

INTEGRATING SUSTAINABILITY INTO STRATEGIC MANAGEMENT ACCOUNTING: FRAMEWORKS FOR MEASURING ENVIRONMENTAL AND SOCIAL PERFORMANCE

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ABSTRACT

This research looks into how sustainability can be incorporated into Strategic Management Accounting (SMA) through the creation of frameworks for assessing environmental and social performance. The research tackles the increasing need for management systems that extend beyond financial metrics and integrate sustainability dimensions into decision-making processes. The authors aim to create and assess a comprehensive framework that integrates traditional SMA tools with sustainability-oriented measures. During the research, the authors applied a mixed-methods approach, incorporating case studies of industrial enterprises along with a quantitative analysis of sustainability performance indicators. Environmental data included Scope 1, 2, and 3 greenhouse gas emissions, while social indicators covered employee training, workplace safety, and workforce diversity. The results show that integrating sustainability into Strategic Management Accounting (SMA) enhances the alignment of strategic objectives with long-term environmental and social outcomes, strengthens regulatory compliance, and improves organizational competitiveness. The findings indicate that frameworks such as the Sustainability Balanced Scorecard and internal carbon pricing offer practical tools for embedding sustainability into budgeting, investment appraisal, and incentive systems. This research contributes to theory by extending SMA to incorporate multi-dimensional performance measures and to practice by providing managers with decision-oriented instruments for effective, sustainable strategy implementation.

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1. INTRODUCTION

In recent decades, the increasing demand for organizations to address environmental degradation, social inequality, and global sustainability challenges has transformed the landscape of corporate decision-making. In the intricate and sustainability-focused business environment, conventional management accounting, which primarily concentrates on financial indicators,

falls short of encompassing the entire range of necessary performance. As a result, Strategic Management Accounting (SMA) has become a vital tool for linking financial outcomes with broader strategic objectives. Even though its importance has been growing, SMA has not yet been fully developed for the systemic incorporation of sustainability metrics, particularly those related to environmental and social performance. Sustainability, often represented by the Triple Bottom

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Line (TBL) model, emphasizes the interdependence of economic, environmental, and social factors in achieving organizational success. Companies are facing increasing demands from regulators, investors, and stakeholders to move past mere profit generation and actively work to lessen their environmental impact and contribute positively to society. In this context, it is crucial to integrate sustainability into management accounting systems so that managers can align resource allocation, performance measurement, and strategic decisions with long-term sustainability goals. Despite advancements in sustainability reporting, such as the Global Reporting Initiative (GRI), Sustainability Accounting Standards Board (SASB), and the International Integrated Reporting Framework (IIRC), a significant gap remains between external sustainability reporting and internal strategic management accounting practices. Although many organizations make environmental and social information public for reasons of compliance or reputation, not as many have effectively integrated these metrics into their internal performance evaluation and decision-making processes. This disconnection constrains SMA's ability to offer a comprehensive perspective on organizational performance and obstructs the successful implementation of sustainability-oriented strategies. The importance of developing frameworks for measuring environmental and social performance within SMA lies in their ability to perform the following:

1. Enhance organizational accountability and transparency;
2. Support strategic decisions that balance financial performance with sustainability outcomes;
3. Improve long-term competitiveness and stakeholder trust;
4. Address regulatory and societal pressures for sustainable business practices.

This research aims to bridge this gap by exploring how sustainability can be effectively integrated into SMA through robust measurement frameworks. It investigates how environmental and social dimensions can be operationalized within SMA systems, with the objective of creating a comprehensive, decision-oriented framework for managers. The research emphasizes the conceptual underpinnings of integrating sustainability and the practical implications for industries facing heightened sustainability challenges.

The rest of this research is organized as follows. The subsequent section surveys pertinent literature regarding SMA and the incorporation of sustainability, with an emphasis on frameworks for environmental and social performance. This section, titled "Theoretical and Conceptual Framework," elaborates on the model for incorporating sustainability into SMA. The research design, data collection methods, and analysis techniques are detailed in the "Methodology" section. The results are subsequently presented and examined, after which their significance for management decision-making is discussed. In the end, the research wraps up with a

summary of results, contributions, limitations, and suggestions for future studies.

