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Linking Executive Pay to ESG Criteria: An Analysis of Current Practice in German Listed Firms

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Abstract This study examines how executive compensation systems can incorporate environmental, social, and governance (ESG) objectives to support sustainable corporate behavior. It develops a conceptual framework that specifies key principles and design characteristics of ESG-linked incentives and applies this framework to the analysis of executive pay practices among HDAX-listed German firms. Using a systematic content analysis of remuneration disclosures for 2021 and 2022, the study identifies considerable heterogeneity in the structure and prevalence of ESG-related pay components. Based on these insights, a composite measure of ESG incentive quality is proposed and empirically validated. The results indicate that higher-quality ESG incentives are positively associated with firms' ESG performance. The study contributes to the literature on executive compensation and corporate sustainability governance by advancing the conceptual understanding of ESG-linked pay and providing empirical evidence on its relevance for sustainable firm outcomes.

Keywords Executive compensation · ESG incentives · ESG performance · Sustainable corporate governance · Stakeholder-agency theory

JEL Classification Codes M12 · M14 · M42 · M52

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1 Introduction

As societal and regulatory pressure to adopt sustainable business practices intensifies, firms increasingly implement corporate governance mechanisms to support this transformation (Goergen and Tonks 2019). One prominent development is the introduction of sustainability incentives in executive compensation contracts. Linking variable executive pay to environmental, social, and governance (ESG) criteria has become a widespread practice among publicly traded firms (Kolk and Perego 2014; Flammer et al. 2019; Bebchuk and Tallarita 2022; Cohen et al. 2023). The underlying rationale is that incorporating objectives such as employee satisfaction or carbon reduction targets into compensation schemes can help align managerial decision-making with broader stakeholder interests and long-term corporate sustainability.

Despite the growing diffusion of ESG-linked pay, its effectiveness as a governance mechanism remains contested. Critics argue that ESG incentives often lack substance and may serve primarily symbolic purposes—designed to signal responsiveness to stakeholder demands rather than to induce genuine behavioral change (Kolk and Perego 2014; Bebchuk and Tallarita 2022; Walker 2022). From this perspective, ESG criteria in pay contracts risk becoming window dressing, potentially rewarding executives for superficial actions that enhance their compensation without materially improving ESG outcomes.

Empirical research on ESG incentives reflects these concerns but has thus far provided mixed and inconclusive evidence. Most prior studies rely on coarse, binary indicators that merely capture the presence or absence of ESG-related pay components (e.g., Derchi et al. 2021; Hong et al. 2016; Abdelmotaal and Abdel-Kader 2016; Haque 2017; Rodrigue et al. 2013). Such an approach limits our understanding of how ESG criteria are embedded in incentive plans and whether their design features can explain variation in ESG performance (Soderstrom et al. 2017). Studies that examine contract details suggest that the impact of ESG incentives depends on specific design characteristics—such as the use of quantitative performance metrics (Maas 2018), their weighting within total compensation (Flammer et al. 2019), and accumulated experience with ESG-linked pay (Derchi et al. 2021). However, existing evidence remains limited in scope, offering only partial insights into how ESG incentives are designed and how their features relate to sustainability outcomes.

Against this background, a more comprehensive understanding of the design and diffusion of ESG incentives is needed to evaluate their governance potential. A systematic and detailed analysis can reveal not only the prevalence but also the qualitative differentiation of ESG pay practices, thereby enabling an assessment of their alignment with principles of effective incentive design. Germany represents an especially suitable empirical context, as the German Stock Corporation Act (AktG) requires that executive compensation promote the sustainable, long-term development of the firm. As a result, ESG incentives are both widespread and diverse among German listed firms (Cohen et al. 2023), offering a rich setting for examining their design characteristics and potential implications for sustainability governance.

Building on this motivation, our study pursues three interrelated objectives. First, we aim to advance conceptual clarity on ESG-related executive incentives by iden-

tifying and systematizing the key design characteristics discussed in the literature. The objective is to provide a coherent framework that facilitates a more structured analysis of ESG incentive schemes and supports comparability across firms and studies. Second, we seek to document and critically assess the extent to which ESG incentives have been adopted in practice, as well as how they are configured, by examining executive compensation disclosures of HDAX-listed firms. This objective addresses the limited empirical evidence on the actual prevalence and design of ESG incentive components. Third, we aim to evaluate whether and how specific ESG incentive design choices are associated with firms' ESG performance. By doing so, we seek to identify which ESG incentive designs are most effective in aligning executive incentives with sustainability outcomes.

Accordingly, the study addresses the following research questions:

RQ1: What are the key design characteristics of ESG-related incentives?

RQ2: How are these characteristics related to the ESG performance of German listed firms?

Our analysis shows that ESG-linked compensation has become widely adopted among HDAX-listed firms, with 85% including ESG criteria in executive pay by 2022. Environmental and social targets are the most prevalent, while governance targets and combined ESG targets based on external indicators such as ESG ratings are used less frequently. ESG criteria are increasingly integrated into both short-term and long-term variable compensation, and many firms specify quantitative performance metrics, particularly in the environmental domain. On average, ESG incentives account for around 25% of variable compensation, and responsibility for achieving ESG targets is often shared across the executive board. The results further show that characteristics such as the number of ESG dimensions covered, the weighting of ESG components, and their integration into long-term incentive plans are positively associated with higher ESG performance.

We make three contributions. First, we develop a conceptual framework that specifies the qualitative design characteristics of ESG-linked incentive schemes, shifting the focus from the mere inclusion of ESG criteria to the question of what constitutes meaningful incentive design. Second, applying this framework to HDAX-listed firms, we construct and validate a composite measure of ESG incentive quality, showing how specific design choices relate to firms' ESG performance. Third, by examining all ESG dimensions rather than isolating environmental or carbon-based targets, we offer a more comprehensive view of how sustainability objectives are embedded in executive compensation.

Taken together, these contributions connect conceptual clarification with empirical evidence on the effectiveness of ESG-linked pay. The findings help distinguish symbolic from substantive uses of ESG incentives and thus have direct implications for firms, stakeholders, and regulators seeking to ensure that ESG-linked compensation contributes to improvements in ESG performance rather than serving as mere signaling.

The remainder of the study is organized as follows: we review previous literature and outline key design choices in Section 2. We describe the research method in Section 3 and empirically investigate the characteristics and ESG-performance related implications of ESG-linked compensation practices in German HDAX-listed

firms in 2021 and 2022 in Section 4. We discuss the results against previous findings and conclude in Section 5.

2 Theoretical Background and Design Characteristics of ESG Incentives

2.1 Stakeholder-Agency Theory and ESG Incentive Quality

The integration of ESG criteria into executive compensation can be understood through the lens of stakeholder-agency theory. Stakeholder theory argues that firms must respond to the expectations of a broad set of stakeholders to ensure long-term value creation (Freeman 1984). Building on this view, stakeholder-agency theory incorporates a corporate governance perspective and holds that managers maintain implicit contracts with heterogeneous stakeholder groups, whose interests may not always align (Hill and Jones 1992; Collier 2008). Similar to traditional agency relationships (Fama and Jensen 1983; Jensen and Meckling 1976), managerial self-interest can generate agency conflicts between managers and stakeholders; however, these conflicts may be mitigated through incentive alignment mechanisms (Hill and Jones 1992). The inclusion of ESG-related targets in executive compensation serves as such a mechanism by rewarding managers for actions that support stakeholder welfare (Adu et al. 2022).

In the academic literature, this practice is commonly referred to as CSR contracting, denoting the incorporation of corporate social responsibility objectives into compensation schemes (Flammer et al. 2019). While the term CSR contracting historically reflects earlier CSR terminology in the literature, contemporary applications predominantly use ESG metrics to operationalize these non-financial objectives. Firms are more likely to adopt such ESG-linked incentive mechanisms in contexts with strong institutional pressures for social and environmental responsibility (Berrone & Gomez-Mejia 2009), and prior research shows that incentive alignment via non-financial targets can shape both stakeholder-related performance outcomes (McGuire et al. 2003; Mahoney and Thorne 2005) and firms' financial conditions (Cordeiro and Sarkis 2008). However, the extent to which ESG-linked compensation enhances stakeholder welfare depends critically on the design characteristics and quality of the ESG metrics used (Yang 2023; Bebhuk and Tallarita 2022).

While the integration of ESG-related objectives into executive pay can theoretically align managerial decisions with stakeholder interests, its effectiveness depends on the quality of ESG incentive design. We define ESG incentive quality as the extent to which ESG performance metrics in compensation contracts are specific, measurable, anchored in verifiable indicators, and sufficiently weighted to influence payout outcomes. High-quality ESG incentives provide clear performance guidance and meaningful accountability, whereas low-quality incentives rely on vague or discretionary criteria that risk symbolic adoption without behavioral impact (Bebchuk and Tallarita 2022). This distinction is consistent with broader findings in performance measurement research emphasizing the importance of well-defined and credible tar-

gets for effective incentive alignment (Ittner et al. 2003). Consequently, variation in ESG incentive quality shapes whether ESG-linked compensation meaningfully contributes to stakeholder-oriented value creation.

In addition to agency-based mechanisms, prior research also emphasizes that firms' adoption and design of ESG-linked compensation are shaped by institutional expectations and pressures for responsible behavior (DiMaggio and Powell 1983; Gond et al. 2012). These complementary insights underscore that both governance incentives and institutional contexts influence how ESG is incorporated into executive pay, providing the theoretical foundation for examining the key design characteristics of ESG incentives in the following sections.

2.2 Prior Empirical Evidence On ESG Incentives and Firm Outcomes

As outlined above, the findings of previous studies that map the adoption of ESG incentives in binary variables and analyze their effects on various firm outcomes have generated mixed and inconclusive findings (Velte 2024). While some studies find positive effects of the mere use of ESG performance-based incentives on emission reductions, green innovations, and firms' scores in ESG ratings (Hong et al. 2016; Flammer et al. 2019; Baraibar-Diez et al. 2019), others document negative (Fabrizi et al. 2014) or no effects on ESG performance (Maas 2018). Given these mixed findings, theoretical concerns that ESG incentives serve as a symbolic practice with the true aim of increasing management compensation levels by performance-insensitive components (Kolk and Perego 2014) could so far not be convincingly alleviated.

In response to the concern that ESG incentives may be inefficient in incentivizing executives to address ESG issues in their decision-making, recent studies have thus begun to orientate empirical quantitative studies more on the characteristics of the underlying incentive schemes to generate more specific knowledge of their function and effectiveness in promoting firms' ESG performance (Maas 2018; Flammer et al. 2019; Ikram et al. 2023; Derchi et al. 2021). For example, Maas (2018) finds no general effects of including ESG incentives on firms' ESG-related performance, but documents that integrating quantifiable ESG metrics into executives' incentive plans is positively associated with firms' KLD ESG scores. Flammer et al. (2019) focus on the weight assigned to ESG incentives and indicate that the impact of ESG incentives on firms' ESG performance is stronger when the share of ESG targets in executives' incentive plans is substantive rather than trivial. Derchi et al. (2021) complement these findings by showing that a positive effect of ESG contracting on firms' ESG performance is likely to occur only if the mechanism is used over longer time periods.

Winschel (2021) investigates carbon-related compensation and explores links between European firms' carbon reduction strategies and carbon-related targets linked to executives' compensation contracts, indicating that carbon targets are mainly integrated in short-term variable executive pay contracts. Maas and Rosendaal (2016) describe specific contract details such as the time horizon and dimensions of ESG incentives for a large sample, but neglect other design characteristics, e.g., the relative weight assigned to ESG incentives and their fit with the firm's strategy. Bebhuk and Tallarita (2022) focus on the formal adoption of ESG criteria in executive compensa-

tion among US firms and constate that ESG incentives used in these firms are narrow in topical focus, assigned insufficient weights, and rarely assessed transparently in quantifiable ways.

