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Agents of sustainable change: the importance of leadership and responsibility in corporate sustainability

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Introduction: Addressing climate change requires both individual behavioral change and corporate transformation, as organizations play a crucial role in a sustainable society. How sustainability in organizations is perceived and implemented, depends on diverse factors such as management practices, communication, individual attitudes, and behaviors of leaders and employees. However, current research only investigates factors that affect the implementation of sustainable development and practices separately. Hence, holistic approaches are required to provide insight into how they affect a company's sustainability efforts.

Methods: A quantitative online survey with n = 87 employees was conducted in Germany in 2023. The Corporate Sustainability Index (CSI) was developed to indicate the extent to which organizations implement sustainability into their policies and concrete practices. To investigate which factors predict corporate sustainability, we analyzed employee-, management-, and organization-related factors using multiple linear regression analysis.

Results: Institutionalized responsibility for sustainability was the strongest predictor of the CSI, along with a top-down approach to implement corporate sustainability. In contrast, employees' environmental awareness and their organizational citizenship behavior towards the environment were not related to CSI.

Discussion and conclusions: Our results stress the importance of leaders with an environmental focus as role models who can drive the transformation towards effective sustainability management in companies. This study offers important insights into the prerequisites for leaders to foster an environmentally responsible culture in their organizations.

KEYWORDS

Corporate Sustainability Index, sustainable leadership, individual pro-environmental behavior, perceived corporate sustainability, hierarchical linear regression

1 Introduction

The pressing challenges of climate change mitigation, including the rapid deterioration of environmental conditions, have urged both governments and organizations to accelerate effective and extensive sustainability measures (Fawehinmi et al., 2020). Ensuring sustainability is no longer just an option, but a necessity for companies. On the one hand, achieving sustainable development at the societal level appears to be unlikely without concurrent sustainable transformation within organizations (Schaltegger et al., 2016). On the other hand, setting and pursuing sustainability targets is demanded by all stakeholder groups and thus contributes to organizations' competitiveness (Yue et al., 2023). While many companies have recognized its importance, the implementation of sustainable practices is often hindered by several factors such as financial constraints and internal organizational factors (Gawusu et al.,

2022). As evidenced by a report from CDP, out of over 18,600 companies assessed, merely 0.4% demonstrated adequate disclosure of all essential indicators required for a credible climate transition plan aligned with the 1.5°C goal. This entails comprehensive strategies for greenhouse gas emission reduction and a targeted pathway towards achieving net-zero emissions by 2050 (CDP, 2023). The ongoing challenges faced by companies in implementing comprehensive sustainability initiatives and setting sustainability goals that promote sustainable development while maintaining economic viability have brought corporate sustainability to the forefront of academic research.

A primary emphasis in the extant literature revolves around employees and managers as change agents who drive corporate sustainability transformations through their individual behaviors, such as deciding on and implementing sustainability measures (Schaltegger et al., 2024). Concerning environmental sustainability in particular, various studies have investigated employee green behavior as a dependent variable indicating an organization's environmentalism, based on the assumption that employee behavior constitutes corporate sustainability (see Norton et al., 2015 for a review). Another line of research focuses on leadership behaviors as a management-related factor that indirectly shapes corporate sustainability by significantly influencing the pro-environmental behavior of employees (e.g., Liu and Yu, 2023; Saputro and Nawangsari, 2021). Although attributes such as green attitudes or green subjective norms have been recognized as influencing factors for green behaviors (Khalid et al., 2022), there is a lack of literature examining the characteristics that define employees and leaders as sustainability change agents (Schaltegger et al., 2024). Moreover, despite the widespread recognition of the importance of pro-environmental behavior and its influencing factors for corporate sustainability, only few empirical studies examine how these factors impact corporate sustainability directly. This represents another important research gap.

In addition to individual factors related to both employees and leaders, research has shown that organizational factors, such as culture and management strategies regarding sustainability, can act as facilitators or impediments to corporate sustainability, depending on their orientation and openness to change (Kiesnere and Baumgartner, 2019). However, to the best of our knowledge, the existing body of literature lacks empirical assessments of corporate sustainability that analyse individual, behavioral as well as organizational drivers in one frame of reference. Thus, this paper's aims are

A) To apply a multifactorial approach that investigates the direct influence of attitudinal, behavioral, and organization-related factors on corporate sustainability, and
B) To identify and quantify corporate sustainability predictors by using a methodological approach that considers different corporate sustainability drivers simultaneously.

A significant challenge in investigating corporate sustainability lies in the comparability of previous studies, complicated by the diverse range of variables proposed by different authors to measure corporate sustainability (Ruiz-Pérez et al., 2021). In their systematic review, Meuer et al. (2020) identify and compare corporate sustainability definitions and discern four conceptual components (genus, level of ambition, level of integration, and specificity of sustainable development) that describe the differences between these definitions. They found that the majority of definitions conceptualize corporate sustainability by drawing on either Elkington (1997). Triple Bottom Line or the definition given in the Brundtland Report (World Commission on Environment and Development, 1987) for sustainable development, thus linking corporate sustainability to economic, environmental, social, and intergenerational dimensions. In this paper, we adapted Meuer et al.'s (2020) corporate sustainability definitions and define it as "activities and policies integrated into a firm's overall strategy that contribute to addressing environmental issues." Thus, we concentrate on the environmental dimension of corporate sustainability, as it is particularly pertinent in the context of current debates, existing climate targets, and the ongoing corporate sustainability transformation.

To effectively analyze corporate sustainability as a target variable in this paper, our third aim is

C) To develop an instrument for measuring employees' perceptions of corporate sustainability that reflects the construct's complexity by taking several indicators into account.

2 Literature review

Before investigating individual (employee- and management-related factors) and organizational factors into a multi-factorial framework, key factors influencing corporate sustainability are identified from the current state of research. As highlighted, this research addresses the transformation of corporate sustainability as an integral part of combating climate change, with a focus on studies related to environmental sustainability. However, we will also review literature based on broader sustainability definitions to ensure a comprehensive understanding of the field.

2.1 Individual factors influencing sustainability

Environmental sustainability in organizations largely depends on the pro-environmental behavior of its members, both employees and executives (Robertson and Carleton, 2018). As "change agents for sustainability" they play a crucial role in steering organizational change. This involves shaping an organization's purpose including its vision and corporate goals; influencing organizational processes such as workflows and management tools; and influencing values, skills, and behaviors of others within the organization (Schaltegger et al., 2024). Thus, (voluntary) environmental behavior of employees has become a central variable in corporate sustainability research (Norton et al., 2015). An extensively studied approach to operationalizing employees' pro-environmental behavior is through Organizational Citizenship Behavior for the Environment (OCBE). This concept refers to environmentally friendly actions undertaken by employees that are not formally recognized by the reward system but contribute to improving the effectiveness of an organization's environmental management (Boiral, 2009). The significance of employees' OCBE has been underscored by empirical studies revealing its positive correlation with corporate sustainability indicators, such as green product development performance (Chang et al., 2019). More generally, Luu (2020) demonstrated a positive relationship between employees' OCBE and corporate sustainability which the authors defined as organizational green performance. Contrarily, other studies proposed an indirect influence of OCBE, acting as a mediator: For

example, Yue et al. (2023) suggest that OCBE serves as a mediator between the presence of an environmental management system and corporate sustainability, while Khan et al. (2021) propose that OCBE partially mediates the influence of green human resource management practices on corporate sustainability. Both studies sampled Malaysian manufacturing firms.