2. LITERATURE REVIEW

2.1 Strategic Management Accounting and Sustainability Integration

Traditionally, Strategic Management Accounting (SMA) concentrated on supplying information for long-term competitive advantage. However, its scope is now broadening to encompass sustainability dimensions. Galant and Cadez (2017) emphasize that SMA practices can evolve to incorporate non-financial data, aligning decision-making with broader environmental and social objectives. Lueg and Radlach (2016) argue that embedding sustainability within SMA requires rethinking traditional performance measures to include environmental efficiency, social equity, and stakeholder-oriented outcomes.

In practice, the move towards sustainability-integrated SMA is driven by institutional pressures. The introduction of the International Sustainability Standards Board (ISSB) reporting standards in 2023 (IFRS S1 and S2) requires companies to disclose climate-related and broader sustainability risks, pushing management accountants to embed these metrics internally (KPMG, 2023b). Similarly, the EU's Corporate Sustainability Reporting Directive (CSRD) mandates comprehensive disclosures aligned with the European Sustainability Reporting Standards (ESRS), reinforcing the integration of sustainability into internal performance frameworks (PwC, 2024). These global regulatory changes highlight the growing expectation that SMA will track financial outcomes and account for environmental and social impacts.

2.2 Measuring Environmental and Social Performance

The environmental dimension of sustainability measurement has advanced significantly, particularly with the adoption of the Greenhouse Gas (GHG) Protocol for measuring Scope 1, 2, and 3 emissions. Schaltegger and Burritt (2018) note that carbon accounting provides a foundation for connecting environmental impacts to managerial decisions. Semancik (2024) highlights the role of internal carbon pricing in embedding sustainability into investment appraisals. Real-world examples include Microsoft's internal carbon fee, which allocates climate costs to business units and funds emission reduction projects (KPMG, 2023a).

The social performance dimension remains less standardized. According to Michelin et al. (2015), social metrics (e.g., employee well-being, diversity, community engagement, and supply-chain labor conditions) are often reported qualitatively. However, recent frameworks like ESRS and the updated Global Reporting Initiative (GRI) Standards require quantifiable indicators (e.g., gender pay equity, training hours, and health and safety rates) (Global Reporting Initiative, 2023). This development

signals a shift toward measurable and auditable social KPIs that can be linked to strategic management accounting practices.

2.3 Frameworks for Integrating Sustainability into SMA

One of the most widely applied approaches is the Sustainability Balanced Scorecard (SBSC). Kaplan and Norton's (1996) Balanced Scorecard has been adapted to include sustainability perspectives, enabling firms to link strategic objectives with environmental and social indicators. Hansen and Schaltegger (2016) argue that SBSC provides a holistic framework by embedding sustainability into cause-and-effect relationships, though challenges remain regarding indicator overload and alignment with incentives. More recent analyses by Lueg et al. (2015) show that SBSC applications are increasing, particularly in industries facing regulatory scrutiny and high environmental impact.

Digitalization also plays a key role. According to Guthrie et al. (2017), advanced data systems improve the traceability and reliability of sustainability metrics, which strengthens their integration into SMA frameworks. This reflects a broader shift toward sustainability data governance, driven by the need for assurance and credibility in both internal decision-making and external reporting.

3. MATERIALS AND METHODOLOGY

3.1 Research Design and Data Collection

This research applies a mixed-methods research design that combines quantitative measurement of environmental and social indicators with qualitative interpretation of their implications for management accounting. Four industrial enterprises were selected as case studies based on their exposure to sustainability reporting requirements and the availability of relevant data.

Data were obtained from primary and secondary sources. Primary data were collected from internal reporting systems, environmental accounting records, and workforce statistics of the selected companies. Secondary data were gathered from publicly available sustainability reports, company websites, and regulatory disclosure platforms aligned with the Global Reporting Initiative (GRI), the Corporate Sustainability Reporting Directive (CSRD), and the International Sustainability Standards Board (ISSB) frameworks. Environmental data included Scope 1, Scope 2, and Scope 3 greenhouse gas emissions. Social data focused on employee training hours, workplace accident rates, and workforce diversity indices.