Qin and Yang (2022) and Yang (2023) are among the first studies that map several aspects of ESG contracting quality and analyze its association with US firms' ESG performance. Yang (2023) refines a factor score measure of ESG contracting quality developed by Qin and Yang (2022) that maps the number of dimensions, the relative and absolute weight assigned to ESG performance measures, and the qualitative or quantitative assessment of ESG metrics, and condenses these four aspects in a principal component analysis. The study finds that this index-based measure is positively associated with future ESG performance in S&P 500 firms, and indicates that the number of dimensions and the relative and absolute weights specifically contribute to explaining the positive association between ESG contracting quality and future ESG performance.

In light of this mixed but growing evidence on the associations between qualitative aspects of ESG contracting and firm-level consequences, a comprehensive picture of the design characteristics of ESG incentives that are relevant in determining the quality of ESG incentives contributes to a better understanding of their implications for ESG performance.

2.3 Key Design Characteristics of ESG Incentives

To identify the key design characteristics of ESG incentives, we draw on management control theory, which conceptualizes incentive systems as mechanisms that translate strategic objectives into managerial behavior through target setting, accountability structures, and reward allocation (Simons 1990; Merchant and Van der Stede 2017). Following this logic, the design of ESG-linked compensation can be decomposed into a limited set of interrelated dimensions that jointly determine whether incentives are capable of guiding managerial attention and effort toward sustainability objectives. The four dimensions distinguished below capture these core control functions by addressing *what* is incentivized (target characteristics), *why* it is incentivized (strategic alignment), *who* is held accountable and over which time horizon (responsibility and temporality), and *how strongly* ESG outcomes affect pay (weighting and linkage).

Accordingly, we distinguish the following four design dimensions:

1. the alignment of ESG incentives with corporate strategy,
2. the characteristics of ESG performance targets,
3. the assignment of responsibility and the temporal horizon of ESG incentives, and
4. the weighting and linkage of ESG components within overall compensation.

Together, these design characteristics capture the essential content, process, and governance features of ESG-linked incentives, allowing for a structured and comprehensive assessment of their quality.

1. Alignment with corporate strategy

Within a management control framework, strategic alignment constitutes the foundational design dimension because incentive systems serve to translate strategic priorities into managerial behavior (Simons 1990; Merchant and Van der Stede 2017). When ESG considerations are core to a company's operations, they are typically embedded in corporate strategy, fostering close links to management control systems and compensation practices (Gond et al. 2012). Incentive schemes that support strategy implementation should therefore establish congruence between strategic goals and performance measures by addressing prioritized objectives (Merchant and Van der Stede 2017).

In this study, we define corporate strategy as the firm-level orientation that determines the organization's overall direction and how value is created and sustained across its various businesses and stakeholder relationships (Johnson et al. 2017; Hill et al. 2017). Because ESG incentives are set at the top management level, the relevant level of analysis—and hence the level of strategic embedding—corresponds to the corporate rather than the business-unit level. While business strategy focuses on achieving competitive advantage within specific markets, our analysis concerns the corporate-level integration of ESG considerations into overarching strategic objectives and management control systems (Gond et al. 2012; Ritz 2022). This strategic grounding provides the context in which subsequent design choices regarding ESG targets, responsibility, and weighting unfold.

2. Characteristics of ESG performance targets

Within the strategic context established above, the second dimension concerns the characteristics of ESG performance targets integrated into compensation contracts. This includes the breadth of ESG dimensions covered as well as the assessment mode used to evaluate performance. As firms identify and prioritize relevant ESG topics based on materiality assessments, ESG objectives pertinent to long-term value creation likely differ across firms (Khan et al. 2016). A comprehensive approach requires addressing all three ESG dimensions, as only then can the incentive system reflect the broader range of stakeholder interests associated with ESG performance (Bebchuk and Tallarita 2022).

The mode of assessment is another central aspect of target characteristics. Maas (2018) differentiates between quantitative, hard targets and qualitative, soft targets. Qualitative targets relate to characteristics, strategies, processes, or actions without a clear-cut quantification—for example, the development of a climate strategy—requiring subjective judgment to determine the degree of achievement (Maas 2018; Ikram et al. 2023). Quantitative targets, in contrast, rely on clearly measured and verifiable indicators. Environmental performance, for instance, can be assessed using metrics such as reductions in absolute carbon emissions or improvements in carbon efficiency. Prior research suggests that ESG incentives should incorporate verifiable and quantitative performance measures (Kolk and Perego 2014; Maas 2018; Qin and Yang 2022) to guide managerial behavior effectively (Ittner et al. 2003) and to avoid merely symbolic use (Maas 2018). Bebhuk and Tallarita (2022)

emphasize that, in addition to specifying objective goals, companies should disclose actual outcomes and contextual information to enable the reviewability of goal achievement.

3. Assignment of responsibility and temporal horizon

The third dimension addresses how responsibility for ESG target achievement is assigned and over what temporal horizon ESG incentives apply. Responsibility can rest with individual executives or be shared collectively among the management board. Assigning responsibility collectively underscores the strategic importance attributed to ESG but presumes that executives can meaningfully influence the underlying outcomes together (Kolk and Perego 2014).

The temporal horizon represents another central design choice. Prior studies (e.g., Maas and Rosendaal 2016; Winschel 2021) examine whether ESG incentives should be embedded in short-term or long-term compensation plans. Theoretically, sustainable development—and many ESG topics—aligns closely with long-term corporate value creation (Dyllick and Hockerts 2002). Long-term environmental goals such as reducing emissions or achieving net-zero status are inherently multiyear objectives and thus well-suited for long-term incentive plans. Conversely, specific goals like developing a diversity and inclusion strategy may be achievable within shorter periods. Edmans et al. (2017) argue that short-term incentives often exert stronger motivational effects because their performance metrics are more directly tied to managerial actions. This argument supports the use of intermediate milestones for long-term ESG goals to enhance clarity and maintain managerial commitment. As such, an appropriate combination of short- and long-term ESG incentives can capture both immediate actions and sustained strategic orientation.

4. Weighting and linkage within overall compensation

The final dimension concerns the weighting and linkage of ESG components within overall executive compensation. This dimension captures the substantive significance of ESG incentives, reflecting the extent to which ESG outcomes materially influence executive pay. Prior research consistently emphasizes that the weight assigned to ESG criteria relative to financial criteria is crucial for determining their impact (Flammer et al. 2019; Bebchuk and Tallarita 2022; Qin and Yang 2022; Yang 2023).

Firms can incorporate ESG criteria using stand-alone, additive weights or through performance factors/modifiers. Stand-alone weights clearly communicate the proportion of compensation tied to ESG target achievement, enabling executives and external stakeholders to infer how ESG performance affects variable pay. In contrast, performance factors link the achievement of ESG targets to other performance dimensions multiplicatively, increasing or decreasing the overall payout depending on ESG outcomes. While both approaches can combine ESG and non-ESG targets, performance factors sometimes reduce transparency regarding the specific weight of ESG incentives, complicating stakeholder evaluations.

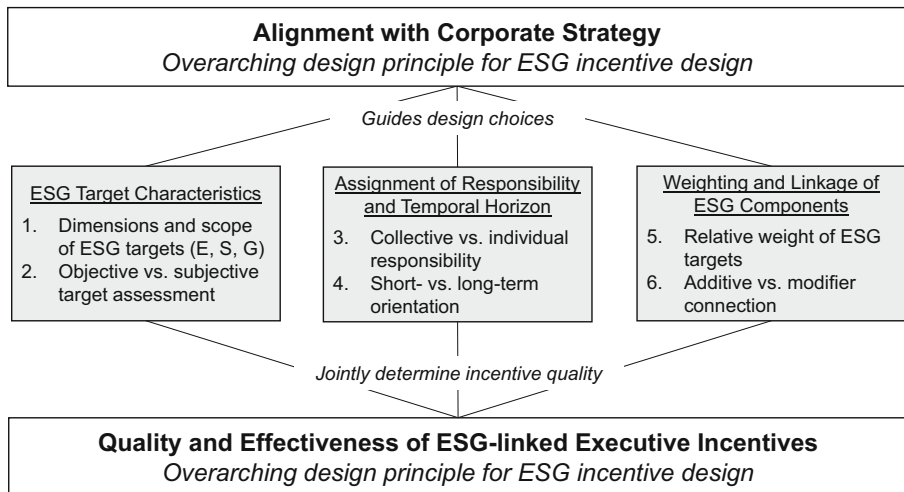


Fig. 1 Conceptual Model of Key Design Characteristics of ESG-linked Executive Compensation

Collectively, these four dimensions specify how strategic intent, target specification, accountability structures, and incentive weightings jointly shape the design and potential effectiveness of ESG-linked executive compensation. We conceptualize ESG incentive quality as the degree to which the design of ESG-linked compensation enables effective alignment between sustainability objectives and managerial behavior. In line with management control theory (Simons 1990; Merchant and Van der Stede 2017), incentive systems function as control mechanisms that translate strategic objectives into managerial action. Accordingly, the quality of ESG incentives reflects how well their design supports this control function. High-quality ESG incentives are strategically aligned, rely on clearly articulated and relevant ESG targets, assign appropriate managerial responsibility and temporal horizons, and apply transparent and meaningful weighting and linkage mechanisms (Ittner et al. 2003; Kolk and Perego 2014; Maas 2018). These features determine whether ESG incentives are substantively integrated into the management control system and likely to guide managerial effort toward improved ESG performance rather than serving symbolic purposes.

Figure 1 illustrates this conceptual model, summarizing how these interrelated design choices jointly determine the overall effectiveness of ESG-linked executive incentives. We use this model as a conceptual framework guiding our subsequent empirical analyses of ESG-linked executive compensation practices in German firms.

3 Method

3.1 Sample Selection

The sample initially includes all firms listed in the German stock market index HDAX for the financial year 2021. The sample is reduced by one company for

which no compensation report could be sourced in 2022, and for one company without ESG performance data available in the LSEG database.

The German context is particularly suited to investigate the quality of ESG incentives for two reasons. First, the adoption of Directive 2017/828/EU resulted in amendments to the German Stock Corporation Act (AktG) that became effective in 2021. The regulation demands that listed companies implement a “compensation structure [that] shall be oriented towards the sustainable and long-term development of the company.” (§ 87 AktG) and thereby explicitly calls on companies to include sustainability criteria in their compensation systems. Along with this, increased transparency requirements regarding firms’ executive compensation structures are introduced. Second, the German context is suited for investigating the characteristics of ESG incentives because it is among the European countries where ESG incentives are highly prevalent as compared to US contexts (Cohen et al. 2023). This high prevalence allows for a detailed analysis of the design characteristics of ESG incentives.

3.2 Research Design

This study follows a two-stage research design. At the first stage, we aim to draw a rich descriptive picture of the design characteristics of ESG-related incentives used in German-listed firms. To this end, we conduct a qualitative content analysis to systematically investigate the extent and characteristics of ESG criteria embedded in executive compensation plans among the sample firms in 2021 and 2022.

