Costing for Sustainability: Integrating Environmental Costs into Accounting

Dr. Janhavi Shridhar Bedekar

Chintamanrao College of Commerce, Sangli.

Abstract:
Sustainability has emerged as a central concern in contemporary business strategy, yet conventional accounting systems often fail to capture environmental externalities. This conceptual paper examines the integration of environmental costs into accounting practices through sustainability-oriented costing frameworks. It argues that traditional cost accounting understates the true cost of production by excluding ecological impacts such as carbon emissions, resource depletion, and waste generation. The paper synthesizes existing theoretical perspectives including environmental management accounting (EMA), full cost accounting, and life cycle costing to develop a structured understanding of sustainability costing. It highlights how incorporating environmental costs can enhance decision-making, improve resource efficiency, and align organizational strategies with sustainable development goals. Further, the study proposes a conceptual framework linking environmental cost identification, measurement, allocation, and reporting with firm performance outcomes. It also discusses challenges such as measurement complexity, lack of standardized reporting, and resistance within organizations. The paper contributes by offering a comprehensive conceptual model that integrates environmental considerations into accounting systems. It provides directions for empirical validation and supports policymakers and practitioners in advancing sustainable financial practices.

Keywords: Sustainability, Environmental Costs and Accounting

1. Introduction

Sustainability has become a defining paradigm in modern business, driven by increasing environmental degradation, regulatory pressures, and stakeholder expectations. Firms are no longer evaluated solely on financial performance, but also on their environmental and social impacts. The concept of sustainable development, popularized by the Brundtland Commission, emphasizes meeting present needs without compromising future generations. This has led to the adoption of sustainability frameworks such as the Triple Bottom Line, which integrates economic, environmental, and social dimensions into organizational performance (Elkington, 1997).

In recent years, businesses have begun embedding sustainability into core strategies rather than treating it as a peripheral activity. Climate change, resource scarcity, and environmental risks have compelled organizations to rethink production processes and cost structures. Environmental costs such as emissions, waste disposal, and resource consumption are now recognized as critical factors influencing long-term competitiveness (Schaltegger & Burritt, 2010). As a result, accounting systems are expected to evolve to capture these emerging dimensions of business performance.

Traditional accounting systems are primarily designed to measure financial transactions and short-term profitability. These systems largely ignore environmental externalities, leading to an incomplete representation of organizational costs and performance. Environmental impacts are often treated as external to the firm, even though they have significant long-term financial implications (Gray, 2010).

One major limitation is the inability of conventional costing methods to identify and allocate environmental costs accurately. Many environmental costs are hidden within overheads, making them difficult to trace to specific products or processes. This leads to distorted cost information and suboptimal decision-making (Burritt, Hahn, & Schaltegger, 2002).

Furthermore, traditional accounting does not account for external costs such as pollution and ecosystem damage, which are borne by society rather than the firm. This creates a gap between private costs and social costs, resulting in unsustainable business practices. The lack of standardized methods for environmental cost measurement further complicates the issue and limits comparability across firms.

The integration of environmental costs into accounting systems is essential for achieving sustainable business practices. Environmental Management Accounting (EMA) has emerged as a key approach to address this gap by incorporating both physical and monetary information related to environmental impacts (IFAC, 2005). By identifying, measuring, and allocating environmental costs, firms can gain a more accurate understanding of their cost structures and improve decision-making.

Integrating environmental costs enables organizations to identify inefficiencies, reduce waste, and enhance resource productivity. It also supports compliance with environmental regulations and improves corporate transparency. More importantly, it aligns business operations with global sustainability goals such as the United Nations Sustainable Development Goals (SDGs).

From a strategic perspective, incorporating environmental costs can lead to competitive advantages through innovation, cost savings, and improved stakeholder trust. Firms that adopt sustainability-oriented costing practices are better positioned to manage risks and respond to evolving market demands (Schaltegger, Burritt, & Petersen, 2017).

This conceptual paper aims to explore the integration of environmental costs into accounting systems and its implications for sustainable business practices. The specific objectives are:

1) To examine the limitations of traditional accounting systems in capturing environmental costs
2) To analyse key concepts and frameworks related to sustainability costing
3) To develop a conceptual framework for integrating environmental costs into accounting practices
4) To identify challenges associated with environmental cost measurement and implementation
5) To provide directions for future research and policy development

The paper is structured into several sections. Following the introduction, the second section discusses the conceptual foundations of sustainability costing, including key definitions and frameworks. The third section presents relevant theoretical perspectives such as stakeholder theory and legitimacy theory. The subsequent sections focus on the identification, measurement, and allocation of environmental costs, along with their integration into accounting systems. Reporting and disclosure practices are also examined. The paper then proposes a conceptual framework linking environmental cost integration with firm performance. Finally, the paper discusses challenges, implications for practice and policy, and future research directions before concluding with key insights.

