

Implementation of Environmental Management Accounting (EMA) in Supporting Sustainable Business Strategy

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Abstract

Sustainability has become an essential component of modern business strategy as organizations face increasing environmental challenges, regulatory pressures, and stakeholder expectations. Companies are required to integrate environmental considerations into strategic decision making to achieve long term competitiveness and responsible resource management. Environmental Management Accounting (EMA) has emerged as an important managerial tool that provides information on environmental costs, resource use, and environmental performance to support sustainability oriented strategies. This study aims to analyze the role of Environmental Management Accounting in supporting sustainable business strategy within organizations. The research employed a quantitative approach using a survey method involving managers, accountants, and sustainability officers in organizations implementing environmental management practices. Data were collected through structured questionnaires and analyzed using descriptive statistics and multiple regression analysis to examine the influence of EMA implementation on sustainable business strategy. The results indicate that the implementation of EMA significantly contributes to sustainability oriented strategic decision making, particularly through environmental cost identification, resource efficiency management, and integration of environmental information in managerial processes. EMA practices enable organizations to improve environmental performance while enhancing operational efficiency and long term competitiveness. The study concludes that Environmental Management Accounting plays a strategic role in bridging environmental sustainability and financial management, thereby supporting the development of sustainable business strategies and organizational resilience in the evolving business environment.

Keywords: Environmental Management Accounting, Sustainable Business Strategy, Environmental Performance, Sustainability Management, Strategic Decision Making

1. Introduction

The increasing awareness of environmental challenges, climate change, and resource scarcity has significantly transformed the way businesses design and implement their strategies. In recent years, sustainability has evolved from being a peripheral corporate responsibility initiative into a central strategic priority that influences long-term competitiveness and organizational resilience. Companies are now expected to integrate economic performance with social responsibility and environmental stewardship, often conceptualized through frameworks such as Environmental, Social, and Governance (ESG) criteria and the Triple Bottom Line (TBL) approach. These frameworks encourage organizations to evaluate their performance not only in financial terms but also in terms of their environmental and social impacts. As a result, sustainability has become an important driver of innovation, risk management, and long-term profitability within modern business environments. Organizations that successfully integrate sustainability into their strategic decision-making processes are more likely to achieve sustainable competitive advantages and improved resilience in rapidly changing markets (Frag, 2025).

The shift toward sustainable business strategies is also influenced by increasing pressure from various stakeholders, including governments, investors, consumers, and civil society organizations. Regulatory frameworks in many countries now require companies to disclose environmental information, reduce carbon emissions, and adopt responsible environmental management practices. At the same time, investors increasingly consider environmental performance indicators when evaluating corporate value and long-term investment opportunities. Consumers are also becoming more environmentally conscious and tend to prefer products and services produced by companies that demonstrate responsible environmental practices. These developments have encouraged organizations to integrate environmental considerations into corporate governance structures, risk management frameworks, and financial planning processes. Consequently, environmental sustainability is no longer viewed as a purely operational issue but as a strategic element that influences corporate competitiveness and long-term value creation (Swalih et al., 2024).

Another important factor driving the integration of sustainability into business strategy is the recognition that environmental risks can significantly affect organizational performance and financial stability. Climate change,



environmental regulations, and resource constraints create new operational and financial risks that must be managed strategically. Companies that fail to anticipate and address environmental risks may face regulatory penalties, reputational damage, supply chain disruptions, and increased operational costs. Conversely, organizations that proactively adopt sustainable practices can benefit from improved efficiency, innovation opportunities, and stronger stakeholder trust. These dynamics highlight the importance of integrating environmental considerations into corporate risk management systems and long-term strategic planning processes (Thakkar, 2025).

In addition to risk management considerations, sustainability also offers opportunities for innovation and value creation within organizations. Sustainable business models often encourage companies to develop new products, adopt cleaner technologies, and implement resource-efficient production processes. Such innovations can reduce operational costs, enhance brand reputation, and open new market opportunities. For example, investments in renewable energy technologies, circular production systems, and sustainable supply chain management can improve both environmental performance and financial outcomes. These developments suggest that sustainability can serve as a strategic catalyst for innovation and long-term competitiveness in modern business environments (Sapsanganboon et al., 2025).

