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Studying the Relation between Environmental Cost Management Accounting and Financial Performance at Manufacturing Enterprises in the Northern Region of Vietnam

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Abstract

Environmental cost management accounting has become a handy tool for managers to track and manage environmental costs effectively, contributing to enhancing the financial performance of businesses. This article focuses on the relationship between environmental cost management accounting and the financial effectiveness of manufacturing businesses in Northern Vietnam. A survey was conducted on 323 manufacturing businesses in Northern Vietnam using questionnaires and regression models. The results show that the overall financial performance of these businesses is in good shape. Analysis of financial performance parameters

indicates that revenue generation and profitability have improved, profit-making ability is on the rise, and a general perception that environmental cost management accounting is well-practiced leads to increased revenue, profits, and better financial performance. The structures of implementing environmental cost management accounting have a positive and significant impact on the financial effectiveness of businesses. The results imply that promoting the application of environmental cost management accounting is a prerequisite for enhancing the financial effectiveness of businesses in Northern Vietnam.

Keywords: Environmental Cost, Environmental Cost Management Accounting, Financial Efficiency, Stakeholder Theory

1. Introduction

The activities of businesses have had and continue to have serious consequences for the environment, depleting resources and causing climate change. The ripple effects are massive as nations and the world at large are spending a lot to manage waste, emissions and mitigate the impacts of tsunamis and global warming. Therefore, green growth is not just a trend but also a top strategy and national policy to ensure sustainable economic and social development.

To meet the pressures of reducing environmental impact in business operations, we need new techniques that help managers integrate environmental information into accounting reports. Environmental cost management accounting is a key tool in assisting businesses to control environmental costs, boost economic efficiency, and aim for sustainable development (Burritt & colleagues, 2009) [3]. Implementing environmental cost management accounting will help businesses standardize their operations, conserve natural resources, and lessen their environmental impact. This, in turn, enhances the financial performance of the business.

The financial effectiveness of a business is incredibly important. It's the foundation of a company's business reproduction process. Good financial health positively impacts the production process, while weak finances can hinder it. Therefore, high financial effectiveness is a long-term strategic goal for most businesses in general and manufacturing businesses in Northern Vietnam in particular. Currently, there aren't many studies evaluating the impact of implementing environmental cost management accounting on a company's financial effectiveness.

The article presents the theoretical basis and an overview of studies on the relationship between the application of environmental cost management accounting and financial efficiency. It discusses research methods and results from manufacturing enterprises in Northern Vietnam, debates the findings, and offers some recommendations for government regulatory bodies, managers, and other relevant parties.

2. Literature Review and Rationale

Literature Review

Ever since its emergence in 1970, when the environmental information and potential of management accounting were discovered, it marked a turning point for the development of environmental cost management accounting. There's limited research on how to implement environmental cost management accounting. Some experiences or initiatives have shown that environmental costs can be significant, and reducing these costs through appropriate management activities can boost profits. According to documents from some projects in the Netherlands, the UK, and some other countries, environmental costs can account for up to 19%-20% of total costs. Studies also show that cost-saving opportunities can increase profits by reducing environmental impacts and managing and preventing pollution (Bartolomeo & colleagues, 1999^[2]; Jasch, 2003).

In the 21st century, environmental cost management accounting has garnered significant attention as a series of environmental impacts have resulted in severe financial consequences for organizations. Numerous documents have been published by international agencies and professional organizations such as "Environmental Management Accounting: Procedures and Principles" (UNSD, 2001)^[20], and "International Guidance Document: Environmental Management Accounting" (IFAC, 2005)^[8]. These serve as a guide for governments and organizations in various countries to practice environmental cost management accounting and understand the financial benefits it brings. This leads to a positive shift where good financial conditions can provide more abundant resources to boost environmental activities (Yuriko Nakao *et al.*, 2007). Summing up these results, one can conclude that while the trend of building good finances to improve environmental activities has long existed, the trend where good environmental activities can improve financial operations is a relatively recent phenomenon. In recent stages, mutual influences in both directions have become clear, a result that shows that at the corporate level, the positive two-way relationship between the environment and the economy is starting to become a reality (Yuriko Nakao *et al.*, 2007).