2. Literature Review

2.1 Sustainability Costing

Conceptual Foundations of Sustainability Costing

Sustainability costing refers to the inclusion of environmental and social costs within traditional accounting systems to reflect the true cost of business activities. It extends beyond financial accounting by incorporating ecological impacts such as emissions, waste generation, and resource depletion. This approach aligns with the broader concept of sustainability, which integrates economic, environmental, and social dimensions of performance (Elkington, 1997). Sustainability costing is rooted in the idea that firms should internalize externalities that are otherwise imposed on society. Conventional accounting fails to capture these external costs, leading to incomplete cost assessments. By incorporating environmental costs, organizations can make more informed and responsible decisions (Schaltegger & Burritt, 2010).

Environmental accounting has evolved over time from a narrow focus on compliance to a broader strategic tool. Early developments focused on environmental reporting and regulatory compliance. Over time, the emphasis shifted toward integrating environmental considerations into internal management systems. Gray

(2010) highlights that traditional accounting systems have been inadequate in addressing sustainability challenges. This led to the emergence of environmental accounting as a discipline that combines financial and non-financial information. The evolution also reflects increasing stakeholder pressure for transparency and accountability. International bodies such as the International Federation of Accountants (IFAC) have played a key role in promoting environmental accounting practices. Their guidelines emphasize the importance of identifying and managing environmental costs within organizations (IFAC, 2005).

Key Frameworks in Sustainability Costing

Environmental Management Accounting (EMA): Environmental Management Accounting is one of the most widely used frameworks for sustainability costing. EMA focuses on the identification, collection, and analysis of environmental cost information for internal decision-making. Burritt et al. (2002) define EMA as a tool that integrates physical and monetary data to improve environmental and economic performance. It helps organizations trace hidden costs, reduce waste, and enhance efficiency. EMA is particularly useful in identifying material and energy flows within production processes.

Full Cost Accounting (FCA): Full Cost Accounting extends traditional accounting by including both internal and external environmental costs. It aims to capture the total cost of a product or service throughout its lifecycle. FCA incorporates costs related to environmental damage, resource depletion, and social impacts. This approach provides a more comprehensive view of organizational performance. However, its implementation is challenging due to difficulties in measuring external costs (Bebbington et al., 2001).

Life Cycle Costing (LCC): Life Cycle Costing evaluates the total cost of a product over its entire lifecycle, from raw material extraction to disposal. It integrates environmental considerations into cost analysis by accounting for impacts at each stage. LCC supports sustainable decision-making by highlighting long-term cost implications. It is widely used in industries with significant environmental impact, such as manufacturing and construction (Gluch & Baumann, 2004).

Material Flow Cost Accounting (MFCA): Material Flow Cost Accounting is a specific tool within EMA that focuses on tracking material and energy flows. It assigns costs to both product outputs and material losses. Jasch (2003) shows that MFCA helps firms identify inefficiencies and reduce waste. By quantifying material losses in monetary terms, organizations can improve resource efficiency and reduce environmental impact.

Integration with Sustainability Frameworks

Sustainability costing is closely linked with broader frameworks such as the Triple Bottom Line and integrated reporting. The Triple Bottom Line emphasizes the need to balance economic, environmental, and social performance (Elkington, 1997). Integrated reporting frameworks encourage firms to disclose how they create value over time, including environmental aspects. These frameworks support the adoption of sustainability costing by promoting transparency and accountability (Schaltegger et al., 2017).

The conceptual foundations of sustainability costing highlight the transition from traditional accounting to more comprehensive systems that incorporate environmental impacts. Frameworks such as EMA, FCA, LCC, and MFCA provide practical tools for implementation. These approaches collectively support better decision-making, improved resource efficiency, and enhanced organizational performance. However, challenges related to measurement and standardization remain, indicating the need for further research and development.

2.2 Theoretical Perspectives

This section explains the theoretical foundations that support the integration of environmental costs into accounting systems. It draws on stakeholder theory, legitimacy theory, and institutional theory to justify why firms adopt sustainability-oriented accounting practices.