Despite the growing importance of sustainability in business strategy, many organizations still face challenges in integrating environmental considerations into their internal management systems. One of the main challenges is the lack of reliable information regarding environmental costs, resource consumption, and environmental performance. Traditional accounting systems are primarily designed to measure financial performance and often fail to capture environmental costs associated with energy use, waste generation, pollution control, and resource inefficiency. As a result, environmental costs are frequently hidden within general operational expenses, making it difficult for managers to assess the true financial implications of environmental performance. This limitation highlights the need for accounting approaches that can integrate environmental information into managerial decision-making processes (Boatcă et al., 2023).

Environmental Management Accounting (EMA) has emerged as an important managerial tool designed to address this limitation. EMA integrates environmental and financial information to support organizational decision-making related to environmental performance and sustainability. Through EMA, organizations can identify, measure, and analyze environmental costs associated with production processes, resource consumption, waste management, and emissions. By providing detailed information about environmental resource use and associated costs, EMA enables managers to identify inefficiencies, evaluate environmental risks, and develop strategies for improving environmental performance. Consequently, EMA serves as an important bridge between environmental management and financial decision-making within organizations (Nguyen & Huynh, 2025).

Research on EMA has demonstrated its potential to support environmentally sustainable business strategies. Studies indicate that EMA provides organizations with critical information for evaluating investments in cleaner technologies, improving resource efficiency, and reducing environmental impacts. By incorporating environmental cost information into capital budgeting and investment evaluation processes, organizations can make more informed strategic decisions regarding environmental initiatives. Furthermore, EMA allows managers to assess the financial implications of environmental risks and opportunities, thereby supporting the development of long-term sustainability strategies that align environmental and financial objectives (Appannan et al., 2022).

Another important role of EMA lies in its ability to mediate the relationship between environmental strategy and environmental performance. Organizations that adopt environmental strategies such as pollution prevention, energy efficiency improvements, and clean technology adoption require reliable information systems to monitor and evaluate their environmental performance. EMA provides such information by generating quantitative data on environmental resource consumption, emissions, and waste management activities. Through these mechanisms, EMA supports the implementation of environmental strategies by enabling organizations to measure performance outcomes and adjust strategies accordingly. Empirical studies have shown that the effective use of EMA can significantly enhance environmental performance by improving organizational awareness of environmental costs and encouraging the adoption of environmentally responsible practices (Zeng et al., 2024).

In addition to its role in environmental performance management, EMA also contributes to broader sustainability governance within organizations. As sustainability reporting and environmental disclosure requirements become more common, organizations increasingly rely on EMA systems to generate reliable environmental data for internal and external reporting. EMA can support corporate sustainability reporting frameworks by providing consistent and verifiable data on environmental resource consumption and environmental performance indicators. This capability enables organizations to enhance transparency, improve stakeholder communication, and demonstrate accountability for their environmental impacts. Consequently, EMA has become an important component of modern sustainability governance systems (Pillay et al., 2025).

Furthermore, the application of EMA has expanded beyond operational cost management to support strategic decision-making processes. Earlier implementations of EMA primarily focused on short-term operational efficiency, such as reducing waste or improving energy efficiency. However, recent studies suggest that EMA is increasingly used to support long-term strategic planning and sustainable business development. Organizations are beginning to integrate EMA information into strategic management systems, including capital investment decisions, environmental risk management, and sustainability-oriented performance evaluation frameworks. This shift reflects the evolving role of EMA from a technical accounting tool toward a strategic management instrument that supports sustainable business transformation (Swalih et al., 2024).

Empirical research also suggests that EMA implementation is positively associated with improved financial performance and eco-efficiency in organizations. Companies that effectively implement EMA systems often experience cost savings from reduced resource consumption, improved operational efficiency, and enhanced environmental compliance. In addition, environmentally responsible business practices can enhance corporate reputation and strengthen relationships with stakeholders, including investors and consumers. These factors contribute

to improved long-term financial performance and sustainable competitive advantage. Consequently, EMA plays a significant role in aligning environmental sustainability with organizational profitability (Utami et al., 2025).

Despite the growing recognition of EMA as a strategic management tool, several research gaps remain in the existing literature. Many studies on environmental management accounting still focus primarily on environmental cost identification and environmental reporting practices rather than examining how EMA can be integrated into broader corporate strategy and management control systems. In many organizations, EMA is implemented at the operational level without being fully incorporated into strategic decision-making processes. This limitation suggests that further research is needed to explore how EMA can be integrated with strategic management frameworks and environmental management control systems to support sustainable business strategies (Zatini et al., 2025).