Content analysis is an effective research method for systematically analyzing textual data from corporate disclosures, as it enables the quantification of specific content elements in a structured manner (Krippendorff 2018). This research method is a commonly applied approach across various contexts, including organizational and social research (Krippendorff 2018) and has recently gained traction in the literature on CSR reporting (Lock and Seele 2016) and CEO compensation (Winschel 2021). To strengthen the reliability and validity of the content analysis, two researchers independently coded the data. They compared and discussed any discrepancies to reach a consensus, ensuring the robustness of the analysis. Validity of the content analysis is further ensured through systematic coding and continuous documentation using MAXQDA.

At the second stage, we aggregate the descriptive data into quantitative variables mapping the extent to which firms implement ESG criteria along the dimensions identified in the conceptual model of ESG-linked executive compensation. We combine these variables to derive a measure of the quality of ESG incentives, and analyze its association with firm-level ESG performance measures obtained from the LSEG database in a structural equation model.

3.3 Data Collection

Data on ESG strategies and ESG incentives were hand-collected from publicly available corporate disclosures, such as annual reports, CSR/sustainability reports, and compensation reports sourced from corporate websites. To gather and organize

Table 1 Overview of Coding Scheme

<i>(1) Firm level</i>	
<i>Category</i>	<i>Codes</i>
ESG strategy	Integrated Decoupled None
ESG incentives	Yes No
<i>(2) Incentive plan level</i>	
<i>Category</i>	<i>Codes</i>
Temporal horizon	Short-term Long-term Short-term and long-term
Linkage and weight	Additive criteria ESG Additive criteria including ESG Performance factor ESG Performance factor including ESG
<i>(3) Target level</i>	
<i>Category</i>	<i>Codes</i>
Target dimension	E S G Combined
Target assessment	Objective Subjective
Target responsibility	Collective Individual

the data, a coding scheme based on the conceptual model of design choices in the implementation of ESG-linked executive compensation outlined in the previous section was developed and used. The coding scheme includes three levels of analysis: the firm, incentive plan, and target level. Categories and codes relating to (1) the firm level consider firms' ESG strategies and the adoption of ESG incentives. Categories and codes relating to (2) the incentive plan level map the characteristics of the compensation plan and consider its temporal horizon and incentive design. At (3) the target level, we code target characteristics such as the ESG dimensions encompassed in targets, how target achievement is assessed, and assigned responsibility. Table 1 displays these levels of analysis along with the overarching code categories defined at each level. Table 10 in the Appendix exhibits the detailed coding scheme and provides examples.

At the firm level, we assess the strategic embeddedness of ESG by examining the extent to which ESG objectives are articulated within the organization's overarching corporate strategy. Following Perego and Hartmann (2009) and Ditillo and Lisi (2016), we classify corporate ESG strategies as either integrated—that is, embedded within the corporate strategy—or decoupled (independent) from it. In line with prior research, ESG strategies can be positioned along a continuum from reactive to proactive (Bui and de Villiers 2017; Azzone and Bertelè 1994; Carroll 1979, 1999; Russo and Fouts 1997), reflecting the organization's strategic stance on ESG and the role of top management in its implementation (Ditillo and Lisi 2016).

According to Perego and Hartmann (2009) and Ditillo and Lisi (2016), reactive organizations have not yet integrated sustainability objectives into their overall corporate strategy, whereas proactive organizations have established and articulated sustainability goals that are embedded in strategic objectives, policies, and management practices. Consistent with our definition of corporate strategy as the firm-level orientation determining the organization's overall direction and value creation across businesses and stakeholder relationships, we operationalize ESG embeddedness at the corporate level. Specifically, we classify ESG strategies as integrated if ESG

objectives are explicitly referenced in the firm's corporate strategy statement, and as decoupled if ESG topics are not included in the corporate strategy but are instead addressed in separate sustainability-related documents, such as standalone ESG or sustainability reports (Gond et al. 2012).

Building on past research, we next generally verify whether executive compensation schemes based on ESG performance indicators are adopted (Kolk and Perego 2014). A company's general statement that variable executive pay is linked to ESG aspects is a sufficient claim for adopting ESG incentives (first-order code). For firms that adopt ESG incentives, we subsequently use second-order codes on key design characteristics of ESG incentives.

At the incentive plan level, we classify incentive plans including ESG targets as short-term, long-term (Maas and Rosendaal 2016), or both. Short-term targets are included in the annual variable compensation of executives, while long-term targets relate to executives' performance-contingent multi-year compensation. Regarding the incentive design and weight, we classify incentive plans according to whether ESG incentives affect total compensation in an additive or multiplicative way. A compensation plan is classified as using additive criteria ESG if single or multiple ESG targets are assigned percentual weights in total variable (short and/or long-term) compensation. We further differentiate between incentive plans using standalone ESG criteria (additive criteria ESG) and plans that assign a weight to ESG incentives that also includes other nonfinancial or individual goals (additive criteria including ESG). Incentive plans that link variable compensation to the achievement of ESG criteria in a multiplicative way, i.e., by using a performance factor or modifier, are coded as performance factor designs. Again, we differentiate between plans with performance factors solely based on ESG metrics (performance factor ESG) and plans with performance factors that include other goals (performance factor including ESG).

At the target level, we classify each individual ESG target according to the target dimension it relates to by dividing ESG targets into environmental, social, and combined ESG targets (Maas and Rosendaal 2016). Based on the definition of the term ESG, the study additionally assigns ESG targets to the governance dimension. Furthermore, we assign identified ESG targets to more fine-grained subthemes in each ESG category. This assignment is done deductively, taking into account classifications of ESG aspects in previous literature (Maas and Rosendaal 2016; Maas 2018; Winschel 2021). We further differentiate between objective and subjective target assessment. We classify targets as objective if quantitative targets are combined with specific target values. As described earlier, quantitative targets rely on a precise underlying quantification, i.e., numerical values such as quantities or percentages (Ikram et al. 2023; Maas 2018). In contrast, ESG target assessment is coded as subjective if the integrated target is of qualitative nature and thus do not rely on a precise underlying quantification (Maas 2018). In addition, we separately classify quantitative targets without clear target values and include them in the subjective category, as in this case the determination of target achievement and thereby the granting of compensation is intransparent and may or may not include subjectivity in target assessment. Further codes at the target-level relate to whether individual or collective responsibilities for achieving the targets are agreed on. Collective ESG

targets are set for all board members whereas individual targets are individually agreed on for single or multiple board members.

3.4 Data Analysis

During the systematic coding and documentation process using MAXQDA, the software automatically records the frequency of each code, offering an overview of frequency counts for data organization. In the content analysis, the coded data were reviewed for completeness and subsequently aggregated according to the categories derived from the study's conceptual model.

To analyze the strategic integration of ESG and the adoption of ESG incentives, coded data on ESG strategies and the use of ESG incentives are aggregated and compared at the industry level for each year in the analysis period. To further evaluate the dimensions targeted by ESG incentives, coded data at the ESG target-level are reorganized, aggregated, and clustered according to firms' ESG strategies. Moreover, we group the data on ESG target assessment, target responsibility, and temporal horizon based on ESG target dimensions and categories. We further classify incentive plan linkage and weight at the firm-level and compare these characteristics over the years 2021 and 2022.

To analyze the interrelation of ESG incentive quality and firms' ESG performance, we define aggregated ESG incentive quality and ESG performance variables as listed in Table 2. *ESG_Strategy* is a numerical variable that increases in the degree to which ESG or sustainability topics are integrated in corporate strategy. *ESG_Inc_Dummy* is an indicator variable taking the value of 1 if a firm uses ESG-linked executive incentives in the respective year, and 0 otherwise. *Dimensions* and *Targets* map the numbers of dimensions and targets used, whereas the numerical variable *Time_horizon* increases in the extent to which, in line with the theoretical reflections above, we assume the incentive effect of short-term and long-term ESG incentives to expand. *Weight* captures the maximum weight assigned to ESG criteria in a company's short-term and/or long-term compensation plan. For aggregation purposes, we include both additive criteria and performance factors exclusively relating to ESG criteria and those including ESG criteria along with other criteria into the *Weight* variable. It, therefore, overestimates the actual weight assigned to ESG criteria for cases in which transparent information on their specific weight is lacking. *Assessment* increases in the degree to which targets are assessed in objective ways as outlined above, and *Responsibility* takes on higher values with collective than individual incentive provision plans.

We combine the ESG incentive quality variables in a latent construct (*ESG_incentive_quality*) and include this construct in a structural equation model. Given the small sample size, we use SmartPLS version 4.1.0.9 (Ringle et al. 2024) to test whether the ESG incentive quality construct is associated with firms' same-year and subsequent years' ESG performance, which is estimated as a latent construct formed by firms' E, S, and G scores as derived from the LSEG database. The PLS algorithm is a variance-based structural equation model that estimates the strength of paths between latent variables (Chin 1998). The use of SmartPLS allows for an interpretable evaluation of the measurement model used to proxy for the theoretical

Table 2 List of Variables

Variable	Description	Source
<i>ESG Incentive quality variables</i>		
ESG_Inc_Dummy	Indicator variable that takes the value of 0 if the company does not include ESG or sustainability criteria into executive incentive schemes, 1 otherwise	Hand-collected
ESG_Strategy	Takes the value of 1 if the company does not disclose a company strategy in its annual or compensation report, 2 if its refers to ESG or sustainability in a separate strategy statement, and 3 if ESG or sustainability aspects are integrated into the company's overall strategy	Hand-collected
Dimensions	Number of E, S, G and/or combined ESG dimensions that targets included into a company's executive incentive scheme can be allocated to	Hand-collected
Targets	Number of ESG targets included in a company's executive incentive scheme	Hand-collected
Time_horizon	Takes the value of 0.33 if ESG targets are included in a company's long-term variable compensation plan, 0.66 if ESG targets are included in its short-term variable compensation plan, and 1 if ESG targets are included in its short-term and long-term compensation plan	Hand-collected
Weight	Maximum weight assigned to ESG criteria in a company's short-term and long-term compensation plan	Hand-collected
Assessment	Takes the value of 0.33 if disclosure of how target achievement is assessed is intransparent or if the majority of targets is assessed based on qualitative criteria, 0.66 if the majority of targets is assessed based on quantitative criteria without disclosing a target level, and 1 if the majority of targets is assessed based on quantitative criteria and a target value is disclosed	Hand-collected
Responsibility	Takes the value of 0.5 if the majority of targets are assigned to individual board members, and 1 if the majority of targets are assigned to all board members collectively	Hand-collected
<i>ESG Performance variables</i>		
E_Score	Environmental pillar score	LSEG
S_Score	Social pillar score	LSEG
G_Score	Governance pillar score	LSEG

construct of ESG incentive quality, a primary aim of our analysis. The factor loadings of each qualitative dimension in the ESG incentive quality latent construct enable the explorative analysis of the dimensions' relevance for the construct. In line with previous research that uses a factor analysis for dimensionality reduction (Yang 2023), we expect to find a positive association between ESG incentive quality and firms' ESG performance.

