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EMBEDDING ESG ANALYTICS INTO MANAGEMENT ACCOUNTING SYSTEMS: IMPLICATIONS FOR STRATEGIC DECISION-MAKING

Dewi Nidia Soepriadi*[1]
Universitas Pattimura, Indonesia
Email: dewi_nidiasoepriadi@yahoo.com

Christina Sososutiksno
Universitas Pattimura, Indonesia
Email: csososutiksno@gmail.com

Rita Atarwaman
Universitas Pattimura, Indonesia
Email: rita.atarwaman72@gmail.com

Abstract

The integration of Environmental, Social, and Governance (ESG) analytics into Management Accounting Systems (MAS) is increasingly becoming a major concern in addressing the demands of sustainability, accountability, and long-term strategic decision-making. This study aims to systematically examine how ESG analytics are integrated into management accounting systems and their implications for organizations' strategic decision-making processes. The research method used is a literature review by examining scientific articles, institutional reports, and reputable academic publications relevant to the topics of ESG, management accounting, and strategic decision-making. The results of the study indicate that embedding ESG analytics into MAS can expand the role of management accounting from merely a cost control tool to a strategic instrument that supports sustainable value creation. This integration enables management to internalize ESG risks and opportunities into strategic planning, performance measurement, and investment evaluation. However, the study also identifies several challenges, such as limited ESG measurement standards, the complexity of non-financial data, and the readiness of human resources and technology. Conceptually, this study confirms that ESG analytics in MAS has the potential to improve the quality of strategic decisions by holistically integrating financial and non-financial dimensions. This research is expected to provide theoretical contributions to the development of sustainable management accounting literature and serve as a practical reference for organizations in designing management control systems aligned with ESG principles.

[1] Correspondence author

Keywords: ESG Analytics, Management Accounting Systems, Strategic Decision-Making, Sustainability Accounting

INTRODUCTION

Developments in the global business environment over the past two decades have demonstrated a significant paradigm shift from a focus solely on financial performance to a more holistic and sustainable approach. Companies are no longer judged solely on their ability to generate profits and increase shareholder value in the short term, but also on their contribution to environmental sustainability, social welfare, and the quality of organizational governance. In this context, Environmental, Social, and Governance (ESG) issues have become a primary concern for various stakeholders, including investors, regulators, consumers, and the wider community (Abdelhalim, 2023a). ESG is seen as a crucial framework for assessing non-financial risks and strategic opportunities that directly impact long-term business sustainability. Therefore, integrating ESG into managerial decision-making processes is no longer optional but has become a strategic necessity for modern organizations (Homotiuk & Mazuryk, 2025a).

With increasing demands for transparency and accountability, companies are faced with the challenge of not only reporting ESG performance separately through sustainability reports but also internalizing this information into their internal management systems. One area that plays a strategic role in this process is the management accounting system. Management accounting traditionally serves as a provider of information for managers in strategic planning, control, and decision-making. However, the focus of conventional management accounting tends to be limited to measuring costs, operational efficiency, and short-term financial performance. This creates a gap between the need for ESG-based strategic information and the capabilities of existing management accounting systems.

Amidst digital transformation and the increasing availability of non-financial data, ESG analytics has emerged as an analytical approach that enables companies to systematically process, measure, and interpret ESG data. ESG analytics serves not only as an external reporting tool but also as a source of strategic information that can be used to identify environmental risks, social impacts, and governance quality that impact organizational performance. The integration of ESG analytics into management accounting systems opens up opportunities for companies to link sustainability indicators with strategic planning, budgeting, performance measurement, and investment evaluation

(Homotiuk & Mazuryk, 2025a). Thus, strategic decisions can be based on a more comprehensive understanding of the trade-offs between financial performance and long-term sustainability.

Although the potential for integrating ESG analytics into management accounting systems is increasingly recognized, its practical implementation still faces various conceptual and operational challenges. One key challenge is the heterogeneous nature of ESG data, which is difficult to measure quantitatively, and often contextual and subjective. Unlike financial data, which has established measurement standards, ESG data still suffers from fragmented standards and differing measurement methodologies. This makes it difficult for management accountants to integrate ESG data into consistent and reliable performance measurement and decision-making systems (Apooyin, 2025a).