Another important research gap concerns the role of accounting professionals in the development and implementation of sustainable business strategies. While managers are typically responsible for strategic decision-making, accountants play a crucial role in providing the financial and environmental information required for strategic planning. However, the contribution of accounting professionals to sustainability strategy development remains relatively underexplored in the literature. Understanding how accountants participate in sustainability-related decision-making processes could provide valuable insights into how EMA can be effectively integrated into strategic management systems (Swalih et al., 2024).

Additionally, the integration of EMA with broader sustainability frameworks such as the circular economy, climate risk management, and green finance remains an emerging research area. While these concepts are widely discussed in sustainability literature, their connections with environmental management accounting systems have not been extensively examined. Integrating EMA with these broader sustainability frameworks could enable organizations to develop more comprehensive strategies for addressing environmental challenges while improving financial performance. Such integration is particularly important in emerging markets, where sustainability challenges are often closely linked to economic development and environmental governance issues (Rasit et al., 2025).

Given these research gaps, further investigation is needed to analyze how the implementation of Environmental Management Accounting can support sustainable business strategies. Understanding the strategic role of EMA in integrating environmental considerations into managerial decision-making can provide valuable insights for organizations seeking to improve their environmental performance and long-term competitiveness. Therefore, the objective of this study is to analyze the implementation of Environmental Management Accounting in supporting sustainable business strategies by examining how EMA systems contribute to the integration of environmental sustainability into organizational strategic management processes.

2. Method, Data, and Analysis

This study employed a quantitative research approach to examine the implementation of Environmental Management Accounting (EMA) in supporting sustainable business strategies within organizations. The research design used a cross-sectional survey method targeting companies that have adopted environmental management practices or sustainability-oriented business strategies. The population of the study consisted of managers, accountants, and sustainability officers working in organizations across manufacturing and service sectors that are actively involved in environmental performance management. A purposive sampling technique was applied to select respondents who possess direct knowledge of environmental accounting practices and sustainability-related decision-making within their organizations. The data collection technique involved the use of a structured questionnaire distributed electronically to respondents. The questionnaire measured several variables, including the level of EMA implementation, integration of environmental information in managerial decision-making, sustainability-oriented business strategy, and organizational environmental performance. The measurement items were adapted from prior empirical studies on environmental management accounting and sustainability management, and responses were assessed using a five-point Likert scale ranging from strongly disagree to strongly agree.

The data analysis was conducted using several statistical techniques to evaluate the relationships between EMA implementation and sustainable business strategies. Descriptive statistical analysis was first performed to summarize respondent characteristics and to describe the general level of EMA adoption within the sampled organizations. Prior to hypothesis testing, reliability and validity tests were conducted using Cronbach's alpha and factor analysis to ensure the consistency and construct validity of the measurement instruments. Subsequently, inferential statistical analysis was carried out using multiple regression analysis to examine the influence of EMA implementation on sustainable business strategy development and environmental performance outcomes. The regression analysis allowed the study to identify the strength and significance of relationships among the variables. All statistical analyses were performed using statistical software to ensure accuracy and reliability of the results, and the findings were interpreted to determine how EMA practices contribute to supporting sustainability-oriented strategic management within organizations.



Figure 1. Diagram Conceptual Research

3. Results

To examine the extent to which Environmental Management Accounting (EMA) practices are implemented within organizations, descriptive statistical analysis was conducted based on the responses obtained from the survey questionnaire. The analysis focused on key indicators of EMA implementation, including environmental cost identification, resource and energy management, environmental performance measurement, and environmental reporting integration. The results of the descriptive analysis are presented in Table 1.