3.2 Measurement Framework

Environmental performance was measured in tons of CO₂ equivalent based on the Greenhouse Gas Protocol Corporate Accounting and Reporting Standard. Scope 1 referred to direct emissions, Scope 2 – to energy-related

emissions, and Scope 3 – to value-chain emissions, allowing for a comprehensive assessment of environmental impact.

Social performance indicators were selected in accordance with GRI and ESRS reporting standards. Employee training hours were recorded annually for each individual. Workplace accident rates represented the number of incidents per 100 employees. Diversity index values reflected the percentage of underrepresented groups within the workforce. These indicators were chosen for their relevance to operational performance and their alignment with internationally recognized sustainability reporting practices.

3.3 Data Analysis and Validation

The analysis consisted of three steps. Initially, the authors used descriptive statistics to investigate how environmental and social indicators varied among the four companies. Second, a comparative analysis was carried out to determine performance differences among companies and how these relate to strategic priorities. Third, interpretive analysis was applied to comprehend how these indicators influence management accounting decisions in domains like cost management, resource allocation, and risk assessment. All tables and figures were prepared in black-and-white line format in accordance with academic publishing requirements. Reliability was supported through the use of standardized measurement frameworks and data triangulation from multiple sources. Validity was enhanced through cross-case comparison and adherence to recognized international reporting standards. Company identities were anonymized to ensure confidentiality; ethical research procedures were followed throughout the research.

4. BODY OF THE PAPER

4.1 Experimental Section

An experimental study was designed to explore the systemic integration of sustainability into Strategic Management Accounting (SMA), combining quantitative performance measurement with qualitative interpretation of results. The research investigated four industrial companies that are affected by new sustainability reporting obligations, including the Corporate Sustainability Reporting Directive (CSRD) and the International Sustainability Standards Board (ISSB) standards. The experiment centered on two primary dimensions:

1. Environmental performance, assessed via greenhouse gas (GHG) emissions in accordance with the GHG Protocol framework. To capture the complete carbon footprint of firms, Scope 1 and Scope 2 emissions (direct and energy-related), as well as Scope 3 emissions (value-chain related), were included;
2. Social performance, assessed via indicators that reflect workforce development, workplace safety, and inclusiveness. Specifically, employee training hours, workplace accident rates, and diversity index

percentages were selected as proxies for organizational commitment to social sustainability. The data were collected from sustainability disclosures, workforce records, and internal reporting systems of the four case study firms. These indicators were embedded into a Sustainability Balanced Scorecard (SBSC)

framework to test how they can be operationalized in managerial decision-making.

4.2 Results Section

Sustainability performance indicators by company are presented in Table 1.

Table 1. Sustainability performance indicators by company.

Company	Scope 1 & 2 emissions (tCO ₂ e)	Scope 3 emissions (tCO ₂ e)	Employee training hours	Workplace accidents	Diversity index (%)
A	12,000	45,000	1,500	12	38
B	18,000	60,000	2,000	8	42
C	15,000	52,000	1,700	15	36
D	21,000	70,000	2,200	6	44

Source: Developed by the authors.

The results are interpreted as follows:

- Carbon emissions: Scope 3 emissions accounted for most total emissions across all companies, representing between 70% and 80% of their overall carbon footprint. This finding supports previous research indicating that value chain emissions dominate industrial sectors and should therefore be prioritized within Strategic Management Accounting (SMA) frameworks (Semancik, 2024).
- Training and safety: Companies with higher training hours (B and D) reported fewer workplace accidents, suggesting a negative correlation between training investments and accident rates. This supports the argument that social indicators can be directly linked to performance outcomes (Michelon et al., 2015).
- Diversity: Firms B and D with diversity indexes above 40% demonstrated higher alignment with global sustainability expectations, reflecting improved stakeholder trust and resilience.

Distribution of Scope 1, Scope 2, and Scope 3 emissions across companies is presented in Figure 1.