4 Findings

4.1 Alignment of ESG Incentives with Corporate Strategy

At the firm level, ESG strategies and the frequency with which ESG targets are used in executive compensation are analyzed based on corporate disclosures in 2021. Table 3 shows the number of firms that adopt ESG-based executive compensation

Table 3 Strategic ESG Integration and Use of ESG Incentives in Executive Compensation

Industry	Strategic integration of ESG										Total			
	Integrated ESG strategy				Decoupled ESG strategy				No ESG strategy		Number of firms with ESG incentives			
	<i>n</i>	Number of firms with ESG incentives			<i>n</i>	Number of firms with ESG incentives			<i>n</i>		Number of firms with ESG incentives			
		2021	2022			2021	2022				2021	2022		
Chemicals	7	7	7		2	2	2		2		9	9		9
Construction	1	1	1		–	–	–		–		1	1		1
Consumer goods	5	5	5		1	1	1		–		6	6		6
E-commerce	1	1	1		2	2	2		–		3	3		3
Energy and environment	6	5	5		1	1	1		–		7	6		6
Finance, insurance and real estate	7	7	7		6	5	5		1		14	12		12
Leisure	–	–	–		–	–	–		1		1	–		–
Media	–	–	–		1	1	1		1		2	1		1
Metal and electronics	15	14	15		7	6	6		–		22	20		21
Pharmaceutical and healthcare	4	3	4		6	5	6		2		12	8		10
Publicity and marketing	–	–	–		1	–	–		–		1	–		–
Telecommunication, IT and consumer electronics	4	4	3 ^a		10	7	8		3		17	11		12
Transport and logistics	3	3	3		1	–	–		–		4	3		3
Travel and gastronomy	–	–	–		1	–	1		–		1	–		1
<i>Total</i>	53	50	51		39	30	33		8		100	80		85

^a One firm in the telecommunications, IT and consumer electronics industry (Vantage Towers) was excluded from the 2022 analysis because no remuneration report was available

clustered by corporate ESG strategy and specified by industry.¹ 93 of 100 HDAX-listed companies follow ESG ambitions strategically in 2021, whereby 53 of these firms integrate ESG topics in their corporate strategy, and 40 firms formulate a separate ESG strategy that complements their corporate strategy. Among the firms that integrate ESG aspects strategically, the use of ESG incentives is widespread. 80 of 100 HDAX-listed companies agree on at least one ESG-oriented compensation component for their board members in 2021, and 85 firms have adopted ESG incentives in 2022. This development is in line with the growing trend in adopting ESG targets in executive compensation contracts in recent years (Velte 2016; Flammer et al. 2019; Cohen et al. 2023).

Among firms pursuing an integrated ESG strategy, the use of ESG criteria in variable executive compensation is more frequent than among firms with decoupled ESG strategies. 50 of the 53 firms with an integrated ESG strategy in 2021 have adopted ESG incentives in 2021 (51 in 2022). In contrast, 30 of the 40 firms with decoupled ESG strategies provide ESG incentives in 2021 (33 firms in 2022). This result is consistent with the findings of Perego and Hartmann (2009) who demonstrate that firms with a proactive environmental strategy rely more on performance management systems that use environmental performance indicators. Moreover, and consistent with previous work (Winschel 2021), the data suggest that a firm's strategic focus on ESG is a prerequisite for adopting ESG-linked executive compensation.

The industry-level breakdown shows that ESG incentives are pervasive among firms with integrated ESG strategies in the chemical, consumer goods, e-commerce, energy, financial, metal and electronics, and pharmaceutical and healthcare sectors. In contrast, ESG-based executive compensation is less prevalent among firms with decoupled ESG strategies operating in the telecommunications, IT and consumer electronics sector. Further, ESG incentives are rarely implemented by firms in the leisure and media sectors.

Extending the firm-level findings with the target level of analysis, Table 4 shows the percentages of firms that use environmental, social, governance, and combined ESG targets clustered by strategic ESG integration and illustrates the means of ESG dimensions and targets over time. Social and environmental targets are most represented across the sample firms, followed by environmental targets. Combined ESG and governance targets are less prevalent. The intertemporal comparison shows that targets in the E, S, and G dimensions are increasingly used in 2022, while combined ESG targets such as, e.g., (further) developing the company's ESG strategy (Evotec, Daimler Truck) and achieving good results in ESG ratings (Aurubis) decrease in importance.

Clustering these results by companies' ESG strategies shows that strategic ESG integration is associated with increases in the number of ESG dimensions and ESG targets in executive compensation systems. Firms with integrated ESG strategies, on average, integrate more ESG dimensions and more targets than firms with decoupled or absent ESG strategies. Comparing both years of analysis, the mean number of ESG dimensions and targets addressed in incentive structures increase specifically in

¹ Data on a company's industry affiliation were captured and classified using the industry classification of Statista (2023).

Table 4 Strategic ESG Integration and Identified ESG Targets in Executive Compensation Clustered by ESG Dimension

<i>ESG dimension</i>	Strategic integration of ESG					
	Integrated ESG strategy		Decoupled No ESG strategy		Total	
	<i>n</i> = 50	<i>n</i> = 51	<i>n</i> = 30	<i>n</i> = 34	<i>n</i> = 80	<i>n</i> = 85
	2021 (% of firms)	2022 (% of firms)	2021 (% of firms)	2022 (% of firms)	2021 (% of firms)	2022 (% of firms)
Environment	78%	86%	50%	74%	68%	81%
Social	84%	86%	63%	85%	76%	86%
Governance	20%	27%	10%	26%	16%	27%
Combined	42%	35%	43%	38%	43%	36%
Mean of ESG dimensions included	2.2	2.4	1.7	2.2	2	2.3
Mean of ESG targets included	4.2	4.1	2.7	3.5	3.6	3.9

firms with decoupled ESG strategies. While these firms include an average of only 1.6 ESG dimensions and 2.5 ESG targets in 2021, they integrate 2.3 dimensions and 3.5 targets on average in the second year of analysis. Overall, firms integrate on average 2.3 ESG dimensions and 3.9 targets in 2022.

Industry-level data indicate that firms' industry affiliation partly determines the dimension of ESG targets included in executive compensation (Table 11 in the Appendix). While environmental and social targets are established in companies across all industries, governance targets are most frequently used in financial companies (58%), but also found for companies operating in the chemical, consumer goods, energy and environment, metal and electronics, and telecommunication sectors.

4.2 Assessment of ESG Target Achievement

We further analyze the characteristics of ESG-linked executive compensation practices at the target level. Table 5 presents a breakdown of all identified ESG targets in 2021 clustered by ESG categories and aspects, by the way in which target achievement is assessed, the responsibility for target achievement, and the targets' temporal horizon. Figure 2 additionally highlights the most frequently used ESG measures in executive compensation grouped by ESG dimension in word clouds derived from the target-level analysis.

The analysis shows that although the share of companies using environmental targets is relatively pronounced, the variety of incorporated environmental targets is proportionately lower. While 28% (86 targets) encompass the environmental dimension, 44% of the identified ESG targets relate to the social dimension (134 targets). This finding aligns with earlier studies identifying social objectives as most commonly incorporated in executive compensation (Maas and Rosendaal 2016). Only 8% (23 targets) refer to the governance dimension, and 20% (59 targets) are attributed to the combined ESG category.

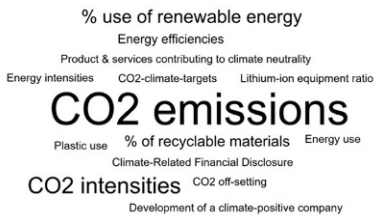
Table 5 2021 ESG Targets Clustered by ESG Dimension and Categories, Type of Target Assessment, Responsibility, and Temporal Horizon

ESG targets	Target assessment		Responsibility		Temporal horizon	
	Objective assessment	Subjective assessment	Individual targets	Collective targets	Short-term targets	Long-term targets
<i>Environment</i>						
Climate neutrality	36 (42%)	22 (26%)	9 (10%)	49 (57%)	32 (37%)	26 (30%)
Energy efficiency	3 (3%)	4 (5%)	–	7 (8%)	4 (5%)	3 (3%)
Environmental performance	1 (1%)	2 (2%)	–	3 (3%)	3 (3%)	–
Environmental reporting	1 (1%)	1 (1%)	1 (1%)	1 (1%)	1 (1%)	1 (1%)
Resource management	9 (10%)	7 (8%)	3 (3%)	13 (15%)	10 (12%)	6 (7%)
Σ <i>Environment</i> ($n = 86$)	50 (58%)	36 (42%)	13 (15%)	73 (85%)	50 (58%)	36 (42%)
<i>Social</i>						
Community/stakeholder engagement	3 (2%)	4 (3%)	–	7 (5%)	1 (1%)	6 (4%)
Customer satisfaction	9 (7%)	16 (12%)	5 (4%)	20 (15%)	21 (16%)	4 (3%)
Diversity and inclusion	13 (10%)	17 (13%)	7 (5%)	23 (17%)	20 (15%)	10 (7%)
Employee engagement	18 (13%)	16 (12%)	6 (4%)	28 (21%)	24 (18%)	10 (7%)
Employee health and safety	9 (7%)	14 (10%)	2 (1%)	21 (16%)	20 (15%)	3 (2%)
Employee training and qualification	–	8 (6%)	1 (1%)	7 (5%)	6 (4%)	2 (1%)
Human rights and business ethics	1 (1%)	–	–	1 (1%)	1 (1%)	–
Supply chain	3 (2%)	3 (2%)	1 (1%)	5 (4%)	5 (4%)	1 (1%)
Σ <i>Social</i> ($n = 134$)	56 (42%)	78 (58%)	22 (16%)	112 (84%)	98 (73%)	36 (27%)

Table 5 (Continued)

<i>ESG targets</i>	Target assessment		Responsibility		Temporal horizon	
	Objective assessment	Subjective assessment	Individual targets	Collective targets	Short-term targets	Long-term targets
<i>Governance</i>						
Compliance	3 (13%)	5 (22%)	2 (9%)	6 (26%)	6 (26%)	2 (9%)
Corporate Governance	–	9 (39%)	–	9 (39%)	8 (35%)	1 (4%)
Integrity	2 (9%)	4 (17%)	2 (9%)	4 (17%)	6 (26%)	–
$\sum$ <i>Governance</i> (= 23)	5 (22%)	18 (78%)	4 (17%)	19 (83%)	20 (87%)	3 (13%)
<i>ESG</i>						
ESG business/performance	5 (8%)	10 (17%)	5 (8%)	10 (17%)	13 (22%)	2 (3%)
ESG ratings	7 (12%)	5 (8%)	3 (5%)	9 (15%)	9 (15%)	3 (5%)
ESG strategy	1 (2%)	19 (32%)	11 (19%)	9 (15%)	19 (32%)	1 (2%)
ESG (not further specified)	–	9 (15%)	1 (2%)	8 (14%)	6 (10%)	3 (5%)
Reputation	1 (2%)	2 (3%)	–	3 (5%)	3 (5%)	–
$\sum$ <i>ESG</i> (= 59)	14 (24%)	45 (76%)	20 (34%)	39 (66%)	50 (85%)	9 (15%)
$\sum$ <i>total ESG targets</i> ($n = 302$)	125 (41%)	177 (59%)	59 (20%)	243 (80%)	218 (72%)	84 (28%)

Environmental targets and metrics



Social targets and metrics



Governance targets



Combined targets



Fig. 2 ESG Targets in Executives' Incentive Plans Clustered by ESG Dimension *Note:* 2021 ESG targets with a minimum of two mentions are included in the analysis

Table 5 shows that environmental targets in executive compensation relate to climate neutrality, energy efficiency, environmental performance and reporting, and resource management. The most frequently linked environmental targets refer to climate neutrality aspects. The reduction of CO₂ emissions is the most commonly used metric when linking executive compensation to environmental objectives. In addition to targets related to CO₂ emissions, carbon intensity metrics and renewable energy shares are often integrated into executives' compensation schemes of HDAX-listed firms. Examples of company-specific carbon intensity metrics include, e.g., a fleet's specific emissions per passenger-kilometer flown (Lufthansa), CO₂ emissions per m² of property (LEG Immobilien SE), and CO₂ per kilowatt per full-load hour (RWE). Regarding the type of target assessment, the results reveal that 58% of linked environmental targets underlie an objective and 42% a subjective assessment of target achievement (Table 5). As explained above, an objective target assessment can be obtained by integrating quantitatively measurable ESG targets with defined target values into executives' compensation structures. For example, BASF links variable executive pay to the company's CO₂ equivalents and defines a target value corresponding to a target achievement of 100%, as well as a minimal value, a maximum value, and a target achievement curve (BASF SE 2022, p. 6). To the contrary, subjective target assessments refers to both quantitative targets for which no target values are agreed upon and for targets that are set qualitatively. Qualitative climate targets comprise, e.g., "advancing the company toward climate positivity" (Henkel AG & Co. KGaA 2022, p. 19) and "development of a climate strategy" (K + S AG 2022, p. 145). These targets as well as quantitative targets without specific target values (e.g., "reduction of total CO₂-emissions in scope 1 and 2", Mercedes-Benz Group AG 2022, p. 19) are less common among the sample firms.