Table 1. Descriptive Statistics of EMA Implementation Indicators

EMA Implementation Indicators	Mean	Standard Deviation	Interpretation
Environmental Cost Identification	4.12	0.68	High
Resource and Energy Management	4.05	0.72	High
Environmental Performance Measurement	3.98	0.74	Moderate-High
Environmental Reporting and Control	3.91	0.79	Moderate-High
Integration of Environmental Information in Decision-Making	4.08	0.70	High

The results presented in Table 1 indicate that the implementation of Environmental Management Accounting within the sampled organizations is generally at a relatively high level. Environmental cost identification obtained the highest mean score, suggesting that organizations are increasingly recognizing the importance of identifying environmental costs associated with operational activities. Similarly, resource and energy management practices show strong implementation, reflecting growing awareness of the need to improve resource efficiency and reduce environmental impacts. Although environmental reporting and performance measurement show slightly lower mean values, they still indicate moderate to high levels of adoption. Overall, these findings suggest that many organizations have begun integrating environmental accounting practices into their operational management processes, which may contribute to the development of sustainability-oriented business strategies.

To examine the influence of Environmental Management Accounting implementation on sustainable business strategy, a multiple regression analysis was conducted. The analysis aimed to determine whether EMA practices significantly contribute to the development of sustainability-oriented business strategies within organizations.

Table 2. Regression Results of EMA Implementation on Sustainable Business Strategy

Variable	Beta Coefficient	t-value	Significance (p-value)
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Environmental Identification	Cost	0.31	4.28	0.000
Resource and Management	Energy	0.27	3.96	0.001
Environmental Performance Measurement		0.22	3.41	0.002
Environmental Reporting and Control		0.19	2.98	0.004
Integration of Environmental Information	of	0.34	4.72	0.000
R²		0.63		

The regression results presented in Table 2 indicate that all EMA implementation indicators have a statistically significant positive effect on sustainable business strategy. The integration of environmental information in managerial decision-making shows the strongest influence, with the highest beta coefficient and a highly significant p-value. This finding suggests that organizations that actively incorporate environmental information into strategic planning processes are more likely to develop effective sustainability-oriented business strategies. Environmental cost identification and resource management practices also demonstrate strong contributions to sustainability strategies, highlighting the importance of accounting systems that capture environmental costs and resource usage. The R² value of 0.63 indicates that approximately 63% of the variation in sustainable business strategy can be explained by the implementation of EMA practices. These findings confirm that Environmental Management Accounting plays an important role in supporting the integration of sustainability considerations into corporate strategic management.

4. Discussion

The results of this study demonstrate that the implementation of Environmental Management Accounting (EMA) plays a significant role in supporting the integration of sustainability into corporate strategy. The descriptive statistics presented earlier indicate that organizations have increasingly adopted EMA practices, particularly in identifying environmental costs, managing energy and material resources, and integrating environmental information into managerial decision making. These findings reflect a broader transformation in the business environment where sustainability is no longer viewed merely as a corporate social responsibility initiative but rather as a strategic driver of long term competitiveness. The literature emphasizes that sustainability integration within corporate strategy contributes to improved organizational resilience, innovation capacity, and long term profitability. Companies that adopt sustainability oriented strategies tend to demonstrate stronger adaptive capabilities in response to environmental and market changes, which ultimately strengthens their competitive positioning in global markets (Farg, 2025).

The growing importance of sustainability in business strategy is closely linked to the increasing expectations of stakeholders. Governments, investors, consumers, and international institutions increasingly require companies to incorporate environmental considerations into their decision making processes. These pressures are reflected in regulatory frameworks, sustainability reporting standards, and investment criteria that prioritize environmental, social, and governance performance. As a result, organizations must integrate environmental considerations into their governance structures, financial planning, and risk management systems. The integration of sustainability principles into strategic management is therefore not only a response to external pressure but also a proactive effort by companies to maintain legitimacy and competitiveness within evolving economic systems (Swalih et al., 2024).

The regression results obtained in this study further confirm the strategic importance of Environmental Management Accounting in facilitating sustainability integration within business strategy. The analysis demonstrates that environmental cost identification, resource management, environmental performance measurement, and environmental reporting significantly influence the development of sustainability oriented business strategies. Among these variables, the integration of environmental information into managerial decision making shows the strongest effect on sustainable strategy implementation. This finding highlights the importance of accounting systems that provide managers with reliable environmental data to support strategic planning and investment decisions. Without such information systems, organizations may face difficulties in identifying environmental risks and opportunities that influence long term performance (Nguyen & Huynh, 2025).