Stakeholder Theory: Stakeholder theory argues that organizations are accountable not only to shareholders but also to a broader group of stakeholders, including customers, employees, regulators, and society (Freeman, 1984). In the context of sustainability costing, this theory emphasizes that firms must consider environmental impacts as part of their responsibility toward stakeholders. Environmental cost integration helps firms address stakeholder concerns related to environmental protection and resource use. By incorporating these costs into accounting systems, organizations can improve transparency and demonstrate accountability. This enhances trust and strengthens relationships with stakeholders. Prior research shows that firms adopting environmental accounting practices are more responsive to stakeholder pressures. These firms are better positioned to meet

expectations related to sustainability and corporate responsibility (Schaltegger & Burritt, 2010). Stakeholder theory thus provides a strong rationale for integrating environmental costs into decision-making processes.

Legitimacy Theory: Legitimacy theory suggests that organizations seek to operate within the norms and values of society to maintain legitimacy. Firms adopt practices that align with societal expectations to ensure continued support and acceptance (Suchman, 1995). In the context of sustainability accounting, integrating environmental costs helps firms demonstrate that they are acting responsibly. This is particularly important in industries with significant environmental impact. By internalizing environmental costs, firms signal their commitment to sustainable practices. Environmental disclosures and sustainability reporting are often used as tools to maintain legitimacy. However, integrating environmental costs into internal accounting systems goes beyond symbolic actions. It reflects substantive commitment to sustainability (Gray, Kouhy, & Lavers, 1995). Legitimacy theory explains why firms adopt environmental accounting even in the absence of immediate financial benefits. It highlights the importance of social approval in shaping organizational behavior.

Institutional Theory: Institutional theory focuses on the influence of external pressures on organizational practices. These pressures can be coercive, normative, or mimetic (DiMaggio & Powell, 1983). Coercive pressures arise from regulations and legal requirements. Firms are required to comply with environmental laws, which encourages the adoption of environmental accounting practices. Normative pressures come from professional bodies and industry standards. Mimetic pressures occur when firms imitate successful competitors. Qian et al. (2011) show that institutional pressures significantly influence the adoption of environmental management accounting. Firms respond to these pressures by integrating environmental costs into their systems to remain competitive and compliant.

Triple Bottom Line Perspective: The Triple Bottom Line framework emphasizes the integration of economic, environmental, and social performance (Elkington, 1997). It provides a broader perspective on organizational success. Sustainability costing aligns with this framework by incorporating environmental costs into financial analysis. It ensures that firms do not prioritize short-term profits at the expense of long-term sustainability. This perspective supports balanced decision-making and encourages responsible resource use.

These theories collectively explain the adoption of environmental cost integration. Stakeholder theory focuses on accountability to stakeholders. Legitimacy theory highlights the need for social acceptance. Institutional theory explains the role of external pressures. Together, they provide a comprehensive understanding of why firms move toward sustainability accounting. They also support the proposed conceptual framework by linking environmental cost integration with organizational performance and external influences.

2.3 Identification, Measurement, and Allocation of Environmental Costs

Identification of Environmental Costs

The first step in sustainability costing is the identification of environmental costs embedded within business operations. These costs include expenses related to waste management, emissions control, energy consumption, and regulatory compliance. Many of these costs remain hidden within overhead accounts in traditional accounting systems, leading to underestimation of true production costs (Burritt et al., 2002). Environmental costs can be classified into internal and external costs. Internal costs are borne directly by firms, such as pollution control equipment and waste treatment. External costs refer to environmental damage imposed on society, such as air and water pollution. Jasch (2003) emphasizes that identifying material and energy flows is essential for uncovering inefficiencies and hidden costs.Another classification includes direct, indirect, contingent, and intangible costs. Direct costs are easily traceable to specific processes, while indirect costs are allocated across operations. Contingent costs arise from potential environmental liabilities, and intangible costs relate to reputation and stakeholder trust.

Measurement of Environmental Costs

Measurement of environmental costs involves assigning monetary values to environmental impacts. This process is complex due to the intangible nature of many environmental effects. Techniques such as material flow cost accounting and life cycle costing are widely used to improve accuracy. Material Flow Cost Accounting quantifies material losses and assigns them financial value. This helps firms identify inefficiencies and reduce waste (Jasch, 2003). Life Cycle Costing evaluates costs across the entire lifecycle of a product, from raw material extraction to disposal, providing a long-term perspective (Gluch & Baumann, 2004). Carbon accounting has also emerged as an important tool for measuring greenhouse gas emissions and

associated costs. It enables firms to track carbon footprints and align with regulatory requirements (Gibassier & Schaltegger, 2015). Despite these advancements, challenges remain due to lack of standardized measurement methods. External costs are particularly difficult to quantify, which limits their inclusion in financial systems.

