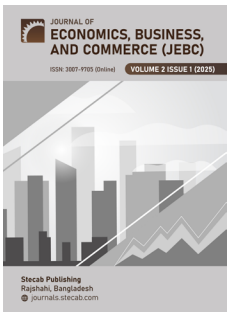

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Research Article

Enhancing Business Sustainability Through Environmental Management Accounting (EMA): Insights and Strategic Applications

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About Article

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ABSTRACT

This paper examines Environmental Management Accounting (EMA) as a strategic tool for promoting sustainable development in businesses. EMA integrates environmental costs into financial decision-making, helping organizations improve both economic performance and environmental responsibility. Using a qualitative approach based on literature analysis, the study explores key EMA components and the factors influencing its adoption, with a focus on developing economies like Vietnam. The findings highlight the importance of leadership commitment, organizational resources, regulatory frameworks, and market pressure in driving EMA implementation. The paper also offers practical recommendations to overcome adoption barriers and enhance sustainability practices in businesses.

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1. INTRODUCTION

In the context of global environmental degradation and increasing societal expectations for corporate responsibility, sustainable development has become an essential objective for modern businesses. Organizations today are expected not only to pursue economic gains but also to align their operations with environmental and social values. This growing pressure from regulators, investors, consumers, and the international community has led to a transformation in business strategies, with a strong emphasis on environmental accountability, resource efficiency, and transparency.

One of the emerging tools that supports this transformation is Environmental Management Accounting (EMA). Unlike traditional financial accounting, which primarily focuses on historical cost reporting for external stakeholders, EMA provides both financial and non-financial information related to environmental performance. It enables organizations to identify, analyze, and manage environmental costs associated with resource consumption, waste generation, pollution, and compliance. By integrating these factors into business decision-making, EMA enhances not only operational efficiency but also supports the organization's contribution to broader sustainability goals.

Over the past two decades, researchers have increasingly emphasized the strategic significance of EMA. Burritt *et al.* (2019) highlighted its ability to support cleaner production and cost-saving through material flow analysis. Hanif *et al.* (2023) pointed to its role in fostering green innovation and enhancing environmental performance, especially under strong leadership committed to sustainability. In this light, EMA serves as both a managerial accounting technique and a driver for organizational change, enabling businesses to transition toward environmentally conscious models of production and governance.

Despite these advantages, the implementation of EMA in practice—particularly in developing countries—remains limited and inconsistent. Several studies (Christ & Burritt, 2013; Nguyen, 2022) have pointed out the barriers that impede EMA adoption, including insufficient awareness among managers, lack of skilled personnel, unclear regulatory guidance, and limited financial resources. These constraints are especially pronounced in Vietnam, where EMA is still a relatively new concept, and few enterprises have fully integrated environmental costs into their internal accounting systems.

Given these challenges and opportunities, this study seeks to provide a comprehensive understanding of EMA within the broader framework of sustainable development. Specifically, it aims to:

1. Clarify the nature, components, and conceptual foundations of Environmental Management Accounting.
2. Explore the strategic role that EMA plays in achieving sustainable development within enterprises;
3. Identify key drivers and obstacles to the implementation of EMA, especially within the Vietnamese business context;
4. Analyze international best practices and derive practical recommendations for Vietnamese enterprises seeking to implement EMA effectively.

By synthesizing international literature and contextualizing it within the realities of developing economies, this paper contributes to both theoretical enrichment and practical guidance. It aims to support policymakers, managers, and scholars in recognizing EMA as a critical tool for advancing sustainability, improving organizational performance, and responding to the evolving environmental expectations of the 21st-century global marketplace.

2. LITERATURE REVIEW

2.1. Environmental management accounting

EMA is an internal accounting system that provides financial and non-financial information related to environmental costs, material flows, energy consumption, waste, and resource efficiency to support decision-making in businesses. According to Burritt *et al.* (2019), EMA is an important tool to connect cleaner production strategies with accounting activities, helping businesses identify and control environmental costs in the production process.

Unlike the traditional accounting approach, which only accounts for actual costs, EMA incorporates potential costs, avoidable costs, and investments related to environmental protection (Vasile & Man, 2012). not only helps businesses assess the economic efficiency of green initiatives but also aims to improve environmental performance and promote sustainable development.