Social targets include community/stakeholder engagement, customer satisfaction, diversity and inclusion, employee engagement, employee health and safety, employee training and qualification, human rights and business ethics, and supply chain aspects. As shown in Table 5, the sample firms mostly use social targets on employee engagement (34 targets) and diversity and inclusion (30 targets). Figure 2 shows that the percentage of women at management levels and employee satisfaction scores are commonly integrated social metrics in executives' incentive plans. However, despite these frequently used quantitative social indicators, 58% of the identified social targets are subjectively assessed. Examples include the "promotion of diversity and inclusion" (Bayer AG 2022, p. 15), "development of a diversity concept" (GEA Group AG 2022, p. 257) as well as quantifiable social targets without specified target values, e.g., an employee net promoter score (Siemens Energy AG 2021, p. 168).

Governance targets linked to variable executive compensation relate to compliance, corporate governance, and integrity aspects. For the majority of agreed governance targets, target achievement is subjectively assessed (78%), as primarily qualitative targets are integrated into executives' compensation structures. Qualitative governance targets include, e.g., the "cooperation within the Board of Managing Directors and promotion of the Bank's values vis-à-vis colleagues, partners and customers" (Commerzbank AG 2022, p. 13) and "[a proper establishment of] governance functions" (Münchener Rückversicherungsgesellschaft AG 2022, p. 11). Quantitative governance targets that allow for an objective determination of target achievement are measures, e.g., based on employee surveys, for example "Organizational Health Check" (Hannover Rück 2022, p. 12) and "Integrity [scores]" (Daimler Truck, Compensation Report 2021, p. 9).

Finally, combined ESG targets linked to executive compensation mostly refer to ESG strategy development and implementation. These targets are usually qualitatively assessed (76%). For example, Henkel incorporates "revising the sustainability strategy 2030 including ESG objectives" (Compensation Report 2021, p. 19) and Bayer includes the requirement that executives "further drive implementation of sustainability strategy in divisions and enabling functions" (Bayer AG 2022, p. 15). Moreover, achieved scores in ESG rankings are frequently linked to executives' incentive plans, partly objectively assessed if target values and target achievement curves are determined (e.g., Deutsche Börse AG 2022). An example of subjective assessment is Allianz, incorporating "securing the strong sustainability position in three leading sustainability indices" as a target in annual variable executive pay (Allianz SE 2022, p. 13).

4.3 Assignment of Responsibility and Temporal Horizon of ESG Targets

Table 5 further shows the identified ESG targets specified by target responsibility and temporal horizon. Overall, 80% of ESG targets are set collectively for all board members in 2021, i.e., (not) achieving these ESG targets equally impacts the variable compensation of all board members. Individual ESG targets are less frequently incorporated, as only 20% of ESG targets are linked to the variable pay of single board members.

The results for the temporal horizon of ESG targets in Table 5 show that 218 short-term ESG targets and 84 long-term ESG targets are included in variable executive pay in 2021. Hence, short-term targets are much more frequently used, especially in the governance and combined ESG categories. For the environmental dimension, the temporal horizon of the linked targets shifts slightly towards more long-term environmental targets integrated into variable executive pay (42%). In the social dimension, 73% of the targets linked with short-term variable pay.

4.4 Weighting and Linkage of ESG Components

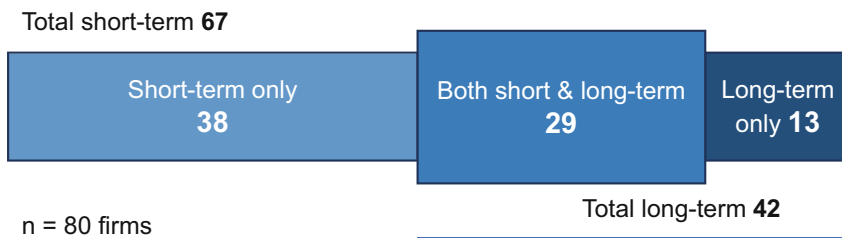
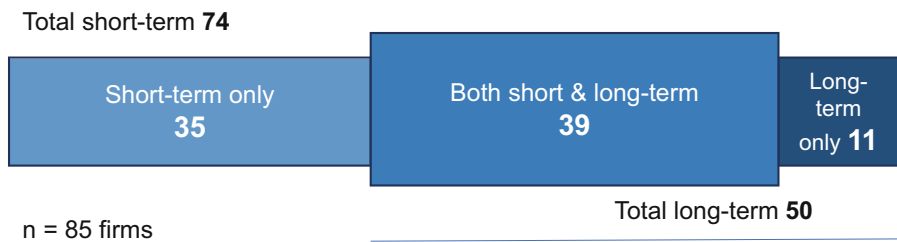
Table 6 and Figure 3 show the distribution of alternative designs used in incentive plans to link ESG target achievement with variable executive pay, clustered by the incentive plans' temporal horizon. The target-level findings (Table 5) are mirrored in the incentive plan-level analysis, indicating that linking ESG targets to executives' short-term incentive (STI) pay was the most prevalent practice in 2021. Of the 80 firms that used ESG-linked compensation in 2021, 67 implement ESG targets in annual variable executive pay, whereas 42 link ESG targets to executives' long-term incentive (LTI) plans. Overall, 29 of firms incorporate ESG targets in both executives' STI and LTI in 2021. In 2022, linking ESG incentives to both short-term and long-term incentive plans has become the most prevalent practice, as 39 of the 85 firms that used ESG incentives in 2022 adopted this compensation structure in their incentive plan. The number of firms implementing ESG incentives in STI plans only (35 firms) or LTI plans only (11 firms) decreased accordingly (Fig. 3).

Table 6 clusters firms' ESG-related incentive plans by their linkage with overall variable pay, showing that implementing an additive link between ESG target achievement and executive pay is the most widely used practice in both short-term and long-term incentive plans in 2021 and 2022.

ESG measures are included as additive criteria solely based on ESG measures (additive criteria ESG), e.g., in Covestro's 2022 executive incentive plan (Covestro

Table 6 Linkage of ESG Incentive Plans Clustered by Temporal Horizon

Linkage of ESG incentive plan	Temporal horizon							
	Short-term incentive plan				Long-term incentive plan			
	<i>n</i> = 69		<i>n</i> = 78		<i>n</i> = 42		<i>n</i> = 51	
	2021		2022		2021		2022	
	<i>Number (%) of incentive plans</i>		<i>Number (%) of incentive plans</i>		<i>Number (%) of incentive plans</i>		<i>Number (%) of incentive plans</i>	
Additive criteria ESG	29	42%	38	49%	30	71%	38	75%
Additive criteria incl. ESG	14	20%	12	15%	3	7%	3	6%
Performance factor ESG	4	6%	5	6%	3	7%	5	10%
Performance factor incl. ESG	22	32%	23	29%	6	14%	5	10%

2021**2022****Fig. 3** ESG Targets in Incentive Plans by Temporal Horizon

AG 2022), and as additive criteria including ESG measures (additive criteria including ESG), e.g., in Puma's 2021 and 2022 executive incentive plan (Puma SE 2022). Generally, additive criteria solely based on ESG measures are the most prevalent linkage alternative in executives' LTI (71% of incentive plans in 2021, 75% in 2022). In executives' STI, this linkage alternative is used less frequently (49% of incentive plans in 2022).

Performance factors that link ESG target achievement in a multiplicative way with executive compensation are more common in executive's STI plans than in LTI plans. This approach takes into account the achievement of ESG targets by increasing or decreasing variable executive payout that is otherwise based on financial targets (e.g., Volkswagen). A performance modifier may also only entail a potential downward adjustment of executive pay (e.g., Zalando). Performance factors including or solely based on ESG criteria set an average lower limit of 0.72 in STI plans (0.69 in LTI plans), and an average upper limit of 1.26 in STI plans (1.21 in LTI plans) in 2022, with little differences over the two years of analysis.

Figure 4 illustrates the weights assigned to ESG targets clustered by temporal horizon for the subsample of firms that uses additive ESG criteria or additive criteria including ESG criteria and transparently discloses this information, which is the case for 36 short-term and 33 long-term incentive plans in 2021 (44 short-term and 41 long-term incentive plans in 2022). The average weight of ESG incentives in executives' total STI is 18.1% in 2021 and 20.3% in 2022. The average weight of the ESG component in executives' LTI is 25.8% in 2021 and 24.7% in 2022, both exceeding the average weight of ESG-related targets in executives' STI plans.

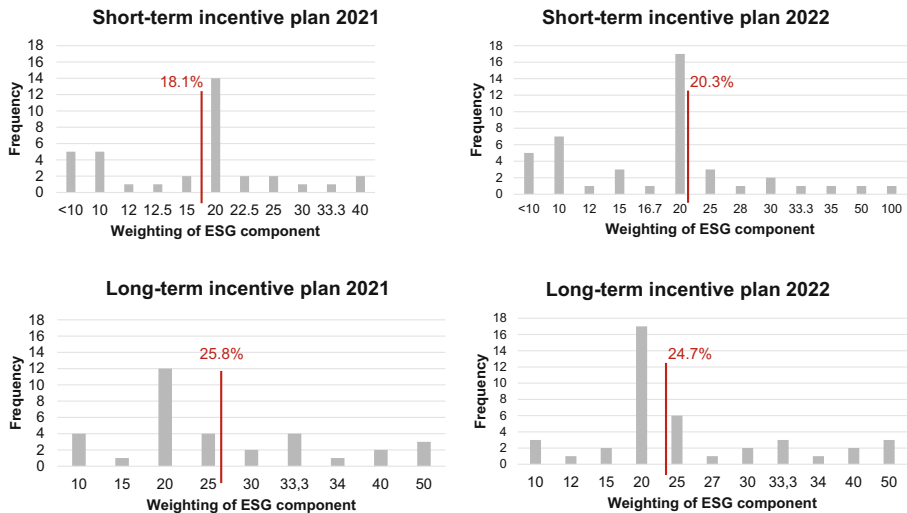


Fig. 4 Weighting of Additive ESG Incentives by Temporal Horizon

4.5 ESG Incentive Quality and ESG Performance

Based on the descriptive findings, we next analyze whether the identified dimensions of firms' ESG incentive quality are related to firms' ESG performance outcomes. To this end, descriptive data is aggregated into the variables defined in Table 2. Table 7 outlines aggregated descriptive statistics of ESG incentive quality and firms' ESG performance data over the time periods covered.

The descriptive statistics for ESG incentive quality show little to no variation in the mean values of variables. While slight increases in the mean number of dimensions, targets, in the temporal horizons covered, and in the weight of ESG targets arise over time, no changes in the assessment of targets and responsibility for target achievement variables are present. The ESG performance variables exert the highest mean values in the social dimension, followed by the governance and environmental dimensions, and also vary little over time.

