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Environmental Cost Management Accounting: A Study in Vietnamese Textile Enterprises

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Abstract

Environmental cost management accounting has become a key management tool for tracking and effectively managing environmental costs. This article focuses on the essence of environmental cost management accounting and the factors influencing its implementation in the Vietnamese textile industry. A survey was conducted on 356 garment enterprises in Vietnam using questionnaires. The findings indicate that, overall, the implementation of environmental cost management accounting

impacts the financial performance of these companies. The results suggest that promoting the adoption of environmental cost management accounting is crucial for enhancing the financial efficiency of Vietnamese textile enterprises. The article also offers several recommendations to encourage the increased practice of environmental cost management accounting, aiming for sustainable development.

Keywords: Environmental Cost, Environmental Cost Management Accounting, Institutional Theory, Stakeholder Theory, Random Theory

1. Introduction

Environmental protection is a reflection of a company's social responsibility, particularly for manufacturing enterprises that primarily consume raw materials and national resources while emitting pollutants and gases into the environment. Environmental protection and related information should be clearly presented within a company's management accounting system (MAS). Today's MAS goes beyond traditional bookkeeping and simple economic activity reporting; it also plays a crucial role in managing environmental protection.

Environmental Accounting and Reporting (EAR) has been garnering increasing attention and is recognized as an effective tool for environmental management. Over the past two decades, the application of EAR has become more evident, with its widespread adoption at a dizzying pace in some Asian countries (Bennett *et al.*, 2008). However, EAR organizations in Southeast Asian nations are still in their infancy, with relatively few resources available on the subject (Herzig, 2012). In Vietnam, EAR is considered a new field both in research and management practice. According to Jalil *et al.* (2016), industries in developing nations do not generally accept eco-friendly operations, which limits the motivation for environmental improvement or cleaner production as well as opportunities for research and practice in EAR. Therefore, researching EAR organization within Vietnamese manufacturing enterprises is essential to uncovering factors that may influence the implementation of EAR from the perspective of developing countries and within businesses.

Despite global trade tensions, Vietnam's economy continues to surge, with a robust GDP growth of 6.98% in Q2 2019. Foreign direct investment commitments to the country neared \$26.16 billion in the first nine months of 2019, equivalent to 77.7% of the same period in 2018. The Northern Provinces, comprising 25 provinces and cities with strategic locations and integrated infrastructure systems, are becoming hotspots for investors. The production value of this region is significant, and according to government reports, the Northern Key Economic Region's average GRDP growth rate for the three-year period from 2016–2018 reached 9.08%, the highest among the four regions and surpassing the target set in Decision No. 198 for the entire 2016–2020 period (9%). The Northern Provinces are major economic growth areas of the country, home to numerous economic centers and industrial zones where business activities substantially impact the environment. Comprehensive environmental management is an essential need for businesses operating there.

According to the United Nations Division for Sustainable Development (UNSD, 2001) [15] and the International Federation of Accountants (IFAC, 2005) [8], the traditional accounting systems currently used by businesses, industries, and even at the

national level only account for the direct costs associated with producing goods and services. They fail to fully or clearly account for environmental costs and the ecological impacts of economic activities. Therefore, information on environmental costs in manufacturing enterprises, especially those in Northern Vietnam, plays an incredibly vital role in helping managers control costs to offer affordable products, diversify product structures, and produce eco-friendly goods, all aimed at sustainable development and improving operational efficiency. Currently, information on environmental costs is only compiled for reporting purposes to regulatory bodies as required and is not widely used for managerial decision-making. Consequently, this information is not adequately gathered, accounted for, or analyzed. This highlights the need for businesses to properly focus on environmental cost accounting to obtain complete and accurate information that serves the management of their business operations.

For many years, the textile industry has been a "pioneer" in Vietnam's export strategy, introducing its products to the global market and earning the country a substantial amount of foreign currency. The Vietnamese textile sector has achieved a relatively high export growth rate.

In 2021, the textile industry's export turnover reached \$40.3 billion, a 15.2% increase from 2020. Out of this, FDI enterprises contributed \$24.3 billion, up by 17.8% from the previous year and accounting for 60.3% of the country's total textile and garment export value. However, this sector also has environmental impacts. Implementing environmental cost management in businesses can influence their financial performance.