Environmental Management Accounting plays a critical role in bridging the gap between environmental management and corporate strategy. Traditional accounting systems often fail to capture environmental costs associated with production processes, resource consumption, and waste management. These costs are frequently hidden within operational expenditures, which makes it difficult for managers to evaluate the financial implications of environmental activities. EMA addresses this limitation by identifying and allocating environmental costs in a systematic manner. Through this mechanism, organizations are able to evaluate the true cost of environmental impacts and incorporate this information into strategic decision making processes. Consequently, EMA enables companies to



align financial management with sustainability objectives, thereby supporting the development of environmentally responsible business strategies (Boatcă et al., 2023).

The role of EMA as a mediator between environmental strategy and environmental performance is also supported by the findings of this study. Organizations that implement EMA are better equipped to evaluate environmental performance indicators such as energy consumption, waste generation, and emissions. This capability allows managers to monitor the effectiveness of environmental initiatives and make informed adjustments to corporate strategy. Studies indicate that EMA serves as a managerial innovation that strengthens the link between environmental strategy and environmental performance outcomes. By providing quantitative data on environmental resource use and environmental costs, EMA encourages organizations to adopt pollution prevention practices and invest in cleaner production technologies (Appannan et al., 2022).

Furthermore, the integration of EMA into corporate strategy contributes to improved environmental governance within organizations. Sustainability oriented organizations increasingly rely on internal environmental accounting systems to support environmental reporting and disclosure requirements. EMA systems provide the data necessary for organizations to report environmental performance indicators in sustainability reports and integrated financial reports. This reporting capability enhances transparency and accountability, which are essential for building trust with stakeholders such as investors, regulators, and consumers. As sustainability reporting becomes more institutionalized in corporate governance frameworks, EMA serves as an important tool for generating reliable environmental data that supports strategic sustainability communication (Sundarasan et al., 2024).

Another important implication of EMA implementation is its contribution to eco efficiency and financial performance. Eco efficiency refers to the ability of organizations to produce goods and services while minimizing environmental impacts and resource consumption. Companies that adopt EMA systems are able to identify opportunities for reducing resource use, improving energy efficiency, and minimizing waste generation. These improvements often lead to cost savings and operational efficiency gains, which enhance overall financial performance. Empirical studies suggest that organizations implementing EMA practices tend to achieve higher levels of eco efficiency and improved profitability due to their ability to optimize resource use and reduce environmental risks (Utami et al., 2025).

The findings of this study also align with previous research demonstrating the positive relationship between EMA implementation and organizational financial performance. Companies that integrate environmental cost information into investment decision making are more likely to adopt sustainable technologies and environmentally responsible production systems. These investments not only reduce environmental risks but also improve operational efficiency and long term competitiveness. In many industries, sustainability oriented innovations supported by EMA can create new business opportunities and enhance corporate reputation. These benefits ultimately contribute to improved financial outcomes and long term business sustainability (Pillay et al., 2025).

In addition to operational benefits, EMA also contributes to strategic financial management within organizations. Environmental accounting information can be integrated into capital budgeting processes to evaluate environmentally related investments. For example, organizations can use EMA data to assess the financial feasibility of investments in renewable energy technologies, waste reduction systems, or sustainable supply chain initiatives. By incorporating environmental cost information into financial analysis, companies can make more accurate investment decisions that align with long term sustainability objectives. This integration of environmental accounting into financial decision making reflects the evolving role of accounting systems in supporting sustainable corporate governance (Huliselan, 2025).

Another important aspect of EMA implementation is its ability to support strategic risk management. Environmental risks such as climate change, regulatory changes, and resource scarcity pose significant challenges to business operations. Companies that fail to manage these risks effectively may face regulatory penalties, reputational damage, or operational disruptions. EMA systems provide managers with information about environmental risk exposure and the potential financial implications of environmental issues. This information allows organizations to develop proactive risk management strategies that minimize environmental liabilities and improve organizational resilience. Consequently, EMA contributes to the development of risk informed sustainability strategies that support long term business stability (Thakkar, 2025).

Despite the benefits of EMA implementation, several challenges remain in integrating environmental accounting systems with corporate strategy. Many organizations still treat EMA as a technical accounting practice rather than as a strategic management tool. In such cases, environmental accounting information may be collected for reporting purposes but not fully utilized in strategic planning or decision making processes. This limitation highlights the need for stronger integration between environmental accounting systems and corporate strategic management frameworks. Organizations must develop management control systems that incorporate environmental performance indicators and align them with strategic objectives (Zatini et al., 2025).