We next analyze the interrelation of ESG incentive quality and firms' ESG performance by estimating a structural equation model. Given the small variation in ESG incentive quality variables over time, we base our analysis on 2021 incentive quality and analyze its relation with the ESG performance scores over the years 2021–2023. To this end, the ESG incentive quality indicators and performance scores are combined in latent constructs using reflective measurement models (Hair et al. 2021). Table 8 displays the measurement model evaluation.

Panel A of Table 8 evaluates indicator reliability. The outer loadings of the ESG incentive quality indicators are all significant but lie below the recommended threshold of 0.7, indicating that the construct explains less than 50% of the indicators' variance (Hair et al. 2021). While indicator loadings between 0.4 and 0.7 are common and acceptable in social sciences research exploring new constructs (Hair et al. 2021; Hulland 1999), the indicator loading of the *Weight* variable lies below the min-

Table 7 Descriptive Statistics for ESG Incentive Quality and Performance Variables

Variable	Year	N	Minimum	Maximum	Mean	Std. Dev
<i>ESG Incentive quality variables</i>						
ESG_Strategy	2021	98	1.00	3.00	2.45	0.64
ESG_Inc_Dummy	2021	98	0.00	1.00	0.80	0.40
	2022	98	0.00	1.00	0.85	0.36
Dimensions	2021	80	1.00	4.00	2.02	0.90
	2022	85	1.00	4.00	2.31	0.85
Targets	2021	80	1.00	10.00	3.63	2.37
	2022	85	1.00	12.00	3.94	2.30
Time_horizon	2021	80	0.33	1.00	0.73	0.24
	2022	85	0.33	1.00	0.77	0.23
Weight	2021	80	0.00	0.80	0.23	0.14
	2022	84	0.00	1.00	0.25	0.15
Assessment	2021	80	0.33	1.00	0.69	0.28
	2022	85	0.33	1.00	0.69	0.30
Responsibility	2021	80	0.50	1.00	0.94	0.16
	2022	85	0.50	1.00	0.94	0.16
<i>ESG performance variables</i>						
E_Score	2021	98	0.00	97.81	62.96	24.91
	2022	98	0.00	98.30	63.35	25.15
	2023	98	0.00	97.86	63.39	24.30
S_Score	2021	98	2.51	97.23	73.93	17.94
	2022	98	2.22	97.39	74.23	17.28
	2023	98	4.73	97.52	74.04	17.09
G_Score	2021	98	10.33	95.12	66.04	20.82
	2022	98	14.47	94.98	65.51	20.33
	2023	98	10.86	92.04	66.77	18.58

Note: ESG strategy was coded for 2021 because it represents the strategic context in which the 2021 ESG incentive plans were designed. In our PLS-SEM, this baseline strategic orientation serves as a time-invariant antecedent to the 2021 incentive quality measures

imum threshold of 0.4. However, as the weight assigned to ESG incentives is seen critical for their incentive effect (Bebchuk and Tallarita 2022; Flammer et al. 2019), deleting this item would severely affect the content validity of the construct. The indicator loadings of the ESG performance constructs for the three years of analysis are all satisfactory. Panel B shows that the composite reliability ρ_{C} can be assessed as satisfactory to good for all constructs, which also holds for the alternative reliability measures Cronbach's alpha and ρ_{A} . However, the average variance extracted (AVE) used to assess convergent validity lies below the recommended threshold of 0.5 for the incentive quality construct (Hair et al. 2021), indicating that the construct explains less than 50% of the indicators' variance.

Table 9 displays the structural model, estimated using bootstrapping with 10,000 replacement samples to assess the significance of path coefficients. In line with our

Table 8 Measurement Model Evaluation*Panel A: Outer loadings and significance levels for the constructs*

Paths from	Paths to			
	2021 ESG Incentive quality	2021 ESG Performance	2022 ESG Performance	2023 ESG Performance
2021 ESG Incentive quality				
ESG_Strategy	0.643***	—	—	—
Dimensions	0.650***	—	—	—
Targets	0.605***	—	—	—
Time_horizon	0.441***	—	—	—
Weight	0.342**	—	—	—
Assessment	0.610***	—	—	—
Responsibility	0.579***	—	—	—
2021 ESG Performance				
E_Score	—	0.886***	—	—
S_Score	—	0.861***	—	—
G_Score	—	0.723***	—	—
2022 ESG Performance				
E_Score	—	—	0.886***	—
S_Score	—	—	0.823***	—
G_Score	—	—	0.571***	—
2023 ESG Performance				
E_Score	—	—	—	0.909***
S_Score	—	—	—	0.825***
G_Score	—	—	—	0.441**

Panel B: Internal consistency and convergent validity

Construct	2021 ESG Incentive quality	2021 ESG Performance	2022 ESG Performance	2023 ESG Performance
Composite reliability	0.758	0.865	0.811	0.785
rhoc				
Cronbach's alpha	0.665	0.767	0.660	0.613
Reliability coefficient	0.641	0.803	0.754	0.789
rhoA				
AVE	0.317	0.683	0.596	0.567

Note: *, **, and *** denote statistical significance at the 0.1, 0.05, and 0.01 levels using a two-tailed test

expectation based on previous research (Yang 2023), the path coefficients are positive and significant at the $p < 0.01$ level. Given the novelty of the ESG incentive quality construct and the complexity of factors captured in the ESG performance measures, the explanatory power (R^2) and effect sizes (f^2) are generally considered satisfactory. Taken together, the results indicate that higher ESG incentive quality in 2021 is significantly positively associated with German listed firms' ESG performance in the current and subsequent years of analysis.

Table 9 PLS Structural Model
($n = 80$)

<i>Panel A: Path coefficients, t-statistics, and R^2</i>			
–	Paths to		
Paths from	2021 ESG Performance	2022 ESG Performance	2023 ESG Performance
2021 ESG Incentive quality	0.526 (7.01)***	0.541 (8.08)***	0.521 (7.79)***
R^2	0.28	0.29	0.27
R^2 adjusted	0.27	0.29	0.26
<i>Panel B: Effect size (f^2)</i>			
–	Paths to		
Paths from	2021 ESG Performance	2022 ESG Performance	2023 ESG Performance
2021 ESG Incentive quality	0.38	0.41	0.37

Note: *, **, and *** denote statistical significance at the 0.1, 0.05, and 0.01 levels using a two-tailed test

5 Discussion and Conclusion

This study explores the key design characteristics of ESG-related incentives integrated into the compensation structures of German listed firms' executives. We comprehensively illustrate the current state and quality of ESG incentives by analyzing the extent to which key design characteristics of ESG-linked executive compensation outlined in the study's conceptual framework are implemented in practice. Toward this end, the study utilizes a content analysis of corporate disclosures on ESG strategies and ESG incentives from large German listed firms for the years 2021 and 2022. Moreover, we analyze how the quality of ESG incentives is related to German listed firms' ESG performance, assessed based on LSEG data, and find strong positive associations of both variables in a structural equation model.

Overall, the study confirms the growing prevalence of ESG-linked compensation, with 85% of German listed firms incorporating ESG criteria into executive compensation structures by 2022. Consistent with studies investigating international samples (Cohen et al. 2023; Aresu et al. 2022), this trend reflects a significant shift towards sustainable corporate governance practices (Goergen and Tonks 2019; Goergen 2022). However, despite the legal requirement on German listed firms to align executive compensation structures with sustainable and long-term corporate development (§ 87 AktG), 20% of HDAX-listed firms did not incorporate ESG-oriented executive compensation components in 2021, highlighting a gap between regulatory requirements and corporate practice which slightly narrowed in 2022. This trend indicates a growing, but not yet universal, commitment to aligning executives' incentives with ESG goals. In this respect, the findings illustrate that ESG incentives are widespread among firms that pursue ESG for corporate strategic purposes. From a management accounting perspective, this finding corroborates with prior arguments that a firm's strategy impacts the design of incentive and performance measurement systems (Simons 1990; Perego and Hartmann 2009). In this respect, the study highlights that organizations facing institutional pressures to adopt ESG-linked executive

compensation may shape their response to these pressures in accordance with their overall corporate strategy. Furthermore, the study supports the theoretical reasoning of an interplay between an organization's sustainability strategy and the degree to which sustainability control systems are integrated (Gond et al. 2012) by describing that firms with an integrated sustainability strategy use ESG incentives more often than firms that decouple their strategic ESG ambitions from their overall corporate strategy.

In addition, our study underscores critical nuances involved in the implementation of ESG incentives. While the presence of ESG incentives in corporate practice is increasingly rising, the quality and design characteristics of ESG incentives are still areas of concern (Bebchuk and Tallarita 2022; Walker 2022; Kolk and Perego 2014). However, contrary to previous findings, our holistic picture of ESG incentive design shows that combined ESG targets, which previous studies have indicated are prone to low controllability and symbolic engagement (Kolk and Perego 2014), are recently relatively uncommon among our sample firms. Furthermore, many ESG targets included, particularly in the environmental domain, are quantitatively assessed based on verifiable criteria (Maas 2018). A further characteristic potentially alleviating concerns about the quality of ESG incentives is the substance of ESG incentives as reflected in their relative weight within overall compensation packages. German firms' ESG incentives accounted for an average of 20% of executives' short-term and 25% of their long-term incentive plans in 2022, underscoring their relevance in comparison to findings for the US context (Bebchuk and Tallarita 2022).

The derivation and analysis of the ESG incentive quality construct we present is closely related to Yang (2023), but differs in several key aspects. While Yang (2023) focuses on the effectiveness of high-quality ESG incentives on ESG performance outcomes through an index-based approach, our study captures ESG quality as a construct with more refined dimensions derived from a comprehensive review of previous literature in the field. By empirically mapping out the extent and variety of ESG criteria embedded in executive compensation contracts, our study details how German listed firms integrate ESG criteria into executives' compensation contracts, contributing to a more comprehensive understanding of the design of ESG incentives. Moreover, while Yang (2023) outlines an indirect improvement of the quality of ESG incentives through other corporate governance practices, our study focuses on developing and refining the ESG incentive quality construct, and analyzing its relation with German firms' ESG performance.

In relation to Winschel (2021), who explored how firms' carbon reduction strategies are translated into carbon incentives, our study encompasses all ESG dimensions rather than solely exploring carbon targets as a subelement of ESG incentives. Furthermore, our study investigates how different types of ESG strategies translate into ESG incentives, thereby providing a nuanced understanding of the alignment between ESG strategy and compensation practices.

Overall, the study contributes to the literature on executive compensation by adding to the debate on the design of ESG incentive systems (Kolk and Perego 2014; Bebchuk and Tallarita 2022; Soderstrom et al. 2017). By mapping out the dimensions and current state of ESG incentives among German listed firms, we extend prior research that has documented international trends in the adoption of

ESG incentives (e.g., Cohen et al. 2023) by providing an in-depth analysis of contract details. The identified dimensions of ESG incentive quality are shown to be positively associated with firms' ESG performance. The study further broadens the focus beyond previous examinations of the integration of carbon-related targets in CEO incentive plans (Winschel 2021), including a comprehensive array of all ESG dimensions and focusing on different types of ESG strategies.