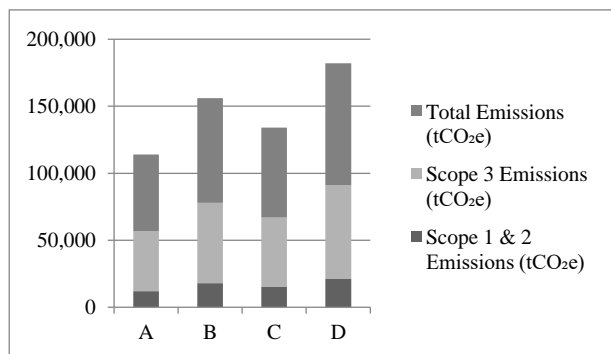


Figure 1. Distribution of Scope 1, Scope 2, and Scope 3 emissions across companies. Source: Developed by the authors.

The graph illustrates that, across all four companies, Scope 3 emissions constitute the largest proportion of total carbon emissions, approximately 70%–80% of the overall footprint. Scope 1 and 2 emissions remain comparatively minor. Company D reports the highest total emissions, exceeding 180000 tCO₂e, followed by Company B, Company C, and Company A, with the lowest. This pattern suggests that larger firms with extensive value chains bear greater environmental burdens and associated risks. The predominance of Scope 3 emissions indicates that supply chain and downstream activities are the primary drivers of carbon impact, emphasizing the necessity for management accounting systems to extend their focus beyond internal operations. From a strategic management standpoint, this distribution highlights the importance of integrating value-chain carbon data into decision-making through mechanisms (e.g., internal carbon pricing and Sustainability Balanced Scorecards), enabling firms to align environmental accountability with long-term competitiveness. Figure 2 illustrates a distinct negative correlation between the number of hours employees are trained and the frequency of workplace accidents at the four companies.

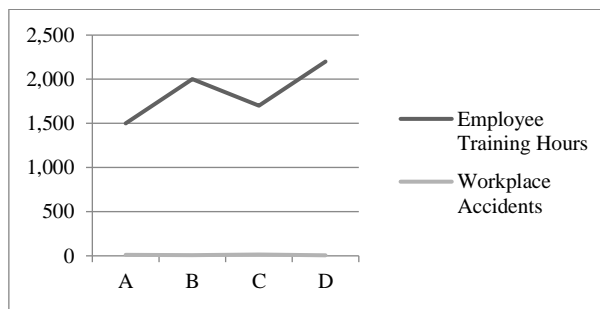


Figure 2. Employee training hours and workplace accident rates by company. Source: Developed by the authors.

Thus, companies that dedicated greater resources to workforce training (e.g., Companies B and D) experienced a significant reduction in workplace accidents. This indicates that improved employee skills

and awareness have a direct positive impact on operational safety. Conversely, Company C, which offered less training than B and D, had the highest accident rate. This suggests potential shortcomings in safety practices or insufficient quality of training. Company A displayed a similar pattern, with fewer training hours and a moderate accident rate. This observation reinforces the trend that lower investment in employee development is associated with higher workplace risks. Overall, the findings indicate that integrating social performance indicators (e.g., training and safety) into strategic management accounting frameworks delivers compliance advantages and tangible improvements in efficiency, productivity, and long-term sustainability.

Figure 3 presents data that highlights considerable differences in workforce diversity across the four companies, suggesting varying levels of commitment to inclusivity and social sustainability.

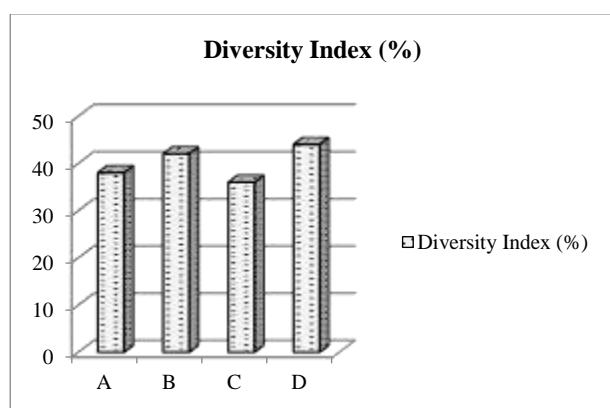


Figure 3. Workforce diversity index across companies.
Source: Developed by the authors.