The impact of OCBE suggests considering factors that promote OCBE for advancing corporate sustainability. Several studies have highlighted the importance of leadership behavior as a management-related factor in promoting sustainable behaviors among employees (e.g., Biswas et al., 2022). Specifically, environmental transformational leadership has been identified as a catalyst of employees' OCBE (e.g., Asghar et al., 2022; Liu and Yu, 2023). Environmentally-specific Transformational Leadership (ETFL) is a target-specific conceptualization of transformational leadership which can be defined as "a manifestation of transformational leadership in which the content of the leadership behaviors are all focused on encouraging pro-environmental initiatives" (Robertson and Barling, 2013, p. 177). All four transformational leadership dimensions (idealized influence, inspirational motivation, intellectual stimulation, individualized consideration) are also applicable as behaviors that enhance environmental corporate sustainability and thus constitute ETFL. More generally, environmentally-specific transformational leaders encourage their subordinate employees to participate in pro-environmental behaviors in the workplace (Robertson and Barling, 2013). Again, similar constructs are operationalized differently in the research field. For example, Wang et al. (2018) examined green transformational leadership, which is closely related to ETFL. They found that leaders indirectly influence employee green behaviors because green transformational leadership promotes value congruence. Thus, employees who see their values as aligned with their leaders' values are more likely to engage in green behaviors, as they find their work tasks to be congruent with their personal values and therefore more fulfilling. However, while leadership can foster sustainable behaviors of employees by demonstrating green behaviors themselves, the direct link between ETFL and corporate sustainability remains uncertain. Using a broad definition of corporate sustainability, which incorporates societal, economic, and environmental dimensions, Shoaib et al. (2022) reported that there was no significant direct correlation between ETFL and a company's sustainable performance.

In addition to the aforementioned leader (ETFL) and employee (OCBE) behaviors, individual attitudinal factors are of significant relevance, as they serve as determinants of these behaviors and, consequently, exert an indirect influence on corporate sustainability. To illustrate, in addition to the direct linkage from ETFL to employee pro-environmental behaviors, Robertson and Carleton (2018) identified an indirect effect that operates through employees' perceptions of the pro-environmental work climate, which is further moderated by their environmental locus of control. However, individual factors have been explored not only as indirect influences within leadership contexts but also as direct drivers of pro-environmental behaviors. For instance Hansmann and Binder (2020) illustrate the complexity of factors shaping pro-environmental behaviors by analyzing them across public and private spheres. While the authors consider numerous predictor variables, including personal motivations (e.g., environmental attitudes and green identity), demographics, personal capabilities (e.g., environmental knowledge and income), and social contexts (e.g., descriptive social norms), they acknowledge their inability to encompass all relevant factors in a single study due to their extensive range. Focusing on workplace settings, the multilevel review by Norton et al., 2014 and Blok et al. (2015) and meta-analysis by Katz et al. (2022) provide a comprehensive overview of the individual influencing variables that affect employee green behaviors. These include individual environmental attitudes, demographic characteristics, work-related perceptions, job attitudes, motivation, affect, and components of Ajzen's (1991) theory of planned behavior framework such as norms and perceived behavioral control. In reviewing the existing literature, it is noteworthy that individual environmental attitudes or related constructs have consistently emerged as a significant positive influence on employee green behaviors (Norton et al., 2015). For example, Li et al. (2023) found that environmental attitudes, here operationalized as environmental awareness, positively influence employee green behavior, while Zientara and Zamojska (2018) found that environmental values were positively associated with OCBE. In contrast, Foster et al. (2022) found that individual environmental attitudes did not significantly impact pro-environmental behavior. However, it must be noted, that they analyzed environmental commitment, environmental awareness, and green self-efficacy as constructs reflecting environmental attitudes. This further illustrates the wide range of possible variables that can be examined as environmental attitudes and the resulting difficulty in comparing different studies.

As the sustainable transformation of companies is a process of extensive change, employees' openness to change is another potential individual driver that has been identified as positively related to employee green behaviors (Katz et al., 2022). However, this finding is contradicted by the study of Blok et al. (2015) where openness to change was not significantly related to pro-environmental behavior, indicating the necessity for additional research to clarify this matter.

Overall, the literature reviewed illustrates the importance of employees' individual attitudes, their pro-environmental behaviors, often measured as OCBE, and managers' pro-environmental leadership behaviors as drivers of corporate sustainability either directly or indirectly through their influence on employee pro-environmental behaviors. Finally, individual attitudes or values can influence organizational values, which form the foundation of an organization's culture and, subsequently, drive the implementation of sustainability initiatives. Since corporate sustainability can be advanced by aligning individual and organizational values (Avota et al., 2015), the next section will focus on organizational sustainability drivers.

2.2 Organizational factors shaping sustainability

Organizational factors are recognized as critical drivers of a company's sustainability and its broader contribution to environmental and social goals. With regard to the implementation of sustainability at the structural level, Gotsch et al. (2023) conducted an analysis to ascertain the impact of top-down, management-driven and bottom-up, employee-driven approaches on corporate sustainability. They emphasized the importance of striking a balance between these two approaches. A top-down strategy aligns organizational policies

and sustainability goals, while a bottom-up approach fosters a collaborative environment where employees feel empowered to contribute their ideas and efforts. The authors posit that the vision and values pertaining to sustainability, which are established and disseminated by management, impact employee engagement from a bottom-up perspective. These values shape the conditions under which employees can engage in pro-environmental behaviors, which can be either encouraging or discouraging. Furthermore, Kiesnere and Baumgartner (2019) emphasize the need to combine top-down and bottom-up approaches, in which corporate sustainability is addressed across all organizational units and management levels. They highlight the importance of top-down management support for the advancement of bottom-up employee-driven measures at both the normative and strategic levels.

Regardless of the chosen approach to promote it, the overall relevance attributed to sustainability within the organizational context has been highlighted as a key driver of corporate sustainability, thereby shaping the implementation of sustainability measures and policies. Multiple studies underscore the significance of how employees perceive sustainability values within their organization to foster internal environmental behaviors (Latif et al., 2022; Norton et al., 2014). In the existing literature, several constructs are discussed with regard to the internal perception of corporate sustainability and its relevance. In this paper, two such constructs will be reviewed, namely Psychological Green Climate (PGC) and Green Work Climate, which have been studied in relation to pro-environmental employee behaviors.

PGC denotes the collective perception of employees regarding a company's policies and procedures promoting environmental sustainability and green values. It is notably enhanced when a visible corporate environmental strategy is in place (Biswas et al., 2022). Research indicates that PGC plays a crucial role in influencing employees' sustainability behaviors positively. For example, Norton et al. (2017) analyzed the moderating effect of PGC on the relationship between intentions for green behavior and actual environmental behavior. Specifically, this relationship tends to be stronger when PGC is more positive.