Several factors may explain the observed positive association between ESG incentive quality and firms' ESG performance. From a management control perspective, well-designed ESG incentives strengthen goal congruence by aligning executives' decision-making with corporate sustainability objectives (Simons 1990; Merchant and Van der Stede 2017). This alignment reduces information asymmetries and agency conflicts concerning the pursuit of long-term, non-financial objectives (Jensen and Meckling 1976). Firms with more integrated ESG incentives may thus achieve superior ESG outcomes because their control systems effectively translate strategic sustainability goals into managerial behavior. Moreover, from an institutional perspective, the increasing diffusion of ESG-linked compensation practices reflects firms' adaptation to stakeholder and regulatory pressures while maintaining internal consistency with existing control systems (DiMaggio and Powell 1983; Gond et al. 2012). The relatively high proportion of quantitative and verifiable targets in our sample may indicate a managerial attempt to enhance the legitimacy and credibility of ESG commitments in response to external scrutiny. Taken together, these theoretical perspectives help explain why firms with high-quality ESG incentives display stronger ESG performance and why variation in incentive design persists across firms and contexts.

Beyond the study's theoretical and empirical contributions, the findings provide important practical implications from corporate and regulatory perspectives. From a corporate perspective, the conceptual model of ESG-linked executive compensation may guide compensation committees in developing and implementing high-quality ESG-based compensation packages. Practical examples may further guide the implementation and (re-) evaluation of strategy-aligned compensation practices. Furthermore, the study emphasizes that regulatory efforts alone are unlikely to secure a substantive integration of ESG criteria into executive pay. Instead, our results indicate that the incorporation of ESG criteria depends critically on a firm's underlying ESG strategy, highlighting the central role of strategic alignment in ensuring meaningful adoption.

This study is subject to several limitations that open avenues for future research. First, our analysis provides descriptive insights into the alignment between firms' ESG strategies and the integration of ESG targets in executive compensation but does not establish causality. Future studies could build on this work by employing statistical models to examine how ESG strategies influence the design and implementation of ESG-linked incentives, thereby offering deeper insights into how strategic alignment unfolds over time. Second, while we find positive associations between the qualitative characteristics of ESG-linked executive compensation in 2021 and firms' subsequent ESG performance, further research could explore how ESG incentive quality interacts with firm characteristics and other sustainable governance mechanisms in a longitudinal setting. We also did not control for characteristics

like firm size or industry affiliation. Future research with larger, regression-based samples could incorporate these factors to assess the robustness of the observed relationships. Such analyses could empirically assess the joint influence of different design choices and contextual factors on firms' ESG performance. Third, our study aggregates the design characteristics of ESG incentives across multiple levels of analysis (firm, target, and incentive levels). Although this approach enables a holistic view, it necessarily condenses qualitative dimensions into composite firm-level indicators. Future research could refine the ESG incentive quality construct to disentangle these levels and examine which specific design elements most strongly drive ESG outcomes. In addition, ESG strategy was assessed for 2021 only. Although corporate strategies typically evolve gradually, firms may have subsequently integrated ESG aspects into their strategic orientation. Extending the timeframe of analysis could capture such developments and provide a more dynamic perspective on ESG strategic integration.

Despite these limitations, the study contributes to the literature on ESG-linked executive compensation by revealing substantial variation in how firms design and implement ESG-related incentives. The findings show that multiple design characteristics jointly shape the quality of ESG-linked compensation and its effectiveness in aligning managerial behavior with sustainability objectives. They also highlight the need for more standardized and transparent disclosure of ESG-linked compensation practices to enhance comparability and stakeholder assessment. Overall, the study provides a conceptual and empirical basis for future research on the design and performance implications of ESG-linked executive incentives.

6 Appendix

Table 10 Codebook for Qualitative Content Analysis				
Main category	Category	Subcategory	Definition	Coding examples
ESG strategy	S1	Integrated	This category identifies corporate strategies that incorporate ESG aspects	“The Airbus Strategy is based on four strategic priorities that will enable the Company to deliver on its purpose. These strategic priorities focus on geopolitics, sovereignty, resilience and sustainability. [...] Priority 4: Lead the transformation of the aerospace industry: Meaningful reductions in carbon emissions are within reach. Airbus SE will lead the decarbonisation of the aerospace sector while meeting emerging international Environmental, Social and Governance standards.” (Airbus SE 2022, p. 10)
	S2	Decoupled	This category identifies corporate strategies that do not prioritize ESG aspects in their overall corporate strategy but formulate a separate (independent) ESG strategy	“[...] 1&1 will continue to invest heavily in new customers and new products so that it can steadily expand its market positioning by building on this expected growth. 1&1’s successful participation in the 5G frequency auction in 2019 opens up further strategic potential for strengthening and expanding its position on the German mobile communications market. The operation of its own 5G mobile network will decrease 1&1’s dependence on access to external networks, increase its own added value and open up opportunities to develop new business areas. While not neglecting organic growth, 1&1 continuously examines as well possible corporate acquisitions, holdings and cooperative ventures as further methods for the expansion of market position, competencies and product portfolios. [...]” (1&1 AG 2022a, p. 36) “Our sustainability strategy and sustainability management activities are designed to address to-day’s material sustainability topics, challenges and opportunities—in other words, the relevant impacts that our Company has on our stakeholders, the environment and society, and the impacts that the environment and society has on it. We ensure this is in fact the case by basing the action areas for our sustainability strategy on a materiality analysis.” (1&1 AG 2022b, p. 16)

Table 10 (Continued)

Main category	Category number	Category	Subcategory	Definition	Coding examples
ESG strategy	S3	None	-	This category identifies corporate strategies that neither prioritise ESG aspects in their general corporate strategy nor formulate them in a separate (independent) ESG strategy	See for example CTS Eventim KGaA 2022
ESG incentives	I1	Yes	-	This category identifies remuneration systems in which ESG aspects are linked	See for example CTS Eventim KGaA 2022
ESG incentives	I2	No	/	This category identifies remuneration systems in which no information is provided on the influence of ESG criteria on the remuneration of the Executive Board or in which it is clearly stated that ESG aspects are not linked	"There are currently no non-financial target parameters" (Sartorius AG 2022 , p. 101)
<i>(2) Incentive plan level</i>					
Temporal horizon	T1	Short-term	/	This category identifies remuneration systems that integrate sustainability indicators into short-term variable remuneration	"STI: Based on the achievement of certain targets (revenue and earnings ratios; operational/strategic aspects; personal performance; non-financial performance criteria (ESG))" (I&I AG 2022a , p. 215)
Temporal horizon	T2	Long-term	/	This category identifies remuneration systems that integrate the sustainability indicators into the long-term variable remuneration	"LTI: Strategic target 3: Grow CO ₂ -neutrally until 2030" (BASF SE 2022 , p. 6)

Table 10 (Continued)

Main category	Category number	Category	Subcategory	Definition	Coding examples
Temporal horizon	T3	Short and long term	/	This category identifies remuneration systems that integrate sustainability indicators into short- and long-term variable remuneration	“2021 Performance Bonus: Individual Criteria Amanda Rajkumar: 20% Diversity, Equity and Inclusion” (Adidas AG 2022, p. 16) “For the LTIP 2021/2025, the Supervisory Board has defined the following financial or ESG-related performance criteria linked to the strategic objectives for each of the five performance years (2021 to 2025): Financial criterion: Increase in net income from continuing operations compared to the previous year (weighting: 80%) ESG criterion: Share of sustainable articles offered (weighting: 20%)” (Adidas AG 2022, p. 9)
Linkage and weight	W1.1	Linkage	Additive criteria ESG	This category identifies remuneration systems that allocate a percentage weighting to single or multiple ESG targets in total variable (short and/or long-term) compensation	“In addition to the three financial targets, 25% of non-financial performance criteria are also included in the determination of the payout from the LTIP” (Vonovia SE 2022, p. 18)
Linkage and weight	W1.2	Linkage	Additive criteria including ESG	This category identifies remuneration systems that allocate a percentage weighting to variable compensation components, where the weighting includes not only ESG targets but also other objectives	“Weighting 50%: Return on strategic projects, ESG; environmental, health & safety, corporate governance” (Befesa S.A. 2022, p. 11)
Linkage and weight	W1.3	Linkage	Performance factor ESG	This category identifies remuneration systems that include ESG criteria as a multiplicative performance factor. The variable compensation based on the achievement of financial targets is multiplied by a performance factor that is determined by the achievement of solely ESG targets	“ESG factor” (VW AG 2022, p. 2)

Table 10 (Continued)

Main category	Category number	Category	Subcategory	Definition	Coding examples
Linkage and weight	W1.3	Linkage	Performance factor including ESG	This category identifies remuneration systems that include ESG criteria as a multiplicative performance factor. The variable compensation based on the achievement of financial targets is multiplied by a performance factor that is determined by the achievement of ESG and other targets	"Individual performance factor" (E.ON SE 2022, p. 11)
Linkage and weight	W2.1	Weight	Weighting apparent	This category identifies the weighting of ESG criteria in remuneration systems that follow the linkage types "additive criteria ESG" and "additive criteria including ESG"	"For the LTIP 2021/2025, the Supervisory Board has defined the following financial or ESG-related performance criteria linked to the strategic objectives for each of the five performance years (2021 to 2025): Financial criterion: Increase in net income from continuing operations compared to the previous year (weighting: 80%) ESG criterion: Share of sustainable articles offered (weighting: 20%)" (Adidas AG 2022, p. 9)
Linkage and weight	W2.2	Weight	Weighting not apparent	This category classifies the linkage types "additive criteria ESG" and "additive criteria including ESG" for which no clear weighting of ESG targets is transparent	"Weighting 50%: Return on strategic projects, ESG: environmental, health & safety, corporate governance" (Befesa S.A. 2022, p. 11)
<i>(3) Target level</i>					
Target dimension*	D1.1	Environment	Climate neutrality	This category identifies key figures that consider climate neutrality in terms of the reduction of greenhouse gas emissions	"Reduction of the CO ₂ footprint" (Fraport AG 2022, p. 7), "Reduction of absolute CO ₂ emissions in Scope 1 and 2" (Mercedes-Benz Group AG 2022, p. 19), "Decarbonization index" (VW AG 2022, p. 12)
Target dimension*	D1.2	Environment	Energy efficiency	This category identifies key figures that consider the reduction of energy consumption, e.g. through energy efficiency and intensity measures	"Reduction in energy consumption" (Deutsche Telekom AG 2022, p. 10), "Energy efficiency of new buildings" (Vonovia SE 2022, p. 18)

Table 10 (Continued)

Main category	Category number	Category	Subcategory	Definition	Coding examples
Target dimension*	D1.3	Environment	Environmental performance	This category identifies key figures that focus on the improvement of the firm's environmental performance	"Avoidance of serious environmental incidents" (RWE AG 2022, p. 14), "Introduction of a certified/audited environmental management system (RWE AG 2022, p. 14)"
Target dimension*	D1.4	Environment	Environmental reporting	This category identifies key figures that focus on aspects with regard to the firm's reporting on environmental aspects	"Implementation of the regulatory transparency requirements for physical and transitory climate risks in the loan portfolio" (Commerzbank AG 2022, p. 13), "Development and implementation of a reporting system that complies with the recommendations of the Task Force on Climate-related Financial Disclosure (TCFD)" (Uniper SE 2022, p. 11)
Target dimension*	D1.5	Environment	Resource management	This category identifies key figures that consider the sustainable use of resources, e.g. by increasing the resource efficiency, reducing resource use and using recyclable materials	"Reduction of saline process water from potash production" (K+S AG 2022, p. 146), "Efficient use of silicon in wafer production" (Siltronic AG 2022, p. 6), "80% of strategic biological raw materials from sustainable sources" (Symrise AG 2022, p. 10), "Increasing the proportion of recyclable materials in plastic packaging" (Beiersdorf AG 2022, p. 175)
Target dimension*	D2.1	Social	Community/ stakeholder engagement	This category identifies key figures that relate to the company's social commitment, e.g. by supporting the development of the local economy and social infrastructure or the company's impact on the community and stakeholders	"Improving quality of life through better access to healthcare" (Siemens Healthineers AG 2021, p. 12), "Number of women in low to middle-income countries with access to modern contraception due to measures supported by Bayer" (Bayer AG 2022, p. 20), "Low-barrier (partial) modernization" (Vonovia SE 2022, p. 16)