The article explains the theory behind environmental cost management accounting and how it affects the financial efficiency of textile manufacturing businesses. It also talks about the research methodology, the study results at Vietnamese textile companies, and what the results mean. Finally, it gives several suggestions for state regulatory bodies, managers, and other interested parties.

2. Research Overview and Theoretical Framework

2.1 Research Overview

Since its emergence in 1970, when the environmental information and potential of management accounting were explored, it has marked a turning point for the development of environmental cost management accounting. Studies on how to implement this kind of accounting have been quite limited. However, experiences and initiatives have shown that environmental costs can be significant, and reducing these costs through proper management activities can boost profits. Documentation from projects in the Netherlands, the UK, and other countries indicates that environmental costs can account for as much as 19%–20% of total costs. Research also highlights that cost-saving opportunities can increase profits by reducing environmental impacts and managing and preventing pollution (Bartolomeo *et al.*, 1999^[2]; Jasch, 2003).

In the 21st century, environmental cost management accounting has garnered significant attention as a series of environmental pollution impacts have led to serious financial consequences for organizations. Numerous publications by international organizations and professional bodies, such as "Environmental Management Accounting: Procedures and Principles" (UNSD, 2001)^[15] and "International Guidance Document: Environmental

Management Accounting" (IFAC, 2005)^[8], have served as a guide for governments and organizations in various nations to use environmental cost management accounting and comprehend the financial advantages it offers. Yuriko Nakao and colleagues (2007) highlight this shift towards a positive relationship where good financial circumstances can provide more resources to boost environmental activities. Synthesizing these findings, it's evident that while the trend of building sound finances to improve environmental activities has been long-standing, the trend where good environmental practices enhance financial performance is a relatively recent phenomenon. In recent times, the mutual influence in both directions has become clear, indicating that at the corporate level, a positive two-way relationship between the environment and the economy is starting to materialize (Yuriko Nakao *et al.*, 2007).

In Vietnam, research on environmental cost management accounting has only touched upon certain aspects of the field and technical implementation issues. It evaluates factors influencing the application of environmental cost management accounting in specific industries, such as brick manufacturing (Lê Thị Tâm, 2017)^[10], steel production (Nguyễn Thị Nga, 2017), and oil processing (Nguyễn Thị Bích Ngọc, 2017)^[14].

Studies on environmental cost management, accounting, and financial performance are scarce. Recent research has highlighted the potential financial benefits organizations can reap by implementing environmental cost management accounting. Tran La Bac (2010) evaluated the environmental efficiency of seafood processing enterprises, while Le Thi Tam (2017) also pointed out benefits for entities practicing environmental cost management accounting, such as aiding in accurate product costing and pricing, generating useful information for strategic decisions, controlling and saving costs, assisting in investment project appraisal, evaluating environmental effectiveness, and enhancing corporate image. Consequently, this helps organizations improve their financial performance. However, previous studies have only raised the issue without actually testing the relationship between environmental cost management accounting and financial performance; hence, this article aims to fill that gap by validating the said relationship.

2.2 Theoretical Foundation

Environmental Cost Management Accounting

Many authors have highlighted the increasingly significant role of environmental cost management accounting. It's a part of environmental accounting that deals with processing and providing information about environmental costs to serve the management functions within a company. Environmental cost management accounting can pinpoint actual costs more accurately by clarifying the environmental impacts arising from material procurement and processing, production, business operations, distribution, usage, maintenance, and disposal.

Financial Efficiency

Financial efficiency is the economic effectiveness within a company, reflecting the relationship between the economic benefits it receives and the costs it incurs to achieve those benefits. As Pham Thi Kieu Trang (2017) suggests, "Financial efficiency is an economic category that reflects the benefits gained through a company's business activities."

