then beforementioned notion that "(...) giving any primacy to a level is an empirical question" (Felin, Foss, and Ployhart 2015), we thus argue that primacy might not exist and that both structure and agency matter. However, although managerial agency seems to exist independently of structure, different structural levels seem to be interdependent. We encourage future research to further challenge this finding or to find similar evidence in related areas.

5.2 | Practical Implications

Governments and other regulators are currently implementing new and adjusting existing regulations with the aim of decreasing carbon emissions. The results of our study directly connect to

and inform ongoing policy discussions. First, we found evidence that investor preferences can create real effects. This supports policy developments aimed at informing investors about the climate impact of companies, such as the SFDR (EU 2019/2088) or the EUGBS (EU 2023/2631).

Second, our finding that the financial impact of carbon-reducing investments plays a strong role in managers' decision-making supports the notion that high carbon prices can lead to increased corporate carbon reduction efforts.

Third, our findings indicate that mandating climate-related disclosures has a positive impact on carbon-reducing investments. This adds, for example, to the findings on the positive effects of the mandatory disclosure of carbon emissions (Bauckloh et al. 2022; Downar et al. 2021). Our empirical insights support the recent push toward mandated climate-related or sustainability-related disclosure as a policy tool. Although the results of our study do not allow for a specific evaluation of different initiatives (e.g., by the EU CSRD and the ISSB), they support the general idea of mandating carbon disclosure.

Fourth, the positive impact of mandating carbon disclosure materialized independently of all the other factors analyzed in our study, indicating an absence of adverse effects. We therefore conclude that mandatory carbon disclosure can also be a good complement to a variety of different sustainable finance regulations. In this vein, our results also hint at potentially reinforcing the mechanisms of some regulations. More specifically, if investors' orientation toward corporate climate impacts increases (e.g., due to the SFDR or the EUGBS), especially companies with high carbon emissions (i.e., poor carbon performance) might be incentivized to invest more in emission reduction efforts. Furthermore, higher carbon prices could lead to increased carbon-reducing investments, especially for firms that connect carbon performance measures to their incentive systems. Overall, our study provides evidence that policy efforts in the area of sustainable finance can have real carbon-reducing effects.

Finally, and beyond policy considerations, our findings on individual-level factors show that personal values, beliefs, and risk preferences have an impact on managers' carbon-reducing investment decisions but at the same time do not strongly interact with other factors. Accordingly, a "value screening" of existing or future managerial staff could thus be a useful human resources task for all firms in different settings that aim to reduce their carbon footprint.

6 | Conclusion

This study provided important insights into the key factors that shape managers' sustainability-related decision-making. We acknowledge, however, that the findings of our study need to be considered in light of its limitations. The results of the E-PVQ as part of the postexperimental questionnaire produced what could be considered an empirical anomaly: Our participants scored relatively high on both altruism and egoism, which goes against theoretical reasoning. However, prior work relying on the E-PVQ (Bouman, Steg, and Kiers 2018; Steg et al. 2014) shows that it is not uncommon to observe a positive or nonsignificant negative correlation between these two characteristics. Nevertheless, all this work could suffer from carry-over effects, in our case from emphasizing the carbon context in the vignettes which might have primed participants when answering the postexperimental questionnaires. Further limitations relate to the applied vignette experiment method. For example, designs such as ours specifically aim to achieve internal validity, which might come at the cost of external validity (R. Hahn et al. 2021). Most importantly, to avoid confounding factors and to limit the participants' cognitive effort, the number of included and manipulated factors at the institutional and organizational levels was limited to five. Although these factors were carefully selected based on prior academic literature and topical regulatory developments, other factors might well have been included. For example, team-level factors were not considered in our setting mainly due to methodological reasons, although they might represent important drivers in the decision-making process (e.g., Harmon, Haack, and Roulet 2019). We encourage future research to explore relations between these and other levels and to analyze further factors at the organizational (e.g., whether sustainability is anchored in a company's mission, vision, or policies) and institutional levels (e.g., the level of pressure by stakeholders other than investors) and how, together with personal values, beliefs, and risk preferences, they influence managerial decision-making.

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Conflicts of Interest

The authors declare no conflicts of interest.

Endnotes

[1] See https://www.epa.gov/ghgreporting.

[2] See https://climate.ec.europa.eu/eu-action/eu-emissions-trading-system-eu-ets_en.

[3] We are very grateful for the insightful comments of one of the anonymous reviewers who paved the way for this theoretical reflection.

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Appendix A

Portrait Value Questionnaire (How Much Is This Person Like You?)

Biospheric	**Not like me at all**		**Somewhat like me**			**Very much like me**	
It is important to [him/her] to prevent environmental pollution.	o	o	o	o	o	o	o
It is important to [him/her] to protect the environment.	o	o	o	o	o	o	o
It is important to [him/her] to respect nature.	o	o	o	o	o	o	o
It is important to [him/her] to be in unity with nature.	o	o	o	o	o	o	o
Altruistic	**Not like me at all**		**Somewhat like me**			**Very much like me**	
It is important to [him/her] that every person has equal opportunities.	o	o	o	o	o	o	o
It is important to [him/her] to take care of those who are worse off.	o	o	o	o	o	o	o
It is important to [him/her] that every person is treated justly.	o	o	o	o	o	o	o
It is important to [him/her] that there is no war or conflict.	o	o	o	o	o	o	o
It is important to [him/her] to be helpful to others.	o	o	o	o	o	o	o
Hedonic	**Not like me at all**		**Somewhat like me**			**Very much like me**	
It is important to [him/her] to have fun.	o	o	o	o	o	o	o
It is important to [him/her] to enjoy the life's pleasures.	o	o	o	o	o	o	o
It is important to [him/her] to do things [he/she] enjoys.	o	o	o	o	o	o	o
Egoistic	**Not like me at all**		**Somewhat like me**			**Very much like me**	
It is important to [him/her] to have control over others' actions.	o	o	o	o	o	o	o
It is important to [him/her] to have authority over others.	o	o	o	o	o	o	o
It is important to [him/her] to be influential.	o	o	o	o	o	o	o
It is important to [him/her] to have money and possessions.	o	o	o	o	o	o	o
It is important to [him/her] to work hard and be ambitious.	o	o	o	o	o	o	o
Business ethics question business ethics	**I strongly disagree**		**I neither agree nor disagree**			**I strongly agree**	
Business has a social responsibility beyond making a profit.	o	o	o	o	o	o	o
The ethics and social responsibility of a firm are essential to its long-term profitability.	o	o	o	o	o	o	o

Risk Preferences Questionnaire.

Risk aversion	**I strongly disagree**		**I neither agree nor disagree**			**I strongly agree**	
I tend to avoid talking to strangers.	o	o	o	o	o	o	o
I prefer a routine way of life to an unpredictable one full of change.	o	o	o	o	o	o	o
I would not describe myself as a risk-taker.	o	o	o	o	o	o	o
I do not like taking too many chances to avoid making a mistake.	o	o	o	o	o	o	o
Uncertainty avoidance	**I strongly disagree**		**I neither agree nor disagree**			**I strongly agree**	
I find it difficult to function without clear directions and instructions.	o	o	o	o	o	o	o
I prefer specific instructions to broad guidelines.	o	o	o	o	o	o	o
I tend to get anxious easily when I do not know an outcome.	o	o	o	o	o	o	o
I feel stressful when I cannot predict consequences.	o	o	o	o	o	o	o