Furthermore, there are challenges related to the changing roles and competencies of management accounting professionals. The integration of ESG analytics requires management accountants to master not only traditional accounting techniques but also a cross-disciplinary understanding of sustainability, risk management, data analytics, and business strategy. This transformation shifts the role of management accountants from merely providing financial information to becoming strategic partners with management in formulating and evaluating sustainability-based decisions. However, the readiness of organizations and human resources to face this change varies, particularly in developing countries and companies with limited technology adoption.

From a strategic decision-making perspective, the integration of ESG analytics into management accounting systems has the potential to have a significant impact. Integrated ESG information can influence investment decisions, resource allocation, product development, supply chain management, and risk mitigation strategies. Strategic decisions that consider ESG aspects tend to be more adaptive to the dynamics of a complex and uncertain business environment. Furthermore, this approach can enhance an organization's legitimacy among stakeholders and strengthen its long-term competitive advantage. However, fundamental questions remain regarding how this integration mechanism affects managers' cognitive processes and behaviors in strategic decision-making (Handoko et al., 2024).

Academic literature shows that ESG-related research largely focuses on the relationship between ESG performance and corporate financial performance, particularly from the perspective of capital markets and external reporting. Meanwhile, studies on the role of management accounting systems

in supporting ESG-based strategic decision-making are relatively limited. Research examining how ESG analytics are integrated into internal organizational processes, particularly within the context of management accounting systems, remains fragmented and conceptual. This gap highlights the need for more in-depth research to understand the strategic implications of embedding ESG analytics into management accounting systems (Dasinapa, 2024).

Furthermore, global regulatory dynamics that increasingly emphasize sustainability disclosure obligations are also encouraging companies to improve the quality of their internal information systems. Evolving sustainability reporting standards, such as those issued by various international institutions, demand consistency and linkages between external reports and internal control systems. In this context, management accounting systems act as a bridge between external demands and internal decision-making processes. Integrating ESG analytics into these systems not only supports regulatory compliance but also enhances the quality of data-driven, long-term strategic decisions. Based on the above description, it can be concluded that embedding ESG analytics into management accounting systems is a relevant and strategic issue from both academic and practical perspectives. Research on the implications of this integration for strategic decision-making is crucial to provide a more comprehensive conceptual understanding of the role of management accounting in the sustainability era. Through a literature review approach, this research is expected to synthesize various theoretical and empirical findings related to ESG, management accounting, and strategic decision-making, as well as identify opportunities for developing a conceptual framework that can be used as a basis for further research. Thus, this research not only contributes to the enrichment of the management accounting literature but also provides practical implications for organizations seeking to integrate sustainability into their business strategies systematically and sustainably.

RESEARCH METHOD

The research method used in this study is a systematic literature review with a qualitative approach. This study aims to examine in-depth conceptual developments, theoretical frameworks, and empirical findings related to the integration of Environmental, Social, and Governance (ESG) analytics into management accounting systems and their implications for strategic decision-making. Research data sources were obtained from reputable international

journal articles, academic books, professional institution reports, and publications from international organizations relevant to the topics of ESG, strategic management accounting, and decision-making. The literature search was conducted through scientific databases such as Scopus, Web of Science, and Google Scholar, using keywords reflecting the research focus and limited to relevant and recent publications to ensure the study's timeliness.

Data analysis was conducted using thematic analysis and narrative synthesis techniques, where the selected literature was classified based on key themes such as the role of ESG analytics in management information systems, the transformation of the management accounting function, and its impact on the quality and orientation of strategic decisions. Through a process of comparison and integration of various theoretical and empirical perspectives, this study seeks to build a comprehensive understanding of how ESG analytics can be effectively embedded into management accounting systems and how this influences managerial thinking in the context of long-term sustainability. The results of this literature review are expected to generate conceptual implications and strategic recommendations for academics and practitioners regarding the development of management accounting systems that are more oriented towards sustainable values.