Similarly to PGC, green work climate perception reflects employee perceptions regarding their organization's and colleagues' orientation towards environmental sustainability (Norton et al., 2014). Norton et al. (2014) argue that a green work climate is a mediator that strengthens the positive relationship between the employees' perception of an existing sustainability strategy and their pro-environmental behavior. Additionally, Liu and Yu (2023) identified green work climate as mediating the relation between green transformational leadership and Organizational Citizenship Behavior for the Environment (OCBE). Latif et al. (2022) contextualize this and assert that a collective green vision within an organization augments pro-environmental behavior. Collectively, the literature underscores that the perceived relevance of sustainability within the organizational framework has a positive impact on internal sustainability behavior, thereby contributing to the overall sustainability transformation of the company.

Since an organization can only be perceived as sustainable if there is sufficient internal communication and thus transparency about its environmental efforts, this factor is also mentioned in the prevailing literature and some articles emphasize the positive relationship between transparency and corporate sustainability (Ludwig and Sassen, 2022). In recent years, more positions in companies have been filled by sustainability managers as the relevance of corporate sustainability has increased. Allocating a specific sustainability position reflects a company's sustainability objectives and facilitates corporate sustainability by institutionalizing sustainability responsibility (Borglund et al., 2023).

Another organizational factor that has been identified as a relevant driver of corporate sustainability is company size. Research has shown that, on the one hand, larger companies tend to focus more intensively on ecological change and are better equipped to implement internal sustainability strategies (Risius et al., 2023). On the other hand, small and medium-sized enterprises (SMEs) face significant challenges in implementing corporate sustainability policies due to their limited access to essential resources such as financial backing, time, and advanced technology, while at the same time, their stakeholders are increasingly demanding sustainability. Resulting from these resource constraints, SMEs often exhibit lower levels of sustainability knowledge and awareness, thereby further hindering their sustainability transformation (Bakos et al., 2020; Font et al., 2016). For example, SMEs have less knowledge of sustainability management tools and are less likely to apply them (Hörisch et al., 2015).

Company age emerges as another potentially impact factor in this context. Previous research indicates that a company's priorities and objectives, which shape its approach to sustainability, are influenced by its age and developmental phase. Lammers et al. (2022) found that start-ups tend to prioritize economic objectives over social and environmental ones. This preference, they argue, stems from the perceived greater societal importance of economic success.

2.3 Research gaps and questions

A review of the existing body of literature has identified numerous individual and organizational drivers of corporate sustainability. Furthermore, the review has demonstrated that corporate sustainability, as a target variable, is not a uniform concept, but rather contingent upon the research focus and available resources. Consequently, sustainability definitions vary in terms of their level of ambition and integration, as well as their specificity regarding the conceptualization of sustainable development (Meuer et al., 2020). To facilitate the comparison of different corporate sustainability studies, there is still a need to develop widely accepted and used corporate sustainability measurement tools. This encourages our aim to develop and test a novel instrument for measuring environmental corporate sustainability that reflects its multifaceted nature, considering both specific measures and sustainability integration into corporate policy. Furthermore, the studies reviewed that have directly correlated green behavior with corporate sustainability have focused exclusively on samples from Southeast Asia. This highlights the need to broaden the scope of empirical research to include samples from diverse regions and cultures.

Further, this study aims to adopt a multi-factorial approach to investigate different drivers of corporate sustainability simultaneously. Despite the insights described, current research lacks an integrated perspective that encompasses both individual (attitudinal and behavioral) and organizational factors at the same time. Consequently, the following research questions were derived:

> **RQ1:** Which attitudinal and behavioral factors influence corporate sustainability?
> **RQ2:** Which organizational factors influence corporate sustainability?
> **RQ3:** Which attitudinal, behavioral, and organizational factors can be used to predict corporate sustainability?

Considering the challenge of capturing all relevant corporate sustainability drivers in a single empirical study, we will focus on key factors identified as significant in multiple studies (such as environmental attitude and environmental awareness) along with those that require further examination due to mixed outcomes (such as openness to change).

3 Materials and methods

To investigate our research questions, we conducted a quantitative online survey using Qualtrics software (Version March 2023; ©2023 Qualtrics, Provo, UT). Employee, management, and organisational factors were either measured with validated scales or derived and qualified from a qualitative pre-study in which semi-structured interviews were conducted with employees ($n = 7$) and corporate sustainability experts ($n = 5$) on the status of corporate sustainability implementation and their perceptions. Since the aim of the present paper was a quantitative-holistic analysis of impact factors, the detailed insights of the qualitative study are not presented in this paper, but in another, forthcoming publication.

3.1 Survey structure and variables

Following an initial thematic introduction, the questionnaire provided information on anonymous data collection, analysis, and utilization, and included a request for consent from the subjects. It then consisted of the following sections:

a) At the beginning, we queried sociodemographics, including *gender, age* in years, highest *educational attainment* so far, type of latest or current *employment* (full-time, part-time, student assistant/mini-job, internship/short-term employment, or no employment) and whether they were in a *leadership position* (yes, no).
b) For individual attitudinal factors, we integrated two scales measuring *environmental awareness* (e.g., "We should not use more resources than can be replenished.") with eight items by Geiger and Holzhauer (2020) and *general openness to change* ("Change measures usually make me feel optimistic.") with four items of the scale developed by Szebel (2015).
c) Next, we included individual behavioral factors and measured employees' sustainable behavior by adapting the *Organizational Citizenship Behavior for the Environment* (OCBE) scale by Boiral and Paillé (2012) and translated twelve of the originally 13 items into German (e.g., "I voluntarily carry out environmental actions and initiatives in my daily work activities"). The perception of leaders' sustainability behavior was operationalized as *Environmentally-specific Transformational Leadership* (*ETFL*) and assessed with six items (e.g., "My leader/manager showed that he/she valued the environment.") from Robertson and Barling (2017).
d) As part of the organizational factors, *company size* (up to 9, 49, 249 and more than 249 employees) and *sector* (commercial service, trade, industry, public service, craft, other) were assessed as key corporate demographics.
e) Finally, respondents were asked about organizational factors regarding corporate sustainability. Here, participants were asked if sustainability in their organizations is approached in a *top-down*, management-driven or *bottom-up,* employee-initiated way (four self-conceived items, e.g., "Regarding sustainability, our employees are pushing the issue more than management"). Based on both insights from the pre-study as well as the literature on transparency and responsibility we measured *institutionalized sustainability responsibility* (from here on also referred to as *institutionalized responsibility*), which was defined as the assignment of responsibilities and competencies for sustainability issues within an organization and the perception of these (four items, e.g., "Our company employs a sustainability expert."). Corporate actions regarding sustainability were measured with 13 items describing different possible areas of *sustainable measures* (e.g., "To become more sustainable, my company approached measures in the area of energy management/mobility/…") as well as an adaptation of the *Corporate Environmental Policies* (*CEP*) scale (Ramus and Steger, 2000) extended to 15 items (e.g., "My Company has specific sustainability targets"). All described multi-item constructs were measured on six-point Likert-scales (1 = strongly disagree, 6 = totally agree) with an additional "I do not know" option for the organizational factors. Finally, we assessed the perceived *relevance of sustainability* once across the *overall* company, at the *management* level, and the *employee* level ("How important is the topic of sustainability in your company overall/at the management level/among employees?") each on a scale from 0 (irrelevant) to 100 (extremely relevant). We decided not to include psychological green climate or green work climate variables, as we already incorporated measures assessing the perception of companies' sustainability initiatives and policies (using the measures and CEP scale), as well as the perceived environmental orientation of colleagues, leaders, and the entire company by evaluating their relevancies.