In finance, financial efficiency is measured by assigning management responsibility to the management team on behalf of shareholders. This critical issue involves measuring the profit, market value, and growth potential of a company. Financial performance is often used as an indicator to assess a company's financial health over a certain period of time. Financial efficiency is measured by various metrics, depending on the purpose of the research. However, three commonly used measures by researchers are: ROA (Liargovas and Skandalis, 2008; McGuire *et al.*, 1988^[12]; Russo and Fouts, 1997; Stanwick and Stanwick, 2000; Tarawneh, 2006; Agiomirgiannakis *et al.*, 2006); ROE (Liargovas and Skandalis, 2008; Konar and Cohen, 2001); and ROS (Hart and Ahuja, 1996; Liargovas and Skandalis, 2008). These metrics are widely used globally due to their ease of calculation. In this study, financial efficiency is measured using ROA, ROE, and ROS indicators. Return on assets (ROA) is widely used by market analysts as a measure of a company's operational effectiveness because it generates income. Return on equity (ROE) measures how effectively a company operates relative to shareholder investments. Return on Sales (ROS) indicates how much net profit is made from each dollar of net sales revenue during a period, reflecting a company's ability to produce low-cost products or sell at high prices. Revenue growth can be seen as a sign of a company's expansion and also as a competitive strategy that businesses continuously pursue. A company that grows sustainably with the environment, differentiating its products, can thereby increase its revenue. Similarly, a company can cut costs on resources, management, capital, and labor to boost its profits.

The Stakeholder Theory

Theo Clarkson (1995)^[5] argued that when businesses are responsible for their stakeholders, it leads to sustainable benefits for the company. The stakeholder theory, combined with environmental cost management accounting, has demonstrated that this approach impacts financial performance. This topic has garnered attention and research over the past few decades (Marom, 2006)^[11]. Business production activities are increasingly focused on environmental protection. Companies are encouraged to integrate environmental actions into their business strategies. Many advocates for environmental initiatives have tried to show that such actions lead to improved financial efficiency. Researchers in this field have investigated environmental cost management accounting and corporate financial performance. Stakeholder theory is the primary framework used to test the relationship between environmental cost management accounting and financial effectiveness. Although studies vary in perspective, they all closely resemble each other and address the same issue: ethical business behaviors towards stakeholders concerned with environmental issues positively influence corporate wealth.

The Theory Focuses on the Relationship between Environmental Cost Management Accounting and Financial Efficiency

Previous research has yielded inconsistent results regarding the relationship between a company's environmental performance and its financial effectiveness (Vance, 1975; Bowman, 1975; Cochran & Wood, 1984^[4]). White (1991)

suggests that whether social or environmental mutual funds perform well financially may be more closely tied to the stock-picking skills of fund managers than to whether companies are environmentally conscious or not. Bragdon & Marlin (1972) and Spicer (1978) found a significant correlation between the environmental performance of companies in the paper and pulp industry and their financial performance. More recently, Erfle and Fratantuono (1992) concluded that environmental performance has a positive impact on companies and is significantly correlated with returns on assets, equity returns, and investment returns. Companies that regularly and effectively assess their environmental impact often have more opportunities to reduce and control costs, gain a competitive edge, and therefore enhance their financial performance. Of course, the company's operational costs are higher for pollution control. There are several reasons why previous authors might have found contrary results, not least of which is that most of their samples were quite small. This paper doesn't compare the financial performance of companies; it doesn't question whether environmental regulations bankrupt a business, but whether effective environmental operations correlate with financial efficiency within a company. Hence, the author proposes the following hypothesis:

H1: There's a positive relationship between environmental cost management accounting and financial performance.

From this, we've developed the following research model:



Source: Compiled by the author team

Fig 1: Research Model

3. Research Methodology

3.1 Research Sample

The study employed a descriptive research design to determine the impact of environmental cost management accounting on the financial operations of manufacturing companies in Northern Vietnam. A sample size of 323 participants was drawn from the finance departments, including chief accountants, financial directors, accounting staff, heads of environmental units, specialists, and environmental technicians from 323 manufacturing enterprises in the region.

The study employed a stratified sampling design, as accountants and environmental technicians have different roles, ensuring a fair representation of the sample. The sample for this research was limited to the finance and environmental departments of each surveyed company. Simple random sampling technique was used to identify the necessary participants for the study. A structured questionnaire was utilized to collect primary data. The study used a quantitative research methodology.