RESULT AND DISCUSSION

ESG Analytics as a Long-Term Strategic Decision-Making Tool

ESG analytics is increasingly viewed as a crucial strategic instrument for long-term decision-making, as global pressure mounts on companies to focus not only on financial performance but also on environmental sustainability, social responsibility, and good governance. In this context, ESG analytics serves as a structured, systematic, and evidence-based mechanism for processing and interpreting non-financial data, providing strategic insights for management in formulating a sustainable business direction. Long-term strategic decisions require a comprehensive understanding of multidimensional risks and opportunities, and ESG analytics provides an analytical framework that enables companies to more comprehensively integrate economic, social, and environmental dimensions into their decision-making processes (Amirreza Taheri & Ehsan Taieby, 2025).

Within the environmental dimension, ESG analytics enables companies to quantitatively measure, monitor, and project the impact of operational activities on ecosystems. Data related to carbon emissions, energy efficiency, natural resource use, and waste management can be analyzed to identify long-

term trends and potential environmental risks that could impact business continuity. Through this analysis, management can formulate green investment strategies, innovate production processes, and transform business models to be more environmentally friendly. These strategic decisions aim not only to meet regulations or stakeholder demands but also to increase the company's resilience to the risks of climate change, fluctuating energy prices, and future natural resource scarcity.

Beyond environmental aspects, ESG analytics also plays a crucial role in the social dimension, which relates to a company's relationships with employees, customers, communities, and other stakeholders. Analysis of social data, such as employee well-being, occupational safety and health, diversity and inclusion, and the social impact of business activities, provides an empirical basis for long-term strategic decision-making (Dako et al., n.d.). Companies that manage social aspects sustainably tend to have stronger reputations, higher employee loyalty, and more stable relationships with surrounding communities. ESG analytics helps management identify areas of social risk that have the potential to lead to conflict, operational disruptions, or a decline in public trust, allowing proactive mitigation strategies to be designed before these risks develop into crises with long-term impacts.

In the context of governance, ESG analytics provides tools to evaluate the quality of a company's internal control system, reporting transparency, business ethics, and decision-making structure. Systematically analyzed governance data enables management and the board of directors to assess policy effectiveness, regulatory compliance, and the organization's level of accountability. Long-term strategic decisions are heavily influenced by the quality of governance, as weaknesses in this area can pose significant legal, reputational, and financial risks. By leveraging ESG analytics, companies can identify governance weaknesses early and formulate structural reforms that support long-term sustainability.

The integration of ESG analytics into the strategic decision-making process also reflects a paradigm shift from a short-term orientation to long-term value creation. Traditional approaches focused on short-term financial indicators often overlook latent risks and emerging strategic opportunities in the long term. ESG analytics broadens the scope of analysis by incorporating non-financial factors that have significant implications for future company value (Lin, 2024). Thus, decisions about investment, business expansion, product development, and resource allocation can be made with consideration of the long-term impact on the company's sustainability and competitiveness.

Furthermore, ESG analytics serves as a data-driven decision-making support tool that improves the quality of management's strategic judgment. Through the use of analytical technologies such as big data, artificial intelligence, and integrated management information systems, companies can process ESG data in real time and link it to financial performance and other strategic indicators. This enables management to conduct scenario analysis, risk simulations, and forecast the long-term impact of strategic policies. With the support of ESG analytics, strategic decisions are no longer based solely on intuition or experience, but on more objective and measurable empirical evidence.

From a stakeholder perspective, the use of ESG analytics as a long-term strategic decision-making tool also enhances corporate transparency and credibility. Investors, creditors, and other stakeholders increasingly consider ESG performance as a critical factor in evaluating long-term risk and growth potential. Strategic decisions supported by ESG analytics send a positive signal about a company's commitment to sustainability and responsible governance. This can strengthen market confidence, lower the cost of capital, and improve the company's access to long-term funding sources.

However, the effectiveness of ESG analytics as a long-term strategic decision-making tool depends heavily on data quality, measurement frameworks, and the organization's commitment to integrating it into its management system. Challenges such as limited reporting standards, data inconsistencies, and difficulties in measuring non-financial impacts remain obstacles that need to be addressed. Therefore, strategic decisions based on ESG analytics must be accompanied by ongoing efforts to improve data quality, strengthen analytical capacity, and build an organizational culture that supports sustainability-oriented decision-making (Apooyin, 2025b).