3.2 Statistical analysis

All analyses were computed using R Studio Version 2022.12.0 + 353. First, we conducted descriptive analyses, calculating measures of central tendency (mean values) and dispersion (standard deviations), and assessed the internal reliability of all multi-item constructs using Cronbach's Alpha (see Table 1). Increased or decreased construct means were statistically validated with one sample t-tests for normally distributed variables and Wilcoxon signed-rank tests for non-normally distributed variables. When evaluating the sustainability measures and policies (s. 4.1), missing values ("I do not know") were not included. On average, there were eleven missing values per measure and twenty per policy, indicating that respondents were unaware of whether specific sustainability measures or policies were implemented in their respective companies.

TABLE 1 Descriptive analysis of attitudinal factors, behavioral factors, and corporate sustainability (n = 87).

		M	*SD*	Cronbach's α	Scale
Individual factors	Environmental awareness	4.76	0.68	0.83	1–6
	Openness to change	4.35	0.7	0.7	1–6
	OCBE	3.38	0.92	0.9	1–6
	Leadership (EFTL)	3.3	1.11	0.93	1–6
Organizational factors	Top-down	3.14	1.17	0.71	1–6
	Bottom-up	3.67	1.06	0.8	1–6
	Institutionalized responsibility	3.83	1.47	0.9	1–6
	Relevance overall	55.37	26.53	-	1–100
	Relevance for employees	53.06	24.11	-	1–100
	Relevance for managers	48.82	29.02	-	1–100

Possible relations between variables were investigated by calculating bivariate correlations using Spearman's rank correlation as not all variables were normally distributed. Before performing the regression analysis, all necessary assumptions were tested. Bivariate correlation analysis indicated linearity, while the Breusch-Pagan test confirmed homoscedasticity and low variance inflation factors (VIFs in the range of 1.3–2.1) ruled out multicollinearity. The normal distribution of residuals was confirmed by both visual inspection and the Shapiro–Wilk test.

3.3 Sample

Data were collected in Germany in March 2023, with participants recruited through a combination of personal contacts and social media platforms. To ensure data quality, we discarded incomplete surveys, speeders (response time below 50% of the median, Md = 29 min.), and non-differentiated data sets. As our focus was on the employee perspective, we omitted 14 data sets from respondents in an executive position. The final sample (n = 87) comprised 72% female (n = 63) and 28% male (n = 24) participants. The mean age of participants was 28 years (SD = 9.21), with an age range spanning from 18 to 56 years. With 61% the majority of participants exhibited high educational attainment (n = 53), while 38% held medium levels (n = 33) and only 1% fell within the lower range of educational attainment (n = 1). The determination of educational levels was based on the International Standard Classification of Education (ISCED). Regarding employment relationships, most participants worked full-time (40.23%, n = 35) or as student assistants and mini-jobbers (37.93%, n = 33). Other employment forms were part-time (18.39%, n = 16) and short-term employment or internships (3.35%, n = 3).

For the individual factors, the sample exhibited an elevated environmental awareness (M = 4.76, SD = 0.68, $Z = -7.85$, $p < 0.001$, r = 0.85) and openness to change (M = 4.35, SD = 0.7, $Z = -7.28$, $p < 0.001$, r = 0.8). The respondents indicated that both their Organizational Citizenship Behavior for the Environment (OCBE) and the perceived environmentally-specific transformational leadership (ETFL) behavior of their superiors were mediocre (Table 1).

Regarding the organizational factors, the mean values of all other factors were closely clustered around the scale means, except for a top-down approach towards sustainability, which was slightly lower (M = 3.14, SD = 1.17, $Z = -2.62$, $p < 0.01$, $r = -0.3$). Six participants worked in very small companies (up to 9 employees), 19 in small companies (10–29 employees), 18 in medium-sized companies (30–249 employees), and 44 in large companies (over 249 employees).

4 Results

4.1 Descriptive analysis of corporate sustainability practices

In this section, the descriptive results of measures that companies have already implemented to enhance their sustainability, as well as the policies employed to integrate sustainability into their corporate culture, are reported.

The most frequently implemented sustainability measures in companies pertained to energy management (M = 4.53, SD = 1.3), waste separation (M = 4.45, SD = 1.4), digitalization (M = 4.35, SD = 1.48), and mobility (M = 4.32, SD = 1.58). These initiatives were widely recognized with more than three-quarters of participants indicating their implementation in their respective organizations. Less prevalent sustainability measures were raising awareness about the current status of corporate sustainability (M = 6.62, SD = 1.58) – e.g., by collecting data on resource consumption –, acquiring knowledge (M = 3.41, SD = 1.64), and adapting their business model to promote sustainability (M = 2.78, SD = 1.69). The response distributions for all sustainability measures can be seen in Figure 1.

Further, respondents were asked which environmental policies already affect their business activities. The predominant policy emphasized companies' commitment to environmental protection (M = 4.63, SD = 1.31), closely followed by dedication to becoming more eco-friendly (M = 4.47, SD = 1.27) and the pursuit of a sustainability-driven vision (M = 3.86, SD = 1.68). These three policies, in essence, describe overarching attitudes or orientations of companies towards sustainability. More tangible policies were less prevalent in respondents' ratings. Only about a third of the respondents stated that their companies offer employee training on sustainability (M = 2.83, SD = 1.86), enforce global environmental standards (M = 2.70, SD = 1.78), and use an environmental management system (M = 2.69, SD = 1.64). As leadership behavior was identified as an important aspect influencing corporate sustainability, it is worth noting that 58% of respondents reported that