Allocation of Environmental Costs

Once identified and measured, environmental costs must be allocated to products, processes, or departments. Accurate allocation is critical for informed decision-making. Traditional costing systems often allocate environmental costs uniformly, which leads to distorted product costing. Activity-Based Costing (ABC) is widely used to improve cost allocation. It assigns costs based on activities that generate environmental impacts. This allows firms to trace costs more accurately and identify high-impact processes (Burritt et al., 2002). Environmental cost allocation also supports pricing decisions and investment planning. By understanding the true cost of production, firms can design more sustainable products and processes.

2.4 Integration into Accounting Systems

Integrating environmental costs into accounting systems requires modifications to existing financial and management accounting practices. Environmental Management Accounting provides a structured approach for incorporating both physical and monetary environmental data. Integration involves linking environmental cost data with budgeting, performance evaluation, and strategic planning. This ensures that sustainability considerations are embedded in core business processes. Schaltegger and Burritt (2010) argue that such integration enhances decision-making and supports long-term value creation. Digital technologies such as data analytics and enterprise systems can further support integration. These tools enable real-time tracking of environmental performance and improve accuracy in cost measurement (Burritt & Christ, 2016).

2.5 Reporting and Disclosure Practices

Sustainability Reporting: Sustainability reporting has become a key mechanism for communicating environmental performance. Frameworks such as the Global Reporting Initiative (GRI) provide guidelines for disclosing environmental costs and impacts. These reports enhance transparency and accountability. However, many firms focus on external reporting without integrating environmental costs into internal accounting systems. This creates a gap between disclosure and decision-making (Bennett et al., 2013).

Integrated Reporting: Integrated reporting combines financial and non-financial information to provide a holistic view of organizational performance. It emphasizes value creation over time, including environmental and social dimensions. By incorporating environmental costs into integrated reports, firms can demonstrate how sustainability contributes to long-term performance. This approach aligns with stakeholder expectations and regulatory requirements (Schaltegger et al., 2017).

Environmental Performance Indicators: Environmental performance indicators are used to measure and report sustainability outcomes. These include metrics such as carbon emissions, energy efficiency, and waste reduction. Integrating these indicators with financial data improves decision-making and performance evaluation. Henri and Journeault (2010) show that firms using environmental indicators within management control systems achieve better performance outcomes.

3. Methodology

This study adopts a conceptual research design based on a systematic review and synthesis of existing literature on sustainability accounting and environmental cost integration. Conceptual research is appropriate as the objective is to develop a theoretical framework rather than empirically test hypotheses. Such an approach enables the identification of key constructs, relationships, and research gaps within the domain. Prior literature reviews have demonstrated the value of systematic synthesis in theory building and conceptual development (Saqib, 2021; Saqib, 2023). The research design follows a structured process involving problem identification, literature analysis, concept development, and framework formulation.

The study follows a qualitative and theory-building approach using secondary data. It relies on peer-reviewed journal articles and relevant academic sources to ensure rigor. A systematic and thematic analysis is employed to identify recurring themes such as environmental cost classification, measurement techniques, and integration mechanisms. This approach supports the development of a coherent conceptual model and aligns with established practices in systematic literature reviews (Reshi et al., 2025).

The data sources include academic articles, books, and policy-related documents on sustainability accounting. Only high-quality and relevant studies are selected to maintain academic rigor. The inclusion criteria focus on studies related to environmental accounting and sustainability costing, while exclusion criteria remove non-academic and methodologically weak sources. The emphasis on structured selection enhances the reliability and transparency of the review process (Saqib, 2023).

The analytical technique used is thematic content analysis. Key themes are identified through repeated examination of selected literature. These themes include environmental cost identification, measurement, allocation, integration into accounting systems, and reporting practices. The analysis also explores relationships between variables to support conceptual model development. Such thematic approaches are widely used in literature-driven research to generate theoretical insights (Saqib, 2021).