Overall, ESG analytics has emerged as an essential strategic tool in supporting sustainable long-term decision-making. By integrating environmental, social, and governance dimensions into strategic analysis, companies can identify risks and opportunities not visible through traditional financial approaches. The resulting strategic decisions not only contribute to achieving business objectives but also to creating long-term value for all stakeholders. In an era of global uncertainty and increasingly complex sustainability demands, ESG analytics is a critical foundation for companies to ensure future strategic relevance, resilience, and sustainability.

The Impact of ESG Analytics on Strategic Planning and Management Budgeting

The growing attention to sustainability issues in the modern business world has encouraged companies to integrate Environmental, Social, and Governance (ESG) aspects into their strategic decision-making processes. ESG is no longer viewed solely as a reporting obligation, but rather as a source of strategic information with direct implications for the company's long-term performance. In this context, ESG analytics presents itself as a data-driven analytical tool that enables organizations to systematically and structuredly measure, monitor, and evaluate ESG performance. The use of ESG analytics provides a new perspective in strategic planning and management budgeting, as it connects sustainability goals with resource allocation, risk management, and long-term value creation (Rastelli, 2023).

In strategic planning, ESG analytics plays a crucial role in broadening the analytical framework of a company's internal and external environments. While previously strategic planning was primarily based on financial indicators, market conditions, and competitive advantages, with ESG analytics, management can integrate environmental factors such as carbon emissions, energy efficiency, and the impact of climate change; social factors such as employee well-being, workplace safety, and community relations; and environmental factors such as environmental sustainability. and governance factors such as transparency, compliance, and business ethics. ESG-based analysis enables companies to identify opportunities and threats that are not always reflected in traditional financial reports but that have the potential to impact long-term business sustainability.

Furthermore, ESG analytics encourages a shift in strategic planning orientation from a short-term focus to a long-term, sustainable perspective. By leveraging historical data and ESG projections, management can develop strategies that not only pursue financial growth but also business resilience to environmental and social risks. For example, analyzing energy consumption and emissions data can encourage companies to formulate investment strategies in environmentally friendly technologies, which may be costly initially but, in the long term, can reduce operational costs and enhance the company's reputation (S.m, 2025). Thus, ESG analytics helps management align business strategies with the demands of regulators, investors, and other stakeholders, who are increasingly emphasizing sustainability principles.

The influence of ESG analytics on strategic planning is also evident in the process of setting strategic goals and performance indicators. Quantitative ESG

data enables companies to set sustainability targets that are realistic, measurable, and aligned with the organization's strategic vision. These targets can then be integrated into a balanced scorecard or other performance management framework, so that ESG aspects do not stand alone but become an integral part of corporate strategy. In this way, strategic planning based on ESG analytics creates a stronger link between strategy, operational performance, and corporate social responsibility (Oduleye & Medon, 2021).

In the context of management budgeting, ESG analytics provides a more comprehensive basis for the resource allocation process. Traditional budgeting generally focuses on projected revenue, costs, and profits, with an emphasis on short-term financial efficiency. However, with the integration of ESG analytics, the budgeting process transforms into an approach that considers the long-term impact of each budget decision. ESG data enables management to evaluate investments not only in terms of financial returns, but also in terms of their contribution to sustainability goals and the management of non-financial risks.

The use of ESG analytics in budgeting encourages management to allocate funds more strategically to programs and projects with high sustainability value. For example, budgets for improving workplace safety, employee training, or waste reduction can be justified through analysis of ESG data demonstrating positive impacts on productivity, employee loyalty, and corporate reputation (Aljebrini et al., 2025). Thus, ESG analytics helps bridge the gap between short-term costs and long-term benefits, which is often a major obstacle to sustainability-based budget decision-making.

Furthermore, ESG analytics plays a crucial role in improving the quality of budget control and evaluation. ESG data integrated into the budgeting system enables management to monitor sustainability budget implementation more accurately and transparently. This supports greater accountability in the use of funds, particularly for programs related to environmental and social responsibility. ESG analytics-based evaluations also enable companies to dynamically adjust budgets when sustainability risks or opportunities change, making budgeting more adaptive to complex and uncertain business conditions.