In Vietnam, studies on environmental cost management accounting have only explored certain aspects of it, along with the technical issues involved, and evaluated the factors influencing its implementation in various industries, such as brick manufacturing (Le Thi Tam, 2017)^[10], steel (Nguyen Thi Nga, 2017)^[14], and petroleum processing (Nguyen Thi Bich Ngoc, 2017)^[14].

There's not a lot of research out there on environmental cost management accounting and financial efficiency. Recent studies have only just started to highlight the potential financial benefits for organizations that implement environmental cost management accounting. For instance, Tran, L.B. (2010)^[19] evaluated environmental efficiency in seafood processing businesses, while Le, T.T. (2017)^[10] pointed out the benefits for units implementing environmental cost management accounting, like helping to allocate and price products accurately, providing useful information for strategic decisions, controlling costs and saving money, assisting in investment project appraisal, evaluating environmental efficiency and enhancing corporate image. All of this helps organizations boost their financial efficiency. However, previous studies have only raised the issue without actually testing the relationship

between environmental cost management accounting and financial efficiency. So, this article aims to test that relationship and fill in the gap in our knowledge.

Rationale

Environmental Cost Management Accounting

Environmental cost management accounting is increasingly being discussed by many authors due to its growing role. It's a part of environmental accounting, handling and providing information about environmental costs to serve management functions in businesses. Environmental cost management accounting can more accurately determine actual costs by clarifying the environmental impacts of purchasing and processing materials, production, business, distribution, usage, maintenance, and disposal.

Financial Efficiency

Financial efficiency is the economic effectiveness within the scope of a business, reflecting the relationship between the economic benefits a business receives and the costs it incurs to achieve those benefits. As Pham, T.K.T. (2017)^[18] puts it, "Financial efficiency is an economic concept that reflects the benefits achieved through a business's operations." In finance, financial efficiency is measured by delegating management responsibilities to shareholders. This crucial aspect relates to measuring profits, market value, and the growth potential of a business. Financial performance is often used as an indicator to assess a company's financial status over a certain period. Financial efficiency is measured by various metrics depending on the research purpose. However, three commonly used metrics by researchers are: ROA (Liargo-vas 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 worldwide due to their ease of calculation. In this study, financial efficiency is measured by ROA, ROE, and ROS indicators. The Return on Assets (ROA) is widely used by market analysts as a measure of a company's operational efficiency as it generates income. The Return on Equity (ROE) measures a company's operational efficiency in relation to shareholder investment. The Return on Sales (ROS) indicates how much after-tax profit each dollar of net revenue generates during the period, reflecting the ability of a business to produce low-cost products or sell at high prices.

Boosting revenue can be seen as a growth indicator for a business and also as a competitive strategy for successive companies. A company that grows sustainably with the environment creates a unique edge for its products and thus increases its revenue. Similarly, a company can save on resources, management costs, capital, and labor, thereby increasing its profits.

Stakeholder Theory

Theo Clarkson (1995)^[5] proposed that businesses that are responsible for their stakeholders can reap sustainable benefits. The theory of stakeholder engagement, combined with environmental cost management accounting, has shown that such accounting impacts financial efficiency. This topic has been of interest and has been researched over the past few decades (Marom, 2006)^[11]. Business operations are increasingly concerned with environmental protection.

Companies are encouraged to incorporate environmental activities into their business strategies. Many environmental advocates have tried to demonstrate that these activities lead to improved financial efficiency. Researchers in this field have investigated environmental cost management accounting and business financial efficiency. Stakeholder theory is used as the main theory to test the relationship between environmental cost management accounting and financial efficiency. While these studies may have different perspectives, they all tackle the same issue: ethical business behaviors towards stakeholders concerned with environmental issues positively impact a company's wealth.