3.2 Data Analysis Method

The research method used in the article is quantitative, employing SPSS22 and AMOS software to measure the relationship between the degree of Environmental Cost Management Accounting (ADMT) application and financial effectiveness (HQTC) among manufacturing enterprises in Northern Vietnam. The sample includes 323 manufacturing businesses from the region. Primary data was collected through surveys using a questionnaire. A 5-point Likert

scale ranging from 1 to 5 corresponds to levels from 1 - not applied at all, to 5-fully applied. The scale for applying Environmental Cost Management Accounting was adapted and modified from Jalaludin & colleagues' study (2011) ^[9] (Table 1).

Primary data was collected through a survey using a 5-point Likert scale ranging from 1 (much lower) to 5 (much higher). The financial effectiveness scale includes 3 observed variables, adopted from the research by Mirsha and Suar (2010) (Table 1).

Table 1: Encoding scale table

STT	Factor	Indicator/Observed variable	Encoding	Theoretical foundation	Scale	Origin
1	Environmental cost management accounting	1.Environmental cost information	ADMT1.	Lý theory the parties related stakeholders	Likert scale from 1 being not implemented at all to 5 being very well implemented.	Jamil <i>et al</i> (2015), (Nguyen Thi Nga, 2017)
		2. Methods for determining	ADMT2			Jamil and associates (2015)
		3. Estimating environmental costs	ADMT3			Jamil and associates (2015)
		4. Environmental cost reporting	ADMT4			Jamil and associates (2015)
		5. Assessing environmental effectiveness	ADMT5			Jamil and colleagues (2015)
		6. Using environmental cost information in decision-making	ADMT6			Jamil and associates (2015)
2	Financial efficiency	1. Asset profitability (ROA)	HQTC1			Mirsha and Suar (2010)
		2. Return on Equity (ROE)	HQTC2			Mirsha and Suar (2010)
		3. Net Profit Margin (ROS)	HQTC3			Mirsha and Suar (2010)

Source: Compiled by the author's team

The survey results were analyzed using Cronbach's Alpha to measure the reliability of the scale. Exploratory Factor Analysis (EFA) was conducted to validate the scale's value, allowing us to determine the weights of the observed variables for comparison, and to decide whether to eliminate or retain them in the study. Regression analysis was performed to prove the proposed hypotheses.

4. Research Findings

4.1 Operating Duration

From Table 2, 61% of the businesses have been operating in the manufacturing sector for over 10 years, 33% for 5 years, and 6% for less than 5 years. The gathered information indicates that most companies have been around long enough to provide reliable insights into the field of study. Therefore, the research data is trustworthy.

Table 2: Statistics on the number of years businesses have been operating

Years of Operation	Frequency	Rate (%)
Under 5 years	19	6
From 5 to under 10 years	106	33
For 10 years or more	198	61
Total	323	100

Source: Compiled by the author's team

4.2 Age of Respondent

A frequency distribution table is used to describe the age distribution of the respondents as shown in Table 3. Table 3 reveals that the majority of respondents fall within the working age range of 20 to under 50 years old, accounting for 66% of those surveyed, with 29% being 50 and older, and a mere 5% under the age of 20.

Table 3: Age Distribution of Respondents

Age	Frequency	Rate (%)
Under 20 years old	15	5
Ages 20-29	18	6
Ages 30-39	29	9
Ages 40-49	116	36
Ages 50-59	52	16
Age 60 and above	93	29
In total	323	100

Source: Compiled by the author group

4.3 The Financial Performance of the Company

Assessing the overall financial performance from findings in Table 3, it's evident that most employees rate their company as average or slightly above average in financial efficiency. Indeed, the majority of respondents have a positive perception of the financial effectiveness of manufacturing enterprises in Northern Vietnam. The results indicate that, in the eyes of employees and managers, the financial performance of business organizations is generally in good shape. Even when analyzing individual financial parameters, it appears that revenue generation is improving, cash flow is considered healthy, and profitability is on the rise. After controlling for traditional variables thought to explain corporate-level financial efficiency, Richard P and colleagues (2008) found that poor environmental performance correlates positively with a company's intangible value. Environmental performance is argued to go hand-in-hand with commercial performance according to Konar S and Cohen MA (2001). However, there's scant evidence due to the inaccessibility of most organizations' financial reports.