The impact of ESG analytics on management budgeting is also evident in risk management. Environmental, social, and governance risks are often long-term and difficult to quantify financially. Through ESG analytics, these risks can be quantified and integrated into the budgeting process, allowing companies to more appropriately allocate reserve funds or invest in risk mitigation. This

approach helps management avoid significant future costs that may arise from failing to manage ESG risks, such as regulatory fines, operational disruptions, or reputational damage (Jack & Mustafa, 2024).

Furthermore, the integration of ESG analytics into strategic planning and management budgeting strengthens the role of management accounting systems as strategic decision-making tools. Management accounting systems, which previously focused on measuring costs and financial performance, are now evolving into strategic information systems capable of accommodating sustainability dimensions. With ESG analytics, non-financial information can be processed and presented in a relevant manner for management, enabling strategic and budgetary decisions to become proactive and future-oriented rather than reactive.

However, the implementation of ESG analytics in strategic planning and management budgeting also faces various challenges. The availability and quality of ESG data remain key issues, especially for companies without a mature sustainability reporting system. Furthermore, integrating ESG data with existing accounting and budgeting systems requires technology investment and increased human resource capacity. However, these challenges do not diminish the strategic potential of ESG analytics, but rather emphasize the need for top management commitment to adopting a more holistic and sustainable approach to decision-making.

ESG Implications for Performance Measurement, the Balanced Scorecard, and Value Creation

The integration of Environmental, Social, and Governance (ESG) into an organization's performance measurement system represents a significant paradigm shift from traditional performance approaches focused solely on financial indicators to a more holistic and sustainable approach. In the modern business context, increasingly influenced by regulatory pressures, stakeholder demands, and social and environmental awareness, ESG is no longer viewed as an add-on element but as a strategic component that directly impacts corporate performance evaluation. ESG-based performance measurement encourages organizations to assess success not only in terms of profit and operational efficiency, but also in terms of contributions to environmental sustainability, social welfare, and the quality of corporate governance. This creates a more comprehensive performance evaluation framework that is relevant to the long-term challenges facing the business world (Michalski, 2024).

The implications of ESG for performance measurement are evident in the expansion of key performance indicators used by management. While previously Key Performance Indicators (KPIs) were dominated by financial ratios such as return on investment, profit margin, or revenue growth, ESG integration requires the development of non-financial indicators that reflect environmental, social, and governance performance. Environmental indicators include energy efficiency, carbon emissions management, waste reduction, and utilization of renewable resources. The social dimension reflects the quality of a company's relationships with employees, customers, and the community, including aspects of workplace safety, diversity, equality, and the social impact of its operations. Meanwhile, the governance dimension emphasizes transparency, accountability, business ethics, and the effectiveness of oversight structures. Thus, ESG-based performance measurement transforms how organizations define success and creates positive pressure to align business objectives with sustainability principles.

In the context of the Balanced Scorecard, ESG implications become even more relevant because this framework is conceptually designed to integrate multiple perspectives on organizational performance. The traditional Balanced Scorecard encompasses financial, customer, internal business process, and learning and growth perspectives (Szóka, 2022). ESG integration encourages a reinterpretation and expansion of the meaning of each of these perspectives. The financial perspective is no longer solely oriented toward achieving short-term profits but also considers long-term risks and opportunities related to environmental and social issues. Investments in environmentally friendly technologies, fair labor practices, and good governance are understood as factors influencing the stability and sustainability of future financial performance.

The customer perspective within the Balanced Scorecard is also undergoing a transformation as consumer awareness of ESG issues increases. Modern consumers increasingly pay attention to a company's values, including commitment to the environment and social responsibility (Anis & Avrilia, 2024). Therefore, ESG performance has become an integral part of a company's perceived quality and reputation among customers. Companies that demonstrate consistent and credible ESG practices tend to gain higher levels of customer trust and loyalty, which ultimately positively impacts business performance. Therefore, performance indicators within the customer perspective need to reflect sustainability and ethical dimensions, not just conventional customer satisfaction and retention.