Based on the analysis, a conceptual framework is developed where environmental cost integration acts as the independent variable, resource efficiency as a mediator, firm performance as the dependent variable, and contextual factors as moderators. The development of such frameworks through systematic synthesis is consistent with prior research in management studies (Reshi et al., 2025).

To ensure validity, the study relies on well-established literature and adopts a systematic approach to data selection and analysis. Reliability is maintained through transparency in the review process. Ethical standards are followed by properly acknowledging all sources and ensuring academic integrity.

4. Conceptual Framework: Environmental Cost Integration and Firm Performance

This study proposes a conceptual framework that explains how integrating environmental costs into accounting systems influences firm performance. The framework is grounded in Environmental Management Accounting and supported by stakeholder, legitimacy, and institutional theories.

Structure of the Framework

The framework consists of four key components:

- Independent Variable: Environmental Cost Integration (ECI)
- Mediating Variable: Resource Efficiency
- Dependent Variable: Firm Performance
- Moderating Variables: Regulatory Pressure and Organizational Capability

Environmental Cost Integration (ECI)

Environmental Cost Integration refers to the systematic inclusion of environmental costs into accounting and decision-making processes. It involves identification, measurement, and allocation of costs related to emissions, waste, and resource consumption.

EMA literature suggests that integrating environmental costs improves transparency and reveals inefficiencies within production systems (Burritt et al., 2002). It enables firms to move beyond traditional cost structures and adopt sustainability-oriented practices.

Resource Efficiency as a Mediator

Resource efficiency reflects how effectively firms utilize materials and energy. It mediates the relationship between environmental cost integration and firm performance.

When environmental costs are identified and tracked, firms are more likely to reduce waste and optimize processes. This leads to improved operational efficiency and cost savings. Schaltegger and Burritt (2010) highlight that eco-efficiency connects environmental performance with economic outcomes.

Firm Performance as the Outcome Variable

Firm performance includes both financial and non-financial dimensions. Financial performance includes profitability and cost reduction. Non-financial performance includes environmental and social outcomes.

Henri and Journeault (2010) provide evidence that integrating environmental metrics into management systems enhances overall organizational performance. This supports the direct and indirect effects proposed in the framework.

Moderating Variables

- Regulatory Pressure: Regulatory pressure influences the extent to which firms adopt environmental accounting practices. Strong environmental regulations encourage firms to internalize environmental costs and improve compliance (Qian et al., 2011).

- Organizational Capability: Organizational capability includes managerial expertise, technological readiness, and availability of resources. Firms with higher capabilities are more effective in implementing environmental accounting systems (Christ & Burritt, 2013).

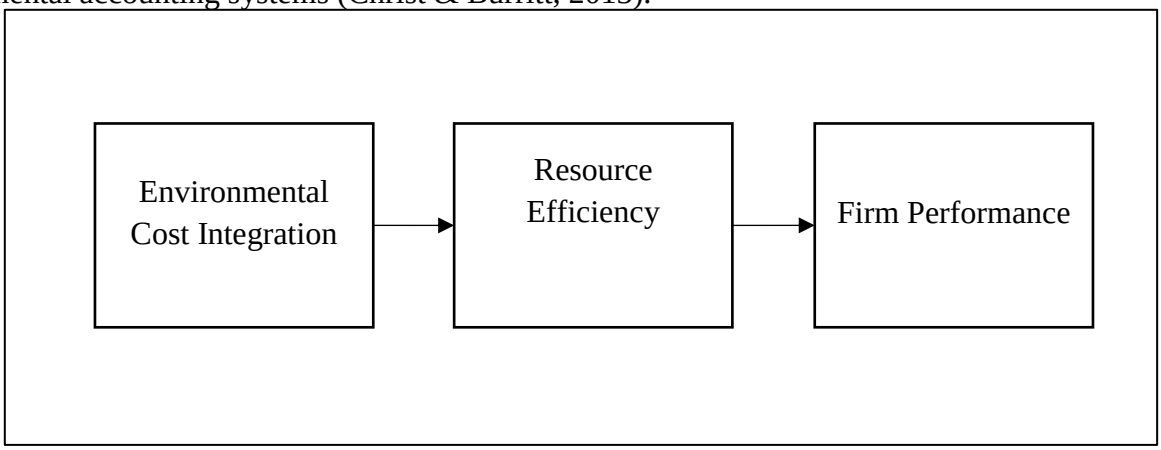

Figure1: Conceptual Framework

5. Challenges in Integrating Environmental Costs into Accounting

The integration of environmental costs into accounting systems offers significant benefits. However, several challenges limit its effective adoption and implementation across organizations.