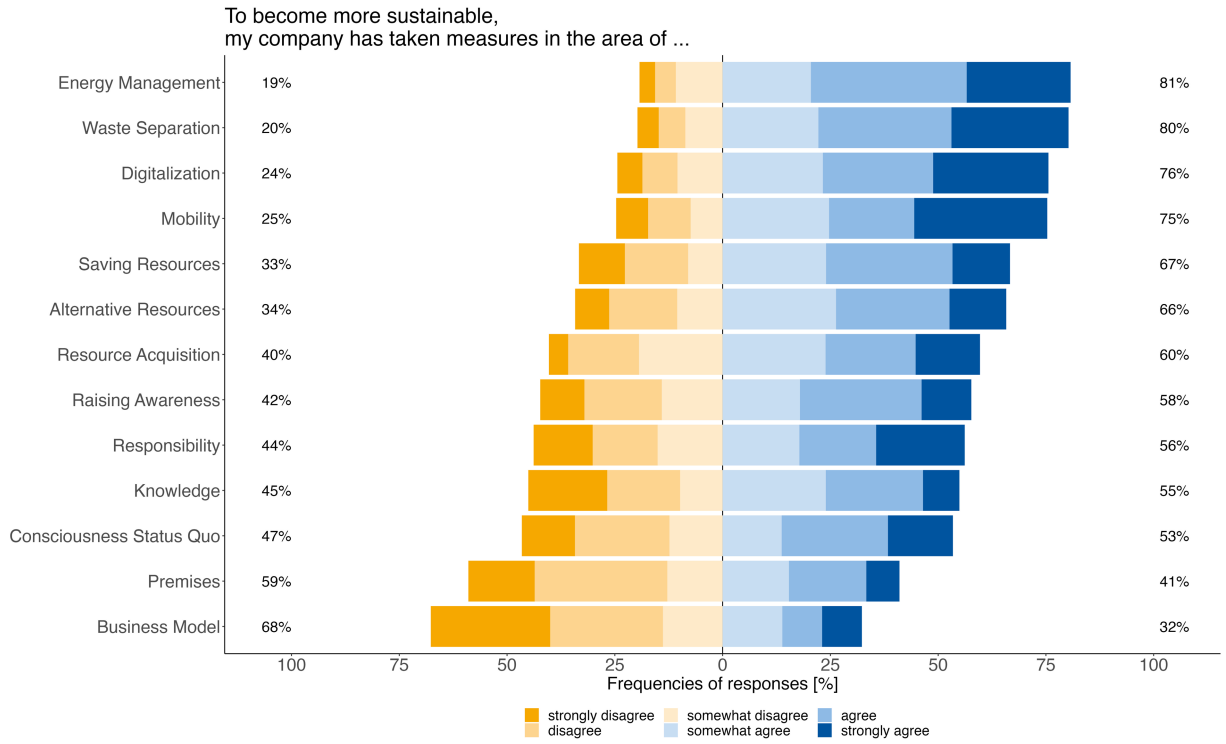

FIGURE 1
Response distributions for perceived sustainability measures in companies (n = 65–86, "I do not know" excluded).

their managers consider sustainability ($M = 3.58$, $SD = 1.64$). Response distributions for all policies can be seen in Figure 2.

4.2 Corporate Sustainability Index (CSI)

As previously stated, various factors such as perceived corporate structures, individual attitudes, and behaviors of leaders and employees influence corporate sustainability. To investigate the interplay between those factors and corporate sustainability, its robust operationalization was a necessary initial step. Therefore, we composed an additive index that comprises sustainability measures and the corporate environmental policies (CEP scale) with 28 items in total. This Corporate Sustainability Index (CSI) reflects a holistic corporate sustainability indicator and encompasses both tangible sustainability actions as well as the integration of sustainability into corporate strategy and culture. In the present study, CSI demonstrated a very high internal consistency ($\alpha = 0.96$) and was normally distributed ($M = 3.63$, $SD = 0.95$). Therefore, CSI is analyzed as a dependent target variable in the following inferential statistical analyses.

4.2.1 Factors correlated to CSI

Bivariate correlations were calculated to determine relations between individual attitudinal and behavioral factors and CSI (Table 2). Neither the employees' environmental awareness ($r_s = -0.13$, $p = 0.223$, n.s.) nor their openness to change ($r_s = 0.07$, $p = 0.532$, n.s.) or their OCBE ($r_s = 0.21$, $p = 0.054$, n.s.) was related to their company's CSI. The only behavioral factor which was significantly correlated to CSI was the management behavior measured in ETFL ($r_s = 0.66$, $p < 0.001$). Hence, the more leaders act sustainably and encourage sustainable practices among their employees, the higher a company's CSI score.

Bivariate correlations for CSI and the organizational factors were also calculated (Table 3). While the approach of driving sustainability from the management in a top-down manner showed a strong positive association with CSI ($r_s = 0.70$, $p < 0.001$), it was not significantly related to a bottom-up approach ($r_s = -0.07$, n.s.), suggesting that higher CSI levels are not affected by such an approach. Among all evaluated factors, institutionalized responsibility ($r_s = 0.76$, $p < 0.001$) had the strongest association with higher CSI levels. Thus, companies with institutionalized sustainability responsibility structures had elevated CSI levels. Regarding the perceived relevance of sustainability in the company, an increased overall relevance ($r_s = 0.65$, $p < 0.001$), a higher perceived relevance for employees ($r_s = 0.53$, $p < 0.001$) as well as for managers ($r_s = 0.69$, $p < 0.001$) was significantly related to higher CSI levels. Of these, the perception of how relevant sustainability appears to the management showed the strongest correlation with CSI.

Summing up so far, the correlation analysis revealed significant associations between CSI and both leadership behavior (specifically ETFL) and several organizational factors, including a top-down approach and institutionalized sustainability responsibility.

4.2.2 Predictors of corporate sustainability

In the next step, we conducted a hierarchical regression analysis to predict CSI. The perceived relevancies were not included as predictors, as their relationship to CSI cannot be assumed to be causal. For example, although it is reasonable to assume that in more sustainable acting companies the perceived relevance of sustainability is higher, this does not necessarily imply that this sustainability results from the perceived relevance. See Table 4 for an overview of the explained variances in each model and β-values as well as levels of significance for all predictors.