From the perspective of internal business processes, ESG encourages companies to evaluate the efficiency and effectiveness of operational processes from a sustainability perspective. Production, distribution, and supply chain processes are assessed not only based on cost and speed, but also on their impact on the environment and society. The integration of ESG within this perspective encourages innovation in more environmentally friendly processes, reduced operational risks, and increased business resilience to external disruptions such as climate change and social instability. Thus, an ESG-integrated Balanced Scorecard serves as a management control tool that drives continuous process improvement.

The learning and growth perspective within the Balanced Scorecard also takes on a new dimension through ESG integration. Employee competency development focuses not only on technical and managerial skills but also on understanding the values of sustainability, ethics, and social responsibility. An organizational culture that supports ESG becomes a strategic asset that contributes to long-term value creation. Investments in training, ethical leadership, and incentive systems aligned with ESG goals strengthen an organization's ability to adapt and innovate in a dynamic business environment (Humphreys, 2024).

The implications of ESG for value creation are the most strategic aspect within the context of performance measurement and the Balanced Scorecard. Value creation is no longer understood narrowly as creating economic value for shareholders, but rather as a process of creating shared value for all stakeholders. ESG integration broadens the concept of value by incorporating environmental and social benefits as part of a company's performance outcomes. Companies that effectively manage ESG issues tend to have lower risk profiles, more competitive costs of capital, and a stronger reputation in the marketplace. This demonstrates that strong ESG performance is not at odds with achieving economic value, but rather serves as a foundation for its sustainability (Rojic, 2023).

In the long term, ESG serves as a strategic value creation mechanism through risk management and opportunity exploitation. Risks related to climate change, regulatory non-compliance, labor conflicts, and governance failures can be minimized through the implementation of robust ESG practices. At the same time, ESG opens up opportunities for sustainability-oriented product and service innovation, expanding markets, and enhancing company competitiveness. By integrating ESG into performance measurement systems

and the Balanced Scorecard, management gains a more effective tool for steering the organization toward sustainable, long-term value creation.

The Role of Digital Technology and Big Data in Supporting ESG Analytics in Management Accounting Systems

The development of digital technology and the utilization of big data have become key factors in the transformation of modern management accounting systems, particularly in supporting the implementation of ESG Analytics as a basis for strategic decision-making. Management Accounting Systems, which have traditionally focused on measuring historical financial performance, are now experiencing a paradigm shift toward more holistic, adaptive, and long-term information systems. This shift is driven by increasing pressure from investors, regulators, and the public for organizations to focus not only on profitability but also on environmental, social, and governance impacts. In this context, digital technology and big data act as key enablers, enabling the systematic and continuous integration, processing, and analysis of ESG data within a management accounting framework (Faccia & Petratos, 2024).

Digital technology is enabling fundamental changes in the way ESG data is collected, processed, and presented in Management Accounting Systems. The digitization of business processes through Enterprise Resource Planning systems, cloud-based accounting, the Internet of Things, and other digital platforms enables automated and real-time ESG data collection (Abdelhalim, 2023b). Data related to energy consumption, carbon emissions, natural resource use, employee safety and well-being, regulatory compliance, and corporate governance practices can be recorded directly from operational activities without relying on manual reporting, which is often slow and inconsistent. This integration broadens the scope of management accounting information from simply monetary data to multidimensional information that more comprehensively reflects an organization's sustainability performance.

In Management Accounting Systems, the role of digital technology extends beyond operational efficiency to improving the quality of managerial information. Digitization enables the standardization of ESG data across business units and time periods, resulting in more consistent and comparable information. This is particularly important in the context of ESG performance measurement, where indicators are often non-financial and difficult to quantify objectively. With the support of digital technology, ESG data can be converted into relevant metrics for management control, such as environmental costs, social productivity, and governance risks, which can then be integrated into

budgeting, performance evaluation, and strategic planning systems (Lodhia et al., 2025).