While both studies underscore EMA's role in bridging financial and environmental considerations, they approach the subject from slightly different angles. Burritt *et al.* (2019) focus on EMA as a practical management tool that facilitates cost control and cleaner production, whereas Vasile and Man (2012) underline its strategic value in promoting long-term environmental performance through comprehensive cost visibility. Together, these complementary insights illustrate that EMA is not simply a reporting mechanism, but rather a dynamic system for guiding both operational improvements and sustainability-driven strategic planning.

2.2. Distinguishing managerial accounting from traditional accounting

EMA and traditional accounting differ in many fundamental aspects, especially in terms of objectives, information content, data scope, and how they serve the decision-making process.

Table 1. Key Differences between Traditional Accounting and Environmental Management Accounting

Criteria for differentiation	Traditional accounting	Environmental management accounting
Objective	Acknowledged, the financial statements comply with legal regulations.	Support internal decision-making on environmental costs and resource efficiency
Type of information	Mainly finance	Combining financial and non-financial information
Target audience	Outside: investors, tax authorities, auditors	Inside: manager, production planning department, R&D
Cost scope	Only record actual incurred expenses.	Including hidden costs, avoidable costs, and product life cycle costs
Focus	Financial results	Optimizing environmental and economic performance

Source: Compiled by the author (2025)

Christ & Burritt (2013) state that the main difference of EMA is that it gives a fuller view of environmental-related costs that regular accounting systems usually miss or only show partially.

2.3. The main components of management accounting

EMA includes many integrated components aimed at providing information for internal control and decision-making. You can divide the main components into two categories:

• Material Flow Accounting

According to Burritt *et al.* (2019), this is the part of EMA that measures the flow of materials, energy, water, emissions, and waste throughout the entire production process. Material accounting helps identify points of resource loss, thereby proposing process improvements to reduce costs and environmental damage.

• *Environmental Cost Accounting:* This is an important component in EMA, focusing on identifying, classifying, and allocating environmental costs such as waste treatment costs, emission reduction costs, environmental compliance costs, and environmental restoration costs. According to Qian *et al.* (2018), accurately reflecting these costs helps businesses make more effective investment decisions and improve their competitiveness.

• *The Environmental Management Information System:* EMA is not only a recording system but also a tool for providing input data for internal reports, which supports strategic decision-making. Departments such as accounting, production, operations, and strategic management need to integrate this system to ensure timely and accurate information (Gunarathne & Lee, 2021).

• *Connect with the sustainable development strategy:* EMA plays a role in linking business strategy with sustainable development goals. Through environmental performance indicators, EMA helps businesses identify strategic options for green products, cleaner production processes, and environmental innovation (Hanif *et al.*, 2023; Almasyhari *et al.*, 2025).

By synthesizing and comparing the findings from these studies, it becomes clearer how EMA can be more effectively used to drive both environmental sustainability and business efficiency. This approach also underscores the importance of adapting EMA to fit the specific needs of each organization, considering factors such as industry, resource availability, and environmental priorities.

3. METHODOLOGY

The methodology of this study is based on a qualitative literature review approach, designed to explore the role of Environmental Management Accounting (EMA) in supporting sustainable development in businesses, particularly in developing countries such as Vietnam. Relevant academic literature was systematically collected using Google Scholar as the primary search engine, applying key terms such as "Environmental Management Accounting," "Sustainable Development," "Material Flow Accounting," "Environmental Cost Accounting," "Environmental Management Information Systems," and "Vietnam." To ensure the quality and academic rigor of the reviewed sources, only studies published in journals ranked in Q1 or Q2 (the top 75%) according to the Scopus classification system were selected for inclusion. This selection criterion ensured that the research incorporated high-quality, peer-reviewed articles that reflect established theories and recent developments in the field. Furthermore, only publications in English were considered, and the review focused on literature published between 2000 and 2023 to capture both foundational perspectives and contemporary advancements related to EMA practices and their connection to sustainable business strategies.

The research focuses on the key components of EMA, such as Material Flow Accounting, Environmental Cost Accounting, and Environmental Management Information Systems, and their role in improving business decision-making and sustainability practices. Moreover, the study highlights the various drivers of EMA adoption, including leadership awareness, resource availability, and legal frameworks, and discusses the barriers to its implementation, especially in resource-constrained contexts like Vietnam. By examining international case studies and best practices, the study seeks to identify actionable strategies for overcoming these barriers.

Through this investigation, the study aims to answer several critical questions related to the implementation and strategic application of EMA. These questions will guide the analysis of EMA's effectiveness and its potential for driving sustainable change in businesses, especially in developing economies.

RQ1: What are the internal and external factors influencing the adoption of Environmental Management Accounting (EMA) in businesses, particularly in Vietnam?

RQ2: What are the key components of Environmental

Management Accounting (EMA), and how do they support decision-making within businesses?

RQ3: What challenges and barriers do businesses face in implementing EMA, and how can they be overcome, especially in developing countries like Vietnam?

4. RESULTS AND DISCUSSION

The results of this study reveal key insights into the role of Environmental Management Accounting (EMA) in promoting sustainability within businesses, particularly in developing economies like Vietnam. The adoption of EMA is influenced by both internal and external factors, including leadership awareness, organizational resources, and regulatory frameworks. Internally, strong leadership, particularly green transformational leadership, is crucial for promoting EMA adoption, while externally, market pressures and legal requirements act as significant drivers.

EMA's components, such as material flow accounting, environmental cost accounting, and the environmental management information system, are essential for supporting decision-making by providing businesses with the tools to analyze material flows, environmental costs, and resource efficiency. This helps improve operational efficiency and environmental responsibility.

Despite its benefits, businesses face numerous challenges in implementing EMA, especially in developing countries. These barriers include lack of awareness, resource constraints, and regulatory gaps. Overcoming these obstacles requires focused efforts on training, capacity building, and supportive government policies to create a favorable environment for EMA adoption, ultimately enhancing businesses' sustainability practices and competitiveness.

RQ1. What are the internal and external factors influencing the adoption of Environmental Management Accounting (EMA) in businesses, particularly in Vietnam?

The adoption of EMA is influenced by both internal and external factors, which play a crucial role in its successful implementation within businesses. Internally, factors such as leadership awareness, organizational resources, and accounting capabilities are critical in driving the adoption of EMA. As noted by Hanif *et al.* (2023), green transformational leadership is particularly influential in encouraging organizations to integrate EMA into their business strategies. Leadership that prioritizes environmental sustainability and creates a strategic vision for sustainable business practices is essential in promoting EMA adoption. Moreover, businesses need to have sufficient financial, human, and technological resources, which are vital for effectively implementing EMA, especially in resource-constrained settings such as those often found in developing countries like Vietnam (Asiri *et al.*, 2020).

Externally, institutional pressures, including legal requirements and industry standards, exert a significant influence on the adoption of EMA. Regulatory frameworks, such as environmental compliance requirements and certification systems, create strong incentives for businesses to adopt EMA as a means of ensuring their activities align with national and international environmental standards. Additionally, market pressures from stakeholders, including consumers, investors, and corporate partners, play an important role in driving EMA adoption. As highlighted by Almasyhari *et al.* (2025), businesses that integrate EMA into their operations are seen as more socially responsible, which enhances their competitiveness in the marketplace. Therefore, both internal leadership commitment and external institutional and market pressures are essential in driving the adoption of EMA, particularly in developing economies like Vietnam.

RQ2. What are the key components of Environmental Management Accounting (EMA), and how do they support decision-making within businesses?

EMA consists of several key components that collectively support decision-making and drive sustainability within businesses. The primary components include Material Flow Accounting, Environmental Cost Accounting, and the Environmental Management Information System. These components work together to provide comprehensive data on environmental costs, resource usage, and waste generation, enabling businesses to make more informed decisions about their operations.

Material Flow Accounting helps businesses track the flow of materials, energy, and waste throughout the production process. By identifying points where resources are lost or wasted, businesses can take corrective actions to reduce inefficiencies and environmental damage. Gunarathne & Lee (2021) argue that this component is essential for businesses to pinpoint areas of resource leakage and optimize the use of materials, energy, and water, thereby improving operational efficiency and minimizing environmental impacts.

Environmental Cost Accounting involves identifying, classifying, and allocating environmental costs, such as waste treatment, emissions control, and environmental compliance. According to Qian *et al.* (2018), this component allows businesses to accurately reflect the full scope of environmental costs, which aids in making more effective investment decisions and improving overall competitiveness. By accounting for these costs, businesses can prioritize eco-efficient investments and allocate resources more effectively to sustainable practices.

The Environmental Management Information System (EMIS) integrates environmental data into business operations and decision-making processes. This system provides real-time data for internal reports, supporting strategic decisions related to sustainability. By integrating environmental data across departments such as accounting, production, and operations, the EMIS ensures that businesses have timely and accurate information to guide their environmental strategies (Gunarathne & Lee, 2021). Together, these components allow businesses to assess environmental performance comprehensively and make decisions that support both economic and environmental sustainability.

RQ3. What challenges and barriers do businesses face in implementing EMA, and how can they be overcome, especially in developing countries like Vietnam?

The implementation of EMA in businesses, particularly in developing countries such as Vietnam, is often impeded by various challenges and barriers. One of the main obstacles is the lack of awareness and understanding of EMA among business leaders and employees. Many companies still rely

on traditional accounting methods that primarily focus on financial performance, without integrating environmental factors into their decision-making processes. This lack of awareness makes it difficult to gain support for EMA adoption within organizations.

Additionally, resource constraints—both financial and human—pose significant barriers to EMA implementation, especially in developing economies where businesses may struggle to invest in the required technologies and training. As Asiri *et al.* (2020) point out, businesses in resource-limited environments face challenges in allocating sufficient funds and skilled personnel to implement EMA effectively.

Regulatory gaps also contribute to the slow adoption of EMA, particularly in countries like Vietnam where there is a lack of clear and comprehensive environmental policies and legal frameworks. In many cases, businesses may be unaware of the benefits of EMA or lack the legal pressure to adopt it. As Burritt *et al.* (2019) suggest, the lack of institutional support and weak enforcement of environmental laws can result in businesses not fully integrating EMA into their operations.

To overcome these challenges, several steps can be taken. Training and capacity building are essential to improving the understanding of EMA and its potential benefits. By investing in training programs for managers and staff, businesses can enhance their knowledge of EMA and encourage its adoption. Moreover, government policies and regulatory support are critical in fostering a conducive environment for EMA implementation. Governments can play a vital role by offering financial incentives, providing clear guidelines for EMA adoption, and enforcing environmental regulations that encourage businesses to adopt sustainable practices. Furthermore, collaboration with international organizations and the sharing of best practices can help businesses in developing countries overcome resource constraints and implement EMA effectively.

Table 2. Summary of Key Findings on Environmental Management Accounting (EMA)

Research Question	Key Points	Explanation
RQ1: What are the internal and external factors influencing the adoption of EMA in businesses, particularly in Vietnam?	Internal Factors	- Leadership awareness, especially green transformational leadership, is a critical driver for EMA adoption. - Availability of financial, human, and technological resources supports successful implementation.
	External Factors	- Institutional pressures such as environmental regulations and industry standards influence adoption. - Market pressures from consumers, investors, and business partners enhance the need for EMA integration.
RQ2: What are the key components of EMA, and how do they support decision-making within businesses?	Material Flow Accounting	Tracks material, energy, and waste flows during production; helps identify inefficiencies and reduce resource loss.
	Environmental Cost Accounting	Identifies, classifies, and allocates environmental costs, improving cost transparency and supporting sustainable investment decisions.
	Environmental Management Information System (EMIS)	Integrates environmental data into business decision-making, offering real-time information for strategy and performance monitoring.
RQ3: What challenges and barriers do businesses face in implementing EMA, and how can they be overcome, especially in developing countries like Vietnam?	Challenges/Barriers	- Lack of awareness and understanding of EMA among leaders and employees. - Resource constraints, particularly in financial and human capital. - Regulatory gaps and weak enforcement of environmental laws.
	Proposed Solutions	- Training and capacity building for staff and management. - Supportive government policies including incentives and clear regulatory frameworks. - International cooperation and sharing of best practices.

Source: Compiled by the author (2025)

5. CONCLUSION

Environmental Management Accounting (EMA) has increasingly emerged as a vital management tool that enables enterprises to balance economic performance with environmental responsibility. By systematically integrating environmental factors—such as material flows, energy consumption, and waste management—into internal accounting and decision-making processes, EMA not only contributes to cost reduction and efficiency improvement but also supports enterprises in achieving long-term sustainability objectives.

This study provides a comprehensive overview of EMA's nature, strategic roles, and the factors influencing its implementation, particularly within the context of sustainable development. Through an analysis of both international practices and the specific challenges facing Vietnamese enterprises, the paper highlights how EMA can serve as a bridge between

environmental protection goals and business competitiveness. The findings emphasize the importance of leadership awareness, institutional support, and internal capacity-building as critical enablers of successful EMA implementation.

However, this research is not without limitations. The analysis primarily draws upon secondary sources and theoretical frameworks, lacking empirical validation through primary data collection or fieldwork. The geographical focus is largely restricted to Vietnam, and the findings may not fully capture the diversity of experiences across different industries or countries. Furthermore, the sectoral analysis remains broad and could benefit from more granular insights into specific business types or scales.

Given these limitations, several directions for future research are proposed. First, empirical studies—such as case studies or survey-based research—should be conducted to evaluate the real-world application of EMA in various organizational settings. These studies could provide deeper insights into the motivations, obstacles, and outcomes associated with EMA adoption. Second, a quantitative assessment of EMA's impact on financial and environmental performance metrics would help build a stronger evidence base for its value. Third, comparative analyses between countries or industries could uncover best practices and contextual factors that enhance or hinder EMA adoption. Finally, future research should explore the role of policy interventions, training programs, and public-private partnerships in fostering a more enabling environment for EMA implementation, especially in developing countries.

In conclusion, while the journey toward widespread adoption of Environmental Management Accounting remains challenging, it is a necessary and strategic pathway for businesses striving to succeed in an increasingly sustainability-driven global economy. Through collaborative efforts between enterprises, governments, and academia, EMA can evolve from a theoretical framework into a transformative tool for sustainable development.

6. RECOMMENDATION

The implementation of EMA (Environmental Management Accounting) in businesses helps improve operational efficiency and contributes to environmental protection, risk reduction, and enhancing the company's image. However, to implement EMA effectively, businesses need a suitable strategy and thorough preparation. Here are some important suggestions to help businesses successfully implement EMA.

6.1. Awareness of the role and importance of EMA

A key factor in EMA's successful implementation is understanding its role in the company's sustainable development strategy.

• Business leaders need to understand that the implementation of EMA is not only about complying with legal regulations but also a strategy to optimize costs, enhance production efficiency, improve social responsibility, and increase market competitiveness.

• EMA helps businesses manage environmental costs (such as waste treatment costs, resource costs, and environmental protection costs) effectively, thereby contributing to long-term profit improvement and sustainable development.

• Businesses need to clearly recognize the role of EMA in promoting clean production, minimizing negative environmental impacts, and helping businesses achieve sustainable development goals, especially in the context of climate change and increasingly stringent environmental protection regulations.

6.2. Training human resources and enhancing internal capacity

To effectively implement EMA, businesses need to invest in workforce training and internal capacity development. Such investment not only helps the relevant departments better understand the EMA processes and techniques but also creates a solid foundation for managing resources and environmental costs throughout the production cycle.

• *Professional training:* The enterprise needs to organize specialized training courses and workshops on EMA for employees in the accounting, finance, environmental, and production management departments. This training will help employees understand the methods for calculating environmental costs, preparing EMA reports, and analyzing the impact of production activities on the environment.

• *Practical learning programs:* To enhance practical skills, businesses can organize learning programs from pioneering companies in EMA implementation, thereby drawing lessons and practical experiences for themselves.

• *Raising environmental awareness in businesses:* Training courses should include content that helps employees understand the role of the environment in sustainable development, thereby encouraging them to apply resource-saving solutions and waste reduction in their work processes.

6.3. Support policies from the government and related organizations

Enterprises cannot implement EMA without the support of government policies and industry organizations. Therefore, businesses need to proactively take advantage of support policies to accelerate the implementation of EMA.

• *Financial and tax support:* The government can provide financial support policies, such as preferential loans, tax reductions, or support packages, so that businesses can invest in EMA technologies and systems. In addition, tax incentives for businesses implementing clean, environmentally friendly production projects are also a strong driving factor for the adoption of EMA.

• *Provide guidance and standards:* The government and relevant agencies should develop and disseminate EMA implementation guidelines for businesses. These standards will help businesses easily implement and comply with the process of applying EMA to production activities.

• *Research and Development (R&D) support:* The government can encourage and support research on the application of EMA in various industries through research and development support programs. These research organizations can collaborate with businesses to find cost-saving methods and minimize environmental impact in production processes.

• International cooperation and the application of

international standards: Businesses can also receive support from international organizations, such as through international cooperation projects, environmental funding grants, and experience-sharing programs.

6.4. Encourage the application of EMA in the supply chain

Companies should apply EMA not only internally, but also externally to their partners and suppliers in the supply chain. Businesses can:

• *Set EMA requirements for suppliers:* Encourage suppliers to implement EMA to minimize the negative environmental impact from input materials.

• *Create a network for sharing environmental information:* Together with partners, businesses can build a system for sharing data and information on environmental efficiency in the supply chain to optimize resource use and minimize waste. Thus, to effectively implement EMA, businesses need to correctly recognize the role and importance of EMA while also investing in workforce training and developing support policies from organizations, governments, and international bodies. In this way, businesses not only optimize costs and environmental efficiency but also enhance their sustainable competitiveness in the global market.

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