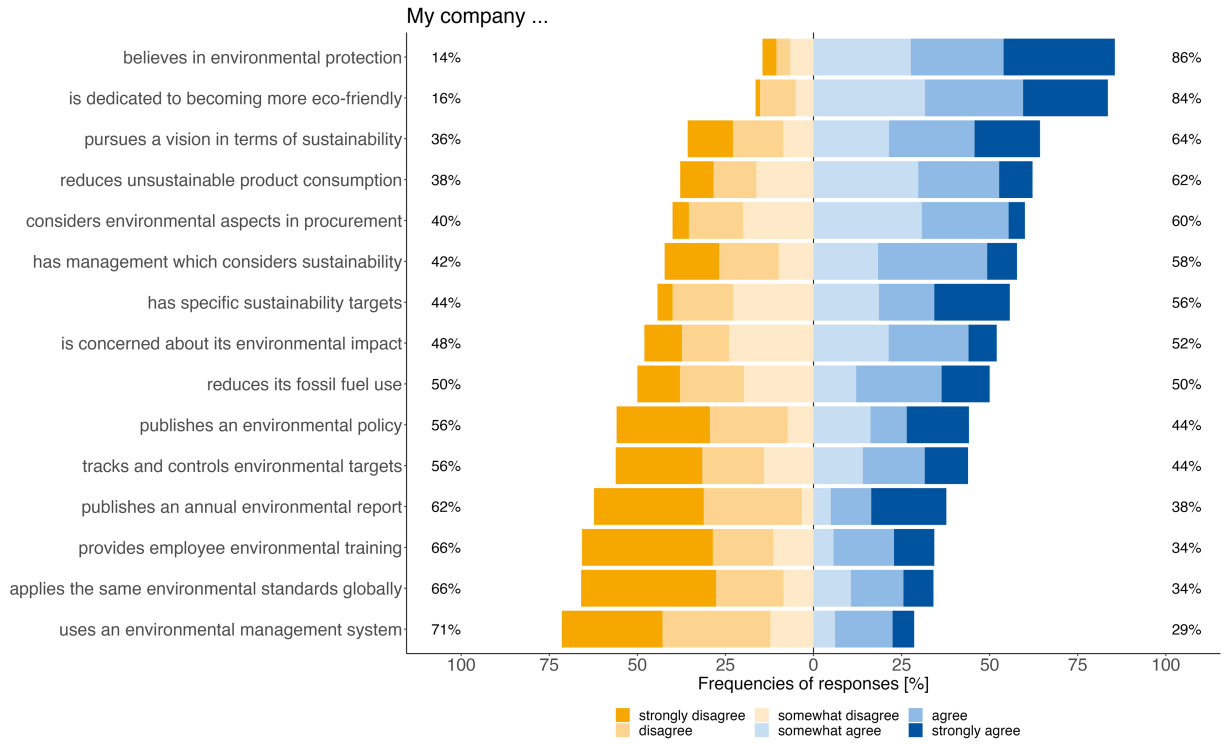

FIGURE 2
Response distributions for perceived corporate environmental policies (n = 47–79, "I do not know" excluded).

TABLE 2 Bivariate correlations Corporate Sustainability Index, attitudinal and behavioral factors (n = 87).

		Eco Consciousness	Openness to change	OCBE	ETFL
CSI	Spearman's rho	−0.13	0.07	0.21	0.66
	p-value	0.223	0.532	0.054	< 0.001

TABLE 3 Bivariate correlations Corporate Sustainability Index and organizational factors (n = 87).

		Top-down	Bottom-up	institutionalized responsibility	Relevance overall	Relevance for employees	Relevance for managers
CSI	Spearman's rho	0.70	−0.07	0.76	0.65	0.53	0.69
	p-value	< 0.001	0.499	< 0.001	< 0.001	< 0.001	< 0.001

TABLE 4 Results of hierarchical regression analysis on the prediction of the Corporate Sustainability Index (n = 87).

Variables	Model 1	Model 2	Model 3
ETFL	0.65***	0.34***	0.15
Top-down		0.44***	0.35***
institutionalized responsibility			0.54***
Adjusted R^2	0.41	0.51	0.74

Dependent variable: Corporate Sustainability Index (CSI); Asterisks indicate level of significance (* = $p < 0.05$, ** = $p < 0.01$ =, *** = $p < 0.001$).

Model 1 (with ETFL as a predictor) accounted for 41% of the variability in CSI (adjusted $R^2 = 0.41$; $F(1, 85) = 61.4$, $p < 0.001$). Companies in which the participants evaluated their leaders as more environmentally transformational ($\beta = 0.65$, $p < 0.001$) scored higher on the CSI. In Model 2 (adjusted $R^2 = 0.51$; $F(2, 84) = 45.6$, $p < 0.001$) the predictor "top-down approach" was included, which significantly improved the explained variance from 41% to 51% ($F(1, 84) = 17.7$, $p < 0.001$). This suggests that a pronounced top-down approach to sustainability led to elevated CSI scores ($\beta = 0.44$, $p < 0.001$). ETFL remained a significant predictor in Model 2. Lastly, adding institutionalized sustainability responsibility as a predictor led to the significant Model 3 (adjusted $R^2 = 0.74$; $F(3, 83) = 80.8$, $p < 0.001$), which increased the explained variance by 23% up to 74% ($F(1, 83) = 73.0$, $p < 0.001$). Higher levels of institutionalized responsibility as a newly added variable were strongly related to higher CSI levels ($\beta = 0.54$, $p < 0.001$). Whilst top-down remained a highly significant predictor in model 3, ETFL became insignificant. In summary, institutionalized sustainability responsibility was the strongest predictor of CSI followed by a top-down approach when integrating

sustainability. Although, ETFL was strongly correlated with CSI and a significant predictor in models 1 and 2, it became insignificant in model 3. This diminished significance may be attributed to the limited sample size or potential overlap among the factors. However, multicollinearity checks confirmed it was not a major concern.

4.2.3 Corporate demographics

In a subsequent step, the remaining organizational factors, which describe key corporate demographics, were analyzed. We built two groups regarding company size to analyze if there is a difference between small and medium-sized enterprises (SMEs) with up to 249 employees ($n = 43$) and large enterprises with 250 or more employees ($n = 44$) regarding their corporate sustainability. The results of Welsh's two-sample t-test ($t(84.6) = 3.29$, $p < 0.01$) indicated that large enterprises ($M = 3.95$, $SD = 0.94$) are more progressive in terms of sustainability and thus have a significantly higher CSI than SMEs ($M = 3.31$, $SD = 0.86$).

4.3 Initial insights: Leadership's role in sustainability

While this paper mainly discusses the effects of the employee sample on corporate sustainability, this section briefly explores individuals in leadership or management roles ($n = 14$), as our results imply a significant role of leaders in corporate sustainability. It is important to note that this can only be interpreted as an exploratory preliminary insight into a potential research direction due to the very small sample size.

The sample comprised eight male and six female participants in leadership positions (age: $M = 37.5$, $SD = 14.79$, 24–62 years). Notably, leaders had a higher environmental awareness ($M = 4.86$, $SD = 0.9$) and openness towards change ($M = 5.02$, $SD = 0.66$) in comparison to employees (s. 3.3). Additionally, leaders scored higher on the OCBE scale ($M = 3.95$, $SD = 1.14$; Figure 3).

When comparing bivariate correlations, leaders' OCBE correlated highly significantly with CSI ($r = 0.78$, $p < 0.001$) – in contrast to the employee sample (n.s., s. 4.2.1). This indicates that higher OCBE levels among leaders are linked to greater sustainability within their organisations while employees OCBE does not significantly influence corporate sustainability. When comparing the two samples, the leadership sample showed a higher variability ($M = 4.03$, $SD = 1.32$) in CSI.

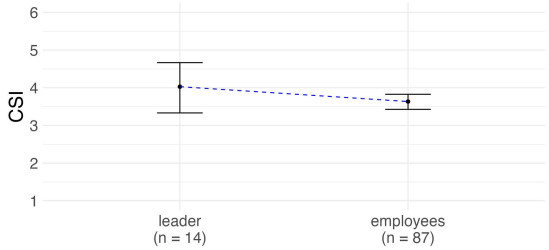

FIGURE 3
Mean CSI of leaders and employees (error bars indicate 95% confidence intervals based on bootstrap).

5 Discussion

The aim of this study was to investigate the multidimensional factors influencing corporate sustainability, emphasizing the roles of both individual factors (attitudes and behaviors) and organizational structures. We conducted a quantitative online survey and developed the Corporate Sustainability Index (CSI). Key findings from our analysis highlighted the impact of leadership behavior (ETFL) on corporate sustainability. Organizational factors such as a top-down structure and institutionalizing sustainability responsibility further acted as strong determinants of sustainability levels. Larger enterprises showed a greater inclination towards sustainable practices compared to SMEs. Additionally, the exploratory observations on leaders highlighted their potential to shape an organization's sustainability efforts. In the following sections, these results, their practical implications, methodological limitations, and future research steps are discussed according to the impact of individual factors (RQ1), organizational factors (RQ2), and their holistic impact on corporate sustainability (RQ3).