Table 10 (Continued)

Main category	Category number	Category	Subcategory	Definition	Coding examples
Target dimension*	D2.2	Social	Customer satisfaction	This category identifies key figures that relate to customer satisfaction. Customer satisfaction can be defined, for example, by the tendency to recommend a service/product to others or a specific customer satisfaction index. Furthermore, key figures are identified which have an impact on the increase in product quality and therefore also have an influence on customer satisfaction	“Customer Satisfaction” (Vonovia SE 2022, p. 16), “Net Promoter Score” (Telefonica Deutschland Holding AG 2022, p. 8), “Quality Costs & Technology Management Costs” (Nordex SE 2022, p. 182)
Target dimension*	D2.3	Social	Diversity and inclusion	This category identifies key figures that deal with diversity aspects, e.g. increasing the proportion of women, e.g. in management positions, and increasing the number of employees of international origin	“Proportion of women in management positions” (Telefonica Deutschland Holding AG 2022, p. 8), “Improving the gender balance” (Siemens Healthineers AG 2022, p. 12), “Internationalization in top management” (VW AG 2022, p. 12), “Contribution to further improving diversity” (Henkel AG & Co. KGaA 2022, p. 19)
Target dimension*	D2.4	Social	Employee engagement	This category identifies key figures that relate to employee engagement and employee satisfaction	“Degree of employee commitment to the company (employee engagement)” (Daimler Truck Holding AG 2022, p. 10), “Global Engagement Score: Engagement of our employees”, (Jenoptik AG 2022, p. 45), “For the ‘employees’ parameter, the Engagement Index was analysed, which measures employees’ loyalty to the company, their willingness to work hard and their willingness to recommend the employer to others” (Lufthansa AG 2022, p. 277)

Table 10 (Continued)

Main category	Category number	Subcategory	Definition	Coding examples
Target dimension*	D2.5	Social	Employee health and safety	This category identifies key figures that deal with increasing or maintaining the health and safety of the workforce “Reduction of the Lost Time Incident Rate” (K+S AG 2022, p. 146), “Reduction of accidents” (Aurubis AG 2022, p. 36), “Occupational safety in the Group” (HeidelbergCement AG 2022, p. 104)
Target dimension*	D2.6	Social	Employee training and qualification	This category identifies key figures that deal with employee training and qualification “Qualifying the workforce to enable digital transformation” (Bayer AG 2022, p. 15), “Continuous personnel development” (Fuchs Petrolub SE 2022, p. 10), “Digital learning hours per employee” (Siemens AG 2022, p. 21)
Target dimension*	D2.7	Social	Human rights and business ethics	This category identifies indicators that relate to the company’s relationship with indigenous peoples and the company’s human rights policies and initiatives “Investment of at least 1.5 h per PUMA Group employee (FTE) in human rights or community projects” (Puma SE 2022, p. 41)
Target dimension*	D2.8	Social	Supply chain	This category identifies key figures that deal with the sustainable design of supply chains. This can be achieved, for example, by introducing sustainable standards within the supply chain to which suppliers must adhere “Coverage of the purchasing volume through the Code of Conduct for Suppliers” (K+S 2022, p. 146), “Complete coverage of the supply chain through the inclusion of international environmental and social standards in supply and trade agreements” (RWE AG 2022, p. 14), “Science-based targets for suppliers” (Zalando SE 2022, p. 52)

Table 10 (Continued)

Main category	Category number	Category	Subcategory	Definition	Coding examples
Target dimension*	D3.1	Governance	Compliance	This category identifies indicators that deal with “Compliance”, “Corporate Governance and ‘Integrity’”. These can be programs, guidelines and policies to prevent corrupt business activities as well as partnerships with local communities and transparency initiatives	“Measures in the area of combating white-collar crime and preventing money laundering activities and fulfilling regulatory requirements” (Deutsche Bank AG 2022, p. 18)
Target dimension*	D3.2	Governance	Corporate Governance	This category identifies indicators that deal with “Compliance”, “Corporate Governance and ‘Integrity’”. These can be programs, guidelines and policies to prevent corrupt business activities as well as partnerships with local communities and transparency initiatives	“Compliance with good corporate governance” (Fuchs Petrolub SE 2022, p. 10)
Target dimension*	D3.3	Governance	Integrity	This category identifies indicators that deal with “Compliance”, “Corporate Governance and ‘Integrity’”. These can be programs, guidelines and policies to prevent corrupt business activities as well as partnerships with local communities and transparency initiatives	“Satisfaction with the expected and actual conduct of the Board of Managing Directors with regard to the criteria of integrity and compliance” (VW AG 2022, p. 12)
Target dimension*	D4.1	Combined	ESG business/performance	This category identifies key figures that refer to the ESG business development and performance, e.g., expansion of ESG business, development of sustainability technologies and the implementation of sustainability projects	“Sustainable financing and investments” (Deutsche Bank AG 2022, p. 18), “Improve EHS (Environment, Health and Safety) metrics” (Qiagen N.V. 2022, p. 10)

Table 10 (Continued)

Main category	Category number	Category	Subcategory	Definition	Coding examples
Target dimension*	D4.2	Combined	ESG ratings	This category identifies key figures that refer to external assessments, e.g. through sustainability indices and certifications, e.g. through ISO certifications in the area of sustainability, as a basis for assessment	“Securing the strong sustainability positioning in three leading sustainability indices” (Allianz SE 2022, p. 13), “Stabilization of the Sustainability rating” (LEG Immobilien SE 2022, p. 86)
Target dimension*	D4.3	Combined	ESG strategy	This category identifies key figures that were formulated in very general terms with regard to ESG strategy, e.g. the development and implementation of a corporate’s ESG strategy	“Establishment and further development of the sustainability concept (Fuchs Petrolub SE 2022, p. 5)”
Target dimension*	D4.4	Combined	ESG (not further specified)	This category identifies key figures that were formulated in very general terms	“Identification of prospective ESG targets” (Henkel AG & Co. KGaA 2022, p. 19)
Target dimension*	D4.5	Combined	Reputation	This category identifies key figures that were formulated with regard to a corporate’s reputation	“Improvement of sustainability commitment and communication as well as internal and external reputation” (Bayer AG 2022, p. 15). Reputation of the company (RepTrak Pulse) (Telefonica Deutschland Holding AG 2022, p. 8)

Table 10 (Continued)

Main category	Category number	Category	Subcategory	Definition	Coding examples
Target assessment	A1	Objective	Quantitative with target value	This category encompasses targets whose achievement can be assessed objectively. Following Maas (2018, p. 576) and the definition of “hard” KPIs, we identify ESG KPIs as objective if they demonstrate clear measurability. Specifically, a target is considered objectively assessable if both a measurement basis (e.g., expressed in specific units) and a target value are explicitly defined	“Reduction of greenhouse gas emissions in Scope 1 and 2 by 80% by the end of the performance period compared to the base year 2017” (Zalando SE 2022, p. 62), “Increase in the proportion of sustainable items in the range by 8 percentage points” (Adidas AG 2022, p. 10)
	A2.1	Subjective	Quantitative without target value	This category includes indicators with a clear measurement basis (e.g., expressed in specific units) but, contrary to the definition by Maas (2018, p. 586), lacking an explicit target value. As such, this category also accounts for cases where the assessment of target achievement may rely on subjective evaluation, despite the presence of a measurable basis	“Digital learning hours per employee” (Siemens AG 2022, p. 21), development of occupational accidents per 200,000 working hours (Knorr Bremse AG 2022, p. 52), proportion of women in management positions (Telefonica Deutschland Holding AG 2022, p. 8)
	A2.2	Subjective	Non-transparent	Indicators are classified as “non-transparent” if they align with Maas’s (2018, p. 576) definition of a qualitative objective or lack a clear measurement basis (e.g., a defined unit). Accordingly, this classification refers to subjective assessments of target achievements, as evaluations rely on discretionary judgments rather than predefined, measurable criteria	“ESG target” (Wacker Chemie AG 2022, p. 9), “Employee satisfaction” (Siemens Healthineers AG 2021, p. 14), “Implementation of the sustainability strategy” (Bayer AG 2022, p. 16)

Table 10 (Continued)

Main category	Category number	Subcategory	Definition	Coding examples
Target responsibility	R1	Individual	/	This category identifies key figures that relate to the fulfillment of sustainability targets within variable remuneration by individual members of the Executive Board “2021 Performance Bonus: Individual Criteria Amanda Rajkumar: 20% Diversity, Equity and Inclusion” (Adidas AG 2022, p. 16)
	R2	Collective	/	This category identifies key figures that relate to the fulfillment of sustainability targets within the variable remuneration by all members of the Executive Board. In addition, individual targets that apply to all members of the Executive Board are also coded as collective targets “The amount of the LTIP Bonus is determined based on the achievement of two uniform criteria for all Executive Board members, which are directly linked to the long-term strategy of adidas.” (Adidas AG 2022, p. 9)

* Further sub-subcategories were developed within the target dimension categories to provide additional granularity. However, for reasons of space, these sub-subcategories are aggregated and presented at the broader level of the primary sub-categories

Table 11 2021 Identified ESG Targets in Executive Compensation Clustered by Industry and ESG Dimension

Industry	ESG dimension					
	Environment		Social		Governance	
	Number (per-centage) of companies	Number (mean) of targets	Number (per-centage) of companies	Number (mean) of targets	Number (per-centage) of companies	Number (mean) of targets
Chemicals ($n = 9$)	6 (67%)	7 (1.2)	5 (56%)	13 (2.6)	2 (22%)	3 (33%)
Construction ($n = 1$)	1 (100%)	2 (2.0)	1 (100%)	1 (1.0)	–	1 (100%)
Consumer goods ($n = 6$)	4 (67%)	14 (3.5)	5 (83%)	10 (2.0)	1 (17%)	3 (50%)
E-commerce ($n = 3$)	3 (100%)	7 (2.3)	1 (33%)	1 (1.0)	–	–
Energy and environment ($n = 6$)	3 (50%)	5 (1.7)	4 (67%)	9 (2.3)	1 (17%)	2 (33%)
Finance, insurance and real estate ($n = 12$)	8 (67%)	13 (1.6)	8 (67%)	21 (2.6)	7 (58%)	9 (75%)
Media ($n = 1$)	1 (100%)	1 (1.0)	–	–	–	–
Metal and electronics ($n = 20$)	12 (60%)	19 (1.6)	17 (85%)	38 (3.2)	3 (15%)	4 (1.3)
Pharmaceutical and healthcare ($n = 8$)	3 (38%)	5 (1.7)	4 (50%)	16 (4.0)	–	–
Telecommunication, IT and consumer electronics ($n = 11$)	6 (55%)	11 (1.8)	10 (91%)	22 (2.2)	1 (9%)	1 (1.0)
Transport and logistics ($n = 3$)	2 (67%)	2 (1.0)	2 (67%)	3 (1.5)	–	–
Total	49 (61%)	86 (1.8)	57 (71%)	134 (2.6)	15 (19%)	23 (1.5)
					37 (46%)	59 (1.6)

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Declarations

Conflict of interest F. Spallek and K. Bastini declare that they have no competing interests.

Consent for Publication Not applicable.

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