Table 4: Financial Performance of the Company

Performance targets	Average	Standard deviation
1. Return on Assets (ROA)	3.2105	1.03612
2. Return on Equity (ROE) potential	3.1424	1.08555
3. Profit margin on net sales (ROS)	3.6068	1.04416
6. Overall assessment of financial efficiency	3.4501	1.07656

Source: Compiled by the author's team

The analysis results show that the average score for "financial effectiveness" is 3.4501 with a standard deviation of 1.07656. The findings indicate that financial effectiveness is rated as moderately good. The highest-rated indicator is "Return on Sales (ROS)" (Mean = 3.6081; SD = 1.104416), while the lowest-rated is "Return on Equity (ROE)" (Mean = 3.1424; SD = 1.08555).

4.4 The Relationship Between Environmental Cost Management Accounting and Financial Performance

4.4.1 Reliability Results of the Scale

Table 5: Reliability of the Scale

	The average scale if the variable is removed	The variance scale if the variable is removed	Correlation of variables – Total	Cronbach's Alpha if the variable is removed	Cronbach's Alpha coefficient
Implementing environmental cost management accounting					
ADMT1	19.6935	8.344	.630	.865	.877
ADMT2	19.6161	8.070	.730	.848	
ADMT3	19.6068	8.010	.755	.844	
ADMT4	19.4861	8.474	.674	.858	
ADMT5	19.6440	7.913	.710	.851	
ADMT6	19.4923	8.201	.609	.870	
Financial efficiency					
HQTC1	7,3591	4,293	,850	,906	.931
HQTC2	7,2817	4,128	,879	,883	
HQTC3	7,3220	4,542	,847	,909	

Source: Data processing results using SPSS software

The reliability analysis results of the scale show that the composite Cronbach's Alpha coefficient for the variables is relatively high. The ADMT variable is at 0.877 and HQTC is at 0.931. All observed variables included in the analysis have relatively good indices. The correlation coefficient for the total variable of the observed variables is greater than 0.3, indicating that all observed variables are meaningful for factor analysis.

4.4.2 Factor Analysis Results

Table 6: Factor analysis results of dependent variables

KMO and Bartlett's Test		
Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.762
Bartlett's Test of Sphericity	Approx. Chi-Square	788,718
	df	3
	Sig.	,000

Source: Data processing results using SPSS software

Table 7: Factor rotation matrix

The matrix revolves around dependent factors.		
Observational variables.	Factor.	
	1	2
HQTC3	.855	
HQTC1	.802	
HQTC2	.779	
ADMT3		.813
ADMT2		.799
ADMT5		.765
ADMT4		.718
ADMT1		.687
ADMT6		.650

The extraction method used is Principal Axis Factoring.
 Rotation method: Promax with Kaiser Normalization.
 Hệ số KMO = 0,877, Bartlett's Test of Sphericity = 0,000
 The total extracted variance is 62.372.

Source: Data processed using SPSS software

Analyzing the dependent variable with 9 observed variables, we find a KMO coefficient of 0.762, which is greater than 0.5, indicating that exploratory factor analysis is suitable; Bartlett's test shows significance < 0.05 (0.000), with a total variance extracted of 62.372% > 50%, confirming that EFA analysis is appropriate. The Eigenvalues coefficient is 3.742 > 1, meaning that at the cutoff score of 3.742, the factors

explain 62.372% of the data variability (see appendix for Eigenvalues citation). The loading factors for all observed variables are >0.5 for both independent and dependent variables, ensuring the practical significance of the EFA test.

4.4.3 The Audit Results Reveal the Correlation Between

Table 8: The correlation between environmental cost management accounting and financial performance

The relationship back and forth	Mean	The average difference	Correlation two variables		t-test	
			r	Significance level	t	The level of significance
ADMT	3.9365	0.50000	.250	.045	8.320	.000
HQTC	3.4365					

Source: Data processed using SPSS software

The audit results reveal a connection between the two variables: the implementation of environmental cost management accounting and financial performance, with an impact level of 0.250, which is considered moderate. This means that applying environmental cost management accounting can influence financial effectiveness, and conversely, strong financial performance gives companies a better chance to enhance their environmental cost management accounting practices, especially in manufacturing enterprises in Northern Vietnam. These findings align with research on the relationship between environmental techniques, environmental cost management accounting, and financial performance by scholars like Stefan Schaltegger and colleagues (2002), Magara and colleagues (2015), and Đỗ Thị Lan Anh (2022).