Measurement Complexity: One of the most critical challenges is the difficulty in measuring environmental costs. Many environmental impacts, such as biodiversity loss and ecosystem degradation, are intangible and cannot be easily expressed in monetary terms. Existing tools like Life Cycle Costing and Material Flow Cost Accounting improve accuracy, yet they do not fully capture external costs. The absence of universally accepted valuation methods creates inconsistency in measurement (Gluch & Baumann, 2004). This limits comparability across firms and industries.

Lack of Standardization: There is no single standardized framework for environmental cost accounting. Different organizations adopt different methods based on their needs and capabilities. While frameworks such as EMA and GRI provide guidance, they do not offer uniform rules for cost measurement and allocation. This lack of standardization creates difficulties in benchmarking and reporting (Burritt et al., 2002). It also reduces the credibility of sustainability disclosures.

Data Availability and Quality: Environmental cost integration requires detailed data on material flows, energy consumption, emissions, and waste. In many organizations, such data is either unavailable or fragmented across departments. Poor data quality affects the accuracy of cost calculations and weakens decision-making. Collecting and managing environmental data also involves additional costs and technical expertise (Christ & Burritt, 2013).

Organizational Resistance: Resistance to change is a major barrier. Traditional accounting systems are deeply embedded in organizational structures. Shifting to sustainability-oriented accounting requires changes in processes, culture, and mindset. Managers may perceive environmental accounting as an additional burden rather than a strategic tool. Lack of awareness and training further limits adoption (Bennett et al., 2013).

High Implementation Costs: Implementing environmental accounting systems involves significant initial investment. Firms need to invest in new technologies, training programs, and data management systems. Small and medium enterprises face greater challenges due to limited financial and human resources. This restricts widespread adoption, especially in developing economies.

Difficulty in Allocating Environmental Costs: Allocating environmental costs accurately to products or processes is complex. Traditional costing methods often distribute costs uniformly, leading to distortions. Although Activity-Based Costing improves allocation, it requires detailed data and sophisticated systems. This increases implementation complexity and cost (Burritt et al., 2002).

Regulatory and Institutional Gaps: In many regions, regulatory frameworks for environmental accounting are weak or evolving. Lack of strict enforcement reduces the incentive for firms to adopt environmental cost integration. Institutional support, including professional guidelines and training, is also limited in some contexts. This slows the adoption of sustainability accounting practices (Qian et al., 2011).

Gap Between Reporting and Practice: Many firms focus on external sustainability reporting rather than internal cost integration. Environmental information is often disclosed in reports but not used in managerial decision-making. This disconnect reduces the effectiveness of sustainability initiatives. Bennett et al. (2013) highlight that integration into internal systems remains limited despite increased reporting.

These challenges indicate that while environmental cost integration is conceptually strong, practical implementation remains complex. Addressing issues related to measurement, standardization, and organizational readiness is essential for wider adoption.

6. Conclusion

This paper examined the integration of environmental costs into accounting systems within the context of sustainability. It establishes that traditional accounting approaches provide a limited view of organizational performance as they exclude environmental externalities. This omission leads to inaccurate cost assessment and weakens strategic decision-making.

The study highlights that sustainability costing frameworks such as Environmental Management Accounting, Life Cycle Costing, and Material Flow Cost Accounting offer practical mechanisms to incorporate environmental costs. These approaches enable firms to identify hidden costs, improve resource efficiency, and enhance operational performance. The proposed conceptual framework further explains that environmental cost integration contributes to firm performance both directly and indirectly through improved resource utilization.

The analysis also shows that the effectiveness of environmental cost integration depends on contextual factors. Regulatory pressure encourages firms to adopt sustainable accounting practices, while organizational capability determines the success of implementation. These factors play a critical role in translating sustainability initiatives into measurable outcomes.

A key insight is the gap between sustainability reporting and internal accounting practices. Many firms disclose environmental information externally but fail to integrate it into decision-making systems. Addressing this gap is essential for achieving meaningful sustainability outcomes.

Despite its contributions, the study recognizes challenges related to measurement, standardization, and data availability. These limitations highlight the need for methodological advancements and stronger institutional support.

The paper contributes to the literature by positioning environmental cost integration as a strategic tool that supports both sustainability and financial performance. It provides a structured framework that can guide future empirical research and practical implementation.