Prior research stressed the role of individual employee factors in corporate sustainability (e.g., Biswas et al., 2022). In contrast, our results challenge the notion that individual factors such as environmental awareness, openness to change as well as pro-environmental citizenship (OCBE) directly impact a company's sustainability. This discrepancy could arise from differences in measuring corporate sustainability or our approach of directly correlating individual factors with CSI, rather than considering individual factors as moderator or mediator variables for employee green behaviors. To elucidate this question, future analysis could employ structural equation modelling to explore potential indirect effects of individual factors, their influence as moderator or mediator variables, and ascertain whether they exert an indirect influence on CSI. More generally, this discrepancy points to the need for further research into the interaction between individual behavior and organizational structures in order to gain a better understanding of the conditions (e.g., different organizational cultures) and the extent to which employee behavior can significantly influence corporate sustainability. However, based on the findings of this study, we recommend that future research should explore how individual factors, such as personal environmental awareness, can be leveraged to exert greater influence within companies, and how additional opportunities and formats can be developed to facilitate this. Albrecht et al.'s (2023) model of pro-environmental engagement offers a valuable framework for this exploration, suggesting that employees' pro-environmental behavior can be enhanced by increasing the availability of information, opportunities, and support from colleagues and leaders, which may further elucidate how individual factors can be effectively leveraged to promote sustainability within companies.

In contrast to employee behavior, leadership behavior appeared to significantly impact corporate sustainability. As a novelty, we examined the direct influence of ETFL on corporate sustainability, whereas prior research mainly focused on ETFL as a facilitator for employee green behaviors, i.e., OCBE (e.g., Asghar et al., 2022). The strong impact of leader behaviors on corporate sustainability, in comparison to employees without leadership tasks, may lie in the managerial capacity to implement more extensive measures due to their hierarchical position (Schaltegger et al., 2024), but also the effect of strong role models that influence employees' opinions, attitudes, and behaviors.

Regardless of the importance of leadership behavior, 42% of participants still stated that their management does not consider sustainability in their actions, yet. However, in our preliminary exploratory analysis, managers' OCBE exceeded that of employees, and unlike their pro-environmental citizenship behavior, managers' OCBE was positively correlated with CSI. Thus, future research should aim at examining the factors that characterize managers as sustainability leaders and facilitate their pro-environmental behaviors due to their potentially higher impact on CSI. In this context, Keil and Arning (2024) demonstrated that leaders' OCBE can be explained by variables derived from Value-Belief-Norm Theory (Stern et al., 1999), as well as by their sustainability interest, innovativeness, and locus of control. Building upon the results of Knight and Paterson (2018), who identified personal expertise and influencing skills as defining behaviors of sustainability leaders, we suggest investigating these individual factors as further potential CSI predictors. Overall, our results underscore the relevance of individual leadership behavior and the importance of training and sensitizing leaders, who drive sustainability transformations in their respective companies. In the context of sustainability education, Haney et al. (2020) propose to focus on leaders' emotional engagement and moral obligation concerning sustainability.

The most influential organizational factor predicting sustainability was found to be creating clear institutionalized responsibility, which defines that there is a person or department responsible for sustainability. This indicates that more sustainable companies appoint and communicate sustainability responsibilities (e.g., Ludwig and Sassen, 2022). As institutionalized sustainability responsibility in the way we defined it has not been addressed in the literature so far, this study contributes to current research on the strategic approach to sustainability. The findings imply that companies should recognize the need to carefully manage the responsibility for corporate sustainability, e.g., by establishing management-centered approaches. Given that only 56% of respondents recognize designated roles as being responsible for sustainability within their companies, it is crucial for companies to clearly identify and communicate institutional responsibilities (be it an individual, team, or department). We suggest that institutional sustainability responsibility and the creation of corresponding job positions should be incentivized or become mandatory for companies above a certain size or annual turnover with the corresponding resources.

Another significant finding is that companies that adopt a top-down approach, with institutionalized responsibility for sustainability and environmentally-specific transformational leaders tend to achieve higher CSI values than companies that adopt a bottom-up approach, without environmentally-specific transformational leadership and without an entity explicitly responsible for sustainability. This underscores the need to make sustainability an integral part of corporate culture (Siyal et al., 2022). Conversely, bottom-up approaches did not have an impact on CSI, suggesting that such initiatives do not significantly improve the development and implementation of sustainability measures and policies. We assume that bottom-up approaches are comparably small measures without a visible impact on sustainability. This needs to be verified, as our findings contradict the prevailing literature, which states that both top-down and bottom-up approaches to corporate sustainability must go hand in hand for successful implementation (Gotsch et al., 2023). In our sample, sustainability was approached rather bottom-up than top-down, which highlights the importance of facilitating management-driven approaches. Alternatively, bottom-up approaches may yield a more significant impact when employees, who are driving sustainability measures bottom-up, are given more responsibility and decision-making authority, thereby enabling their involvement in more substantial sustainability measures. The conclusion that can be drawn here is that holistic approaches with strong management but also more opportunities for employee participation are needed to address corporate sustainability.

Finally, larger companies (250 or more employees) demonstrated higher CSI values, highlighting the necessity of integrating sustainability as a foundational element and assigning institutional responsibilities, even in smaller companies with fewer human and material resources available. However, this result may also be due to the fact that larger companies tend to have more standardised processes and therefore greater transparency in their procedures than smaller companies, so their employees may have been better informed about their company's sustainability activities and therefore rated them higher. Future research could therefore examine whether the transparency of sustainability efforts differs in different company sizes.

5.1 Policy recommendations

Based on the findings of this study, pertinent and novel policy recommendations can be derived. They offer guidance for effective sustainability strategies and practices in all kinds of organizations. First, our results demonstrated that companies with clear institutionalized responsibility for sustainability achieved higher Corporate Sustainability Index (CSI) values. Thus, corporate sustainability could be enhanced with *grants or support for tendering positions in companies that are proactively working to improve sustainability*. Further, as our findings emphasize the importance of *transparently naming an entity that is responsible for a company's sustainability*, this aspect should be included in *mandatory reporting*. The implementation of the EU Corporate Sustainability Reporting Directive (CSRD) will change sustainability reporting practices for certain companies in the near future. Collaboration with experts in fields such as business ethics, economics, and policy can facilitate the assessment and refinement of such mandatory extensions of accountability in sustainability reporting.

Furthermore, we found that larger enterprises are more likely to adopt sustainable practices than smaller ones. Therefore, SMEs and start-ups could be relieved by *tax benefits* and thus have more resources available that can be used for the integration of sustainable measures such as the expansion of energy efficiency. Especially in this phase, in which economic viability is often prioritized over dealing with sustainability based on a lack of resources, subsidies help to mitigate this.