Thus, Company D led with a diversity index of 44%. Company B trailed closely behind at 42%. This indicates that their methods and approaches for establishing inclusive work environments are more successful. In contrast, Companies A and C show poorer performance in this aspect, with diversity scores of 38% and 36%, respectively. This indicates possible dangers in meeting stakeholder expectations and adhering to new rules regarding social reporting. These results imply that companies with higher diversity levels may enjoy advantages such as improved reputation, better employee engagement, and stronger alignment with global sustainability frameworks, while those with lower scores may face challenges in competitiveness and compliance if inclusivity is not prioritized.

4.3 Discussion

The results confirm that the integration of sustainability metrics into SMA provides a richer and more decision-relevant performance measurement framework. First, the dominance of Scope 3 emissions reinforces the need for SMA tools to extend beyond the firm's boundaries to address supply chain and customer-related impacts. This aligns with Schaltegger and Burritt (2018), who emphasize the necessity of environmental management

accounting at the network level. By including Scope 3 in managerial scorecards, firms can better anticipate regulatory risks, cost fluctuations, and reputational challenges.

Second, the observed relationship between training and workplace accidents provides empirical evidence of the causal linkages between social investments and operational outcomes. This demonstrates that social KPIs can be operationalized in the same way as financial indicators, validating the usefulness of the Sustainability Balanced Scorecard. It also confirms Michelon et al. (2015) argument that social disclosures, when quantified, enhance managerial decision-making rather than serving only external stakeholders.

Third, diversity metrics, although often seen as reputational, are increasingly becoming strategic. Firms with higher diversity scores show better alignment with global reporting standards and stakeholder expectations. This suggests that diversity should not be treated as an "add-on" KPI but as a core element of SMA frameworks, especially in multinational enterprises subject to global sustainability benchmarks.

Theoretically, the findings validate the applicability of the SBSC in embedding sustainability dimensions into SMA (Kaplan & Norton, 1996; Hansen & Schaltegger, 2016). Practically, they show that tools such as internal carbon pricing and quantified social KPIs can provide measurable insights for budgeting, investment appraisal, and incentive design. Compared with prior research, this research extends the literature by combining environmental and social dimensions into one integrated framework and providing empirical evidence from industrial enterprises.

5. CONCLUSION

This research demonstrates that integrating sustainability into Strategic Management Accounting (SMA) through frameworks that capture environmental and social performance creates substantial value for modern enterprises. By incorporating indicators such as Scope 1, 2, and 3 emissions, employee training hours, workplace safety outcomes, and workforce diversity into management control systems, organizations can transform sustainability data from a compliance requirement into a strategic decision-making asset. The analysis revealed that environmental impacts—particularly Scope 3 emissions—constitute the largest share of industrial firms' carbon footprints, underscoring the need to extend accounting boundaries across the entire value chain. Similarly, social indicators such as training and diversity showed clear links to operational safety and long-term competitiveness, confirming their importance for managerial decision-making. The findings highlight the theoretical robustness and practical applicability of frameworks such as the Sustainability Balanced Scorecard (SBSC) and internal carbon pricing mechanisms in helping organizations align their strategic objectives with sustainability goals. This research

advances academic discourse by connecting sustainability reporting with SMA, presenting a structured approach through which environmental and social performance metrics can inform budgeting, investment appraisals, and incentive systems. In practical terms, the proposed integration holds implications for managers, policymakers, and researchers. For managers, it enhances strategic agility and accountability by providing a more comprehensive understanding of performance. For policymakers, it demonstrates how regulatory frameworks such as the CSRD, ISSB, and GRI can be effectively implemented at the management level to ensure that compliance fosters competitiveness. For researchers, it opens avenues to explore sector-specific applications, digital tools for managing sustainability data, and the potential of artificial intelligence to automate sustainability performance assessment. Ultimately, this study underscores that embedding sustainability into SMA is not optional but essential for

achieving long-term organizational resilience, strengthening stakeholder trust, and promoting sustainable growth.

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