Another important research gap concerns the role of accounting professionals in sustainability strategy development. While senior managers often lead sustainability initiatives, accountants play a crucial role in generating the financial and environmental data necessary for strategic decision making. However, the involvement of accounting professionals in sustainability strategy formulation remains relatively underexplored in academic literature. Understanding how accountants contribute to sustainability decision making can provide insights into how organizations can strengthen the integration of EMA into strategic management processes (Swalih et al., 2024).



Furthermore, the integration of EMA with broader sustainability frameworks such as the circular economy, green finance, and climate risk management remains an emerging area of research. These frameworks emphasize the need for organizations to adopt holistic sustainability strategies that address environmental, economic, and social challenges simultaneously. EMA can serve as a key information system supporting the implementation of these frameworks by providing quantitative data on environmental performance and resource efficiency. However, empirical studies examining the integration of EMA with these broader sustainability frameworks remain limited, particularly in emerging market contexts where sustainability challenges are often closely linked to economic development issues (Rasit et al., 2025).

The findings of this study therefore contribute to addressing these research gaps by demonstrating the strategic role of Environmental Management Accounting in supporting sustainable business strategy implementation. The results indicate that EMA systems not only support environmental performance monitoring but also facilitate strategic decision making related to sustainability initiatives. By integrating environmental information into corporate management systems, organizations can align financial performance with environmental responsibility and long term value creation. This integration represents an important step toward the development of sustainable business models capable of addressing complex environmental challenges while maintaining economic competitiveness.

Overall, the discussion highlights that Environmental Management Accounting plays a crucial role in supporting the integration of sustainability into corporate strategy. EMA enables organizations to identify environmental costs, improve resource efficiency, support strategic investment decisions, and strengthen environmental governance systems. These capabilities allow organizations to develop sustainability oriented strategies that enhance both environmental performance and financial outcomes. As sustainability continues to shape the future of global business, the strategic role of environmental accounting systems will become increasingly important in enabling organizations to achieve sustainable competitive advantage and long term organizational resilience.

5. Conclusion, Limitations, and Suggestions

Conclusion

The findings of this study demonstrate that the implementation of Environmental Management Accounting plays a significant role in supporting sustainable business strategy development within organizations. The results indicate that EMA practices, including environmental cost identification, resource and energy management, environmental performance measurement, and the integration of environmental information into managerial decision making, significantly contribute to the adoption of sustainability oriented strategies. By providing detailed information about environmental costs, resource utilization, and environmental risks, EMA enables organizations to integrate sustainability considerations into strategic planning, investment evaluation, and corporate governance processes. Consequently, EMA functions as a strategic managerial tool that bridges environmental management and financial decision making, allowing companies to improve environmental performance, enhance operational efficiency, and strengthen long term competitiveness. Therefore, the integration of Environmental Management Accounting into corporate management systems represents an important pathway for organizations seeking to align sustainability objectives with business strategy and achieve sustainable competitive advantage.

Limitation and suggestions

This study has several limitations that should be considered when interpreting the findings. First, the study relied primarily on survey data collected from respondents within selected organizations, which may limit the generalizability of the results to other industries or geographical contexts. Second, the research design used a cross sectional approach that captures EMA implementation and sustainability strategies at a single point in time, thereby limiting the ability to examine long term causal relationships between environmental accounting practices and strategic performance outcomes. Third, the measurement of sustainability oriented business strategy was based on self reported perceptions from respondents, which may introduce subjective bias in the assessment of organizational practices. Future research may address these limitations by incorporating longitudinal data, objective performance indicators, and broader industry samples.

Future research should further explore the integration of Environmental Management Accounting with broader sustainability frameworks such as circular economy practices, climate risk management, and green finance strategies. Empirical studies across different industries and national contexts would provide deeper insights into how EMA contributes to sustainable business transformation in diverse economic environments. In addition, future studies may investigate the role of accounting professionals in shaping sustainability strategies and examine how environmental accounting information can be integrated into strategic management control systems. Research using mixed methods approaches, including case studies and longitudinal analysis, may also provide richer insights into the practical implementation of EMA and its long term impact on organizational sustainability performance.

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