Big data further strengthens the role of Management Accounting Systems in supporting ESG Analytics through their ability to manage large, diverse data volumes sourced from various internal and external channels. ESG data is often complex and unstructured, encompassing environmental sensor data, supplier reports, regulatory compliance data, and public perceptions captured through digital media. Big data analytics enables organizations to systematically process this data and identify patterns, trends, and causal relationships previously difficult to detect through traditional accounting approaches. In the context of management accounting, this capability expands the analytical function from merely descriptive reporting to diagnostic and predictive analysis that supports strategic decision-making (Suhardjo et al., 2024).

The use of big data in ESG Analytics enables Management Accounting Systems to provide deeper insights into sustainability risks and opportunities. Analysis of historical and real-time data allows management to identify potential environmental risks, such as increased emissions or reliance on unsustainable resources, as well as social and governance risks that could impact the company's reputation and value. Furthermore, big data also enables the evaluation of the impact of sustainability policies and strategies on long-term financial performance (Homotiuk & Mazuryk, 2025b). Thus, big data-powered ESG Analytics serves not only as a compliance tool but also as a strategic instrument that helps organizations balance economic and sustainability goals.

The integration of digital technology and big data into Management Accounting Systems is also driving a shift in the role of management accountants within organizations. Management accountants are no longer simply preparing internal financial reports but are evolving into strategic analysts capable of interpreting ESG data and translating it into relevant business implications. With the support of advanced analytical technologies such as artificial intelligence and machine learning, management accountants can conduct scenario modeling, simulate sustainability impacts, and evaluate trade-offs between financial and ESG performance. This change strengthens management accounting's position as a strategic function that directly contributes to the long-term value creation of an organization.

In addition to supporting strategic analysis, digital technology and big data also increase transparency and accountability in ESG performance

management. Digitally integrated management accounting systems enable clear audit trails, automatic data validation, and more accurate tracking of ESG information sources. This reduces the risk of data manipulation and greenwashing practices that can damage an organization's credibility. ESG information integrated with management accounting systems also enables stronger alignment between sustainability strategy and management control mechanisms, including incentive systems and managerial performance appraisals.

In the decision-making context, the role of digital technology and big data in ESG analytics within management accounting systems is increasingly evident through the use of interactive dashboards and real-time data-driven managerial reports. The visually and dynamically presented information enables top management to continuously monitor ESG performance and make decisions that are more responsive to changes in the business environment. This integration supports a more adaptive and data-driven approach to decision-making, where sustainability aspects are considered equally alongside financial aspects in the planning and control process (Mayegun & Nwanevu, 2025).

Overall, digital technology and big data have become the main foundation for the development of effective ESG analytics in management accounting systems. Both enable more integrated, accurate, and strategic ESG data management, enabling management accounting to significantly support organizational sustainability. This integration emphasizes that the future of management accounting is determined not only by the ability to manage financial performance, but also by the organization's capacity to leverage technology and data to manage environmental, social, and governance impacts responsibly and with a long-term focus.

CONCLUSION

The discussion on embedding ESG analytics into management accounting systems emphasizes the shift in the role of management accounting from simply a cost control and financial performance measurement tool to a strategic instrument capable of comprehensively capturing sustainability dimensions. The integration of environmental, social, and governance data into management accounting systems enables organizations to link non-financial performance with financial indicators more systematically and in real time. Through ESG analytics, information related to carbon emissions, energy efficiency, labor practices, and governance compliance can be processed into relevant insights for managers in evaluating the trade-off between short-term

profitability and long-term sustainability. This encourages the transformation of management accounting into a strategic information system that not only records the past but also supports sustainable value-based planning, budgeting, and control.

The implications of ESG analytics integration for strategic decision-making are evident in the improved quality of decisions made, particularly in the context of investment, process innovation, and risk management. With ESG information integrated into management accounting systems, managers can identify non-financial risks that have the potential to significantly impact the company's long-term performance, such as environmental, reputational, and social regulatory risks. Furthermore, ESG analytics helps organizations evaluate previously less visible strategic opportunities, such as clean energy-based operational efficiencies or sustainable product development. Thus, embedding ESG analytics not only enriches the management accounting information base but also strengthens the alignment between business strategy, stakeholder demands, and the company's overall sustainability goals.

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