4.4.4 SEM Analysis Results

The impact of environmental cost management accounting on financial performance is presented in Table 8 as follows:

Table 9: SEM analysis results of the impact of environmental cost management accounting on financial performance

Change	Unstandardized Beta coefficient	Standardized Beta coefficient	S, E	C, R	P	Model explanatory level	Impact ranking
HQTC - ADMTC	.588	.439	.086	6.86	**	19,3%	

Source: Author's data analysis results using AMOS software

According to Table 9, the model applying environmental cost management accounting explains 19.3% of the variance in financial performance. This means that Northern Vietnamese manufacturing companies that effectively implement environmental cost management accounting contribute positively to their financial performance.

5. Discussion of Research Findings and Recommendations

5.1 Let's Discuss the Research Findings

The study concludes that there's a significant and positive relationship between the variables examined, with the level of environmental cost management accounting being notably and positively linked to the financial performance of manufacturing firms in Northern Vietnam. So, this suggests

that these factors have a positive impact on the companies' financial operations.

5.2 Recommendations

The research suggests that:

1. Business organizations should use experts and technicians to enhance periodic environmental assessments (for example, twice a year) to monitor environmental activities. In addition, there needs to be more connection between the environmental management department and the unit's accounting department so that environmental cost management accounting reports are fully prepared.
2. Companies need to keep up with the regulatory frameworks set by governments and regulatory bodies. Doing so ensures that they invest in improving their environmental operations quicker and earlier than their competitors, thereby enjoying the advantage of faster compliance.

6. References

1. Aras GAA, Kutlu O. Managing corporate performance Investigating the relationship between corporate social responsibility and financial performance in emerging markets, *International Journal of Productivity and Performance Management*. 2010; 59:220-254.
2. Bartolomeo M, Bennett MD, Bouma JJ, Heydkamp P, James P, de Walle FB, Wolters TJ. *Eco-Management Accounting*, Kluwer Academic Publishers, Dordrecht, 1999.
3. Burritt RL, Herzig C, Tadeo BO. Environmental management accounting for cleaner production: The case of a Philippine rice mill, *Journal of Cleaner Production*. 2009; 17:431-439.
4. Cochran PL, Wood RA. Corporate Social Responsibility and Financial performance. *The Academy of Management Journal*. 1984; 27(1):42-56.
5. Clarkson. A framework for analyzing and evaluating corporate social performance. *The Academy of Management Review*. 1995; 20:571-610.
6. Đỗ Thị Lan Anh discussed the impact of contingency theory on the application of environmental cost management accounting in businesses in her 2020 article for the *Finance Magazine*. issue number 737 (September period 2), on pages 67-72.
7. Hồ Thị Vân Anh's 2018 doctoral dissertation at Ho Chi Minh City University of Economics delves into the social responsibility and financial efficiency of listed companies.
8. IFAC. *International Guidance Document: EMA*, International Federation of Accountants, New York, 2005.
9. Jalaludin D, Sulaiman M, Ahmad NNN. Understanding Environmental Management Accounting (EMA) Adoption: A New Institutional Sociology Perspective, *Social Responsibility Journal*. 2011; 7(4):540-557.
10. In 2017, Lê Thị Tâm tackled the topic of environmental cost management accounting in Vietnamese brick manufacturing enterprises. Her doctoral thesis is a must-read at the National Economics University.
11. Marom. Toward a unified theory of the CSP-CFP link. *Journal of Business Ethics*. 2006; 67(2):191-200.
12. McGuire. Corporate Social Responsibility and Financial performance. *The Academy of Management Journal*. 1988; 21:854-872.
13. Supriti Mishra, Damodar Suar. Does Corporate Social Responsibility Influence Firm Performance of Indian Companies. *Journal of Business Ethics*. 2010; 95(4):571-601.
14. Nguyễn Thị Bích Ngọc delved into environmental cost management accounting within petroleum processing enterprises of Vietnam's National Oil and Gas Group in her 2017 doctoral thesis. Her work is showcased at the National Economics University.
15. UNDS. *Environmental Management Accounting: Procedures and Principles*, United Nations Division for Sustainable Development, New York, 2001.