Additionally, previous literature indicates that SMEs have more problems in the area of sustainability due to a lack of knowledge and awareness of sustainability (Bakos et al., 2020; Font et al., 2016). Therefore, we advocate the creation of *tailored programs for SMEs that facilitate the internal training of potential change agents* without excessive time and resource commitments.

The analysis of corporate environmental policies revealed that the majority of companies (86%) prioritize environmental protection. However, only around a third of the surveyed companies have adopted crucial additional measures for enhancing corporate sustainability, such as providing environmental training for employees, adhering to

consistent global environmental standards, and implementing an environmental management system. This indicates that offering *subsidies for these less widespread environmental policies and measures* could facilitate the shift towards more eco-friendly practices, thereby mitigating the environmental footprint of business operations.

Given the study's focus on the holistic impact of individual and organizational factors on corporate sustainability, *public-private partnerships* could foster collaboration between governments and businesses.

The impact of leadership behavior (ETFL) on corporate sustainability supports the need for clear *corporate governance standards*. These standards would guide companies in adopting sustainable corporate structures and leadership practices, as the study highlighted the importance of strong leadership in driving sustainability transformations.

Finally, we want to highlight the importance of *leadership training* in sustainability, suggesting that educating corporate leaders is crucial for promoting sustainability.

5.2 Limitations and future research

While our empirical approach provided valuable insights into the influence of diverse corporate sustainability drivers, future research should take into account certain methodological limitations.

First, limitations regarding the sample should be considered when interpreting the results, as our sample was limited in size and therefore may not fully capture the diversity of gender, age, education, and type of employment within corporate environments. While convenience sampling in this study allowed for an efficient exploratory analysis of attitudinal, behavioral, and organizational factors of corporate sustainability, larger sample sizes would enhance the robustness of statistical analyses and provide more reliable insights. Moreover, future studies should aim for greater representativeness concerning the specific corporate context. However, the relatively young age of the sample can be viewed as a benefit in this context, as these individuals will ultimately influence the long-term development of the future working world. Nevertheless, due to the small sample size, the generalizability of the results remains limited, underscoring the importance of future studies to validate these findings with larger, more diverse samples that reflect a broader range of corporate contexts and demographic profiles. Additionally, due to the limited sample size, an inferential statistical analysis of the results regarding company age was not feasible, as the groups were too small. Larger-scale studies could examine whether company age significantly impacts sustainability within organizations.

The critical role of leadership in corporate sustainability was underscored by the correlation and regression analyses in this study, for instance, highlighting the impact of environmentally specific transformational leadership (ETFL). Findings from the exploratory analysis of the leader sample ($n = 14$) further support this notion, revealing a significant positive relationship between leaders' pro-environmental behaviors and corporate sustainability. However, given the small sample size, these results should be interpreted as preliminary and require validation through larger scale studies. Future research should prioritize the managerial perspective by employing larger leader samples to examine key leader factors in corporate sustainability (e.g., Keil et al., 2024), with a specific emphasis on the direct relationship between managerial behavior and CSI.

The finding that bottom-up, employee-driven initiatives were not significantly correlated with CSI contradicts previous literature. One possible explanation for this discrepancy could be that the measures and policies comprising CSI necessitate overarching, top-down implementation, while bottom-up initiatives may be comparatively smaller or less effectively captured by the index. Consequently, further research is essential to validate these results and gain deeper insights into the nature and effectiveness of bottom-up initiatives. A promising starting point could involve examining a middle level, as described by Kristensen (2018), which lies in the collaboration between lower or middle managers and employees. This interaction can foster so-called "bottom-linked innovation," where the collaboration between employees and middle managers facilitates the integration of new innovations into the broader company structure – an aspect that has not been addressed in our research.

Lastly, the newly introduced Corporate Sustainability Index (CSI) serves as a comprehensive measure of corporate sustainability, encompassing specific sustainability initiatives and corporate environmental policies, and demonstrating strong internal consistency. It is important to note that the objective of this paper was not to develop and standardize a measure in the strictest sense, but rather to define an indicator that captures the multifaceted nature of corporate sustainability efforts. The CSI offers potential for integration into future studies for further validation and refinement. To mitigate biases arising from participants selecting the "do not know" option when responding to CSI items, we recommend targeting leaders responsible for sustainability decisions within companies. The effectiveness of these measures may be compromised by inadequate sustainability communication (Genç, 2017). Additionally, future research should explore whether information bias and lack of transparency influenced the results, considering that surveyed employees may not have been fully informed about their company's sustainability efforts. Finally, the CSI was developed and tested within the context of German companies, which may limit its generalizability to other regions. Although the Corporate Environmental Policies Scale, which forms one component of the CSI, has been developed for a pan-European survey (Ramus and Steger, 2000), it remains uncertain whether the underlying sustainability measures are similarly defined and prioritized in other cultural or regional contexts. Future research should therefore investigate how companies across diverse cultural settings conceptualize sustainability and identify which measures and policies can serve as effective and context-sensitive indicators of corporate sustainability.

6 Conclusion

In this study, we identified organizational, employee- and management-related corporate sustainability drivers to jointly investigate their influence on corporate sustainability. Our findings emphasize the pivotal role of leadership behavior, a management-driven approach for embedding sustainability in the corporate culture and institutionalized sustainability responsibility for companies seeking to succeed in their corporate sustainability transformation. For future research, we suggest identifying the characteristics that distinguish managers as 'sustainability leaders', as they are important change agents in the sustainability transformation of companies and thus enable them to contribute to a more sustainable society. Finally, based on our findings, we were able to derive both initial recommendations for policymakers as well as company managers to promote change towards greater business sustainability. These suggestions illustrate how

policymakers can support the sustainability transformation of companies, for example through regulations and subsidies that support SMEs, as they have implemented fewer sustainability measures and integrated policies than larger companies. For company managers, a key recommendation is to institutionalize sustainability responsibility by clearly designating a person or department accountable for sustainability-related matters. This individual could also foster pro-environmental engagement among employees, empowering motivated staff to contribute more effectively.

Data availability statement

The raw data supporting the conclusions of this article will be made available by the authors, without undue reservation.

Ethics statement

Ethical approval was not required for the studies involving humans because study participants provided informed consent after being informed that their involvement is voluntary, anonymous, and can be terminated at any point. Additionally, they were briefed on the methods of data collection, as well as the purpose for which the data would be gathered and stored. This research focuses on non-invasive, non-clinical investigations involving participants who gave informed consent. Therefore, ethical approval from the institutional review board was not sought as such studies do not require ethical approval. The studies were conducted in accordance with the local legislation and institutional requirements. The participants provided their written informed consent to participate in this study.

Author contributions

MK: Formal analysis, Visualization, Writing – original draft, Writing – review & editing, Methodology. VM: Conceptualization, Investigation, Writing – original draft, Writing – review & editing, Data curation, Methodology. MZ: Conceptualization, Funding acquisition, Project administration, Writing – review & editing. KA: Conceptualization, Funding acquisition, Project administration, Writing – review & editing.

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Conflict of interest

The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

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