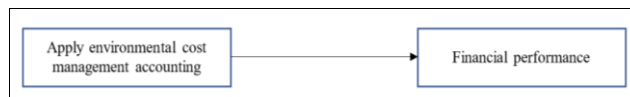
The Hypothesis on the Relationship between Environmental Cost Management Accounting and Financial Efficiency

Previous research results have shown inconsistent findings on the relationship between a company's environmental performance and its financial effectiveness (Vance, 1975; Bowman, 1975; Cochran & Wood, 1984) [4]. White (1991) suggested that whether social/environmental funds perform well financially might be more related to the fund managers' stock-picking abilities than whether the companies are environmentally conscious or not. Bragdon & Marlin (1972) and Spicer (1978) found a significant correlation between a company's environmental activities in the pulp and paper industry and its financial performance. More recently, Erfle and Fratantuono (1992) concluded that the effectiveness of environmental activities for companies is positive and significantly correlated with asset returns, equity returns, and investment returns.

Businesses that regularly and effectively conduct environmental assessments have more opportunities to reduce and control costs, gain a competitive edge, and thereby enhance their financial performance. Of course, the company's operating costs are higher for pollution control. There are many reasons why previous authors might have found the opposite results, not least of which is that most of their samples were quite small. This paper does not compare the financial performance between businesses, the author does not ask whether environmental regulations exhaust a business or not, but whether effective environmental activities are related to financial performance in a business or not. Therefore, the author proposes the following hypothesis:

There's a positive relationship between environmental cost management accounting and financial efficiency.

From this, we have the following research model:



Source: Compiled by the author team

Fig 1: Research Model

3. Research Method

Research Sample

The study uses a descriptive research design to determine the impact of environmental cost management accounting on the financial operations of manufacturing businesses in Northern Vietnam. The sample size for the study is 323 individuals from the finance department, including chief accountants, finance directors, accountants, heads of environmental departments, specialists, and environmental technicians in 323 manufacturing businesses in Northern Vietnam.

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 study was confined to the finance and environmental departments of each surveyed business. A simple random sampling technique was used to identify those needed for the study. A structured questionnaire was used to collect primary data. The study utilized a quantitative research method.

Data Analysis Method

The research method used in this article is quantitative, utilizing SPSS22 and AMOS software to measure the relationship between the degree of application of environmental cost management accounting (ADMT) and financial efficiency (HQTC) in manufacturing enterprises in Northern Vietnam. The sample includes 323 manufacturing enterprises from this region. Primary data was collected through a survey questionnaire. A 5-point Likert scale was used, with levels ranging from 1 to 5, corresponding from 1- not applied at all to 5- fully applied. The scale for applying environmental cost management accounting was inherited and adjusted from the research of Jalaludin & colleagues (2011) [9] (Table 1).

Primary data was collected from a survey using a questionnaire. A 5-point Likert scale was used, with levels ranging from 1 to 5, corresponding from 1- much lower to 5- much higher. The financial effectiveness scale includes three observed variables inherited from the research of Mirsha and Suar (2010) [13] (Table 1).

Table 1: Scale coding table

Number	Factor	Indicator/Observation Variable	Encoding	Theoretical Basis	Scale	Source
1	Environmental Cost Management Accounting	Environmental cost information	ECMA1	Theory Hypothesis Various Next to Connect Related	Likert scale from 1 being not implemented at all to 5 being very well implemented	Jamil et al (2015), (Ng,.N.T, 2017)
		2. Method of Determining Environmental Costs	ECMA2			Jamil et al (2015)
		3. Estimate environmental costs	ECMA3			Jamil et al (2015)
		4. Environmental cost report	ECMA4			Jamil et al (2015)
		5. Evaluate environmental effectiveness	ECMA5			Jamil et al (2015)
		6. Using environmental cost information in decision making	ECMA6			Jamil et al (2015)
2	Financial Performance	1. Asset Profitability (ROA)	FP1			Mirsha and Suar (2010) [13]
		2. Profitability of Shareholder's Capital (ROE)	FP2			Mirsha and Suar (2010) [13]
		3. Profit rate on net revenue (ROS)	FP3			Mirsha and Suar (2010) [13]

Source: Compiled by the author team

The survey results are analyzed using the Cronbach’s Alpha coefficient to measure the reliability of