Future research should focus on empirical validation of the framework across industries and regions. There is also a need to develop standardized metrics and explore the role of digital technologies in enhancing environmental accounting practices.

7. Implications

Managerial Implications: The integration of environmental costs into accounting systems has direct relevance for managerial decision-making. Managers can move beyond traditional cost structures and incorporate environmental impacts into pricing, budgeting, and investment decisions. This improves cost accuracy and reduces the risk of underestimating production expenses. Environmental cost information helps managers identify inefficiencies in resource use. Firms can reduce waste, optimize energy consumption, and improve operational processes. This leads to cost savings and enhances productivity. Environmental Management Accounting tools also support better capital allocation by highlighting sustainable investment opportunities.

Another important implication is strategic alignment. Managers can integrate sustainability into core business strategies rather than treating it as a separate function. This strengthens competitive advantage and supports long-term value creation. Firms that adopt such practices are better positioned to respond to stakeholder expectations and market changes.

Policy Implications: The study highlights the need for stronger regulatory frameworks to promote environmental cost integration. Policymakers can introduce guidelines that encourage firms to internalize environmental externalities within accounting systems. Standardized reporting frameworks can improve comparability and transparency across industries. There is also a need for incentives to support adoption. Governments can provide tax benefits, subsidies, or financial support for firms implementing sustainable

accounting practices. Regulatory bodies can mandate disclosure of environmental costs to ensure accountability. Capacity building is equally important. Training programs and awareness initiatives can help organizations understand and implement environmental accounting methods. Policymakers can collaborate with academic and professional institutions to develop standardized tools and practices.

Theoretical Implications: The paper contributes to the advancement of sustainability accounting literature by integrating multiple theoretical perspectives. It extends stakeholder theory by demonstrating how environmental cost integration responds to stakeholder expectations. It also supports legitimacy theory by showing that firms adopt sustainable practices to maintain social acceptance. The framework further enriches Environmental Management Accounting literature by linking cost integration with firm performance through resource efficiency. This provides a clearer explanation of how environmental accounting influences organizational outcomes. The study also opens new avenues for theory development. Future research can integrate dynamic capabilities and institutional theory to better understand adoption patterns and performance variations.

Practical Implications for Industry: For practitioners, the study provides a structured approach to implementing environmental cost integration. Firms can adopt tools such as activity-based costing and life cycle costing to capture environmental impacts. Digital technologies such as data analytics can enhance accuracy and monitoring. Industries with high environmental impact, such as manufacturing and energy, can benefit significantly from these practices. By internalizing environmental costs, firms can improve compliance, reduce risks, and enhance sustainability performance. Small and medium enterprises may face challenges due to limited resources. However, simplified accounting tools and government support can facilitate adoption. Collaboration across supply chains can also improve environmental cost management.

8. Limitations and Future Research Directions

This study is conceptual in nature and does not include empirical validation. The proposed framework is derived from existing literature and theoretical synthesis. While this approach helps in theory building, it limits the ability to test causal relationships among variables such as environmental cost integration, resource efficiency, and firm performance. Another limitation relates to the reliance on secondary data. The study depends on published research from Scopus and Web of Science indexed journals. Although these sources ensure quality, they may not fully capture emerging practices in industries where sustainability accounting is still evolving. There is also a possibility of publication bias, as successful implementations are more likely to be reported. The measurement of environmental costs presents an additional constraint. Environmental costs often include intangible and external components such as ecosystem damage and social impact. These are difficult to quantify in monetary terms. The lack of standardized measurement frameworks affects comparability and limits the practical application of the proposed model. The framework does not account for industry-specific variations in depth. Different sectors face different environmental challenges and regulatory requirements. The general nature of the model may not fully reflect sectoral complexities, especially in industries such as energy, manufacturing, and services. Contextual limitations are also present. The study does not focus on a specific geographic region. Regulatory environments, institutional pressures, and organizational capabilities vary across countries. These differences may influence the applicability of the framework.

Future research should focus on empirical testing of the proposed conceptual framework. Quantitative studies using survey data or secondary datasets can examine the relationships between environmental cost integration, resource efficiency, and firm performance. Structural equation modelling can be used to test mediating and moderating effects. Longitudinal research is needed to assess the long-term impact of environmental cost integration. Such studies can provide insights into how sustainability practices influence firm performance over time. This will address the limitations of cross-sectional analysis found in existing literature. Sector-specific studies can enhance the applicability of the framework. Future research can examine industries such as manufacturing, energy, agriculture, and services separately. This will help identify unique challenges and best practices within each sector. Comparative studies across developed and developing economies can provide deeper insights. Differences in regulatory frameworks, institutional pressures, and resource availability can influence adoption. Such studies can contribute to global sustainability accounting literature. There is also significant scope for exploring the role of digital technologies. Future research can investigate how artificial intelligence, big data analytics, and blockchain improve environmental cost measurement and

reporting. These technologies can address issues related to data accuracy and transparency. Another important direction is the development of standardized environmental cost metrics. Research can focus on creating unified frameworks that improve consistency and comparability across firms. Collaboration between academia, industry, and regulatory bodies will be essential in this area. Finally, future studies can integrate additional theoretical perspectives such as dynamic capabilities and resource-based view. This can provide a deeper understanding of how firms build capabilities to implement sustainability accounting practices effectively.

REFERENCES:

1. Bebbington, J., Gray, R., Hibbitt, C., & Kirk, E. (2001). Full cost accounting: An agenda for action. *Certified Accountants Educational Trust*.
2. Bennett, M., Schaltegger, S., & Zvezdov, D. (2013). Exploring corporate practices in sustainability accounting and reporting. *Accounting, Auditing & Accountability Journal, 26*(4), 647–676.
3. Burritt, R. L., & Christ, K. L. (2016). Industry 4.0 and environmental accounting. *Asian Journal of Sustainability and Social Responsibility, 1*(1), 23–38.
4. Burritt, R. L., Hahn, T., & Schaltegger, S. (2002). Towards a comprehensive framework for environmental management accounting. *Australian Accounting Review, 12*(2), 39–50.
5. Christ, K. L., & Burritt, R. L. (2013). Environmental management accounting: The significance of contingent variables for adoption. *Journal of Cleaner Production, 41*, 163–173.
6. DiMaggio, P. J., & Powell, W. W. (1983). The iron cage revisited: Institutional isomorphism and collective rationality. *American Sociological Review, 48*(2), 147–160.
7. Elkington, J. (1997). *Cannibals with forks: The triple bottom line of 21st century business*. Capstone.
8. Freeman, R. E. (1984). *Strategic management: A stakeholder approach*. Pitman.
9. Gibassier, D., & Schaltegger, S. (2015). Carbon management accounting and reporting. *Sustainability Accounting, Management and Policy Journal, 6*(3), 340–365.
10. Gluch, P., & Baumann, H. (2004). *The life cycle costing (LCC) approach: A conceptual discussion of its usefulness for environmental decision-making*. Building and Environment, 39(5), 571–580.
11. Gray, R. (2010). Is accounting for sustainability actually accounting for sustainability and how would we know? *Accounting, Organizations and Society, 35*(1), 47–62.
12. Gray, R., Kouhy, R., & Lavers, S. (1995). Corporate social and environmental reporting. *Accounting, Auditing & Accountability Journal, 8*(2), 47–77.
13. Henri, J. F., & Journeault, M. (2010). Eco-control and organizational performance. *Accounting, Organizations and Society, 35*(1), 63–80.
14. IFAC. (2005). *International guidance document: Environmental management accounting*. International Federation of Accountants.
15. Jasch, C. (2003). The use of environmental management accounting for identifying environmental costs. *Journal of Cleaner Production, 11*(6), 667–676.
16. Qian, W., Burritt, R., & Monroe, G. (2011). Environmental accounting practices. *Accounting, Auditing & Accountability Journal, 24*(1), 93–128.
17. Reshi, Z. M., Saqib, N., & Nazir, H. (2025). Entrepreneurial orientation: A systematic literature review and future research. *Journal of Management History*, 1–34.
18. Saqib, N. (2021). Positioning–a literature review. *PSU Research Review, 5*(2), 141–169.
19. Saqib, N. (2023). Typologies and taxonomies of positioning strategies: A systematic literature review. *Journal of Management History, 29*(4), 481–501.
20. Schaltegger, S., & Burritt, R. (2010). Sustainability accounting for companies. *Journal of World Business, 45*(4), 375–384.
21. Schaltegger, S., Etxeberria, I. Á., & Ortas, E. (2017). Innovating corporate accounting and reporting for sustainability. *Sustainability Accounting, Management and Policy Journal, 8*(4), 527–546.
22. Suchman, M. C. (1995). Managing legitimacy. *Academy of Management Review, 20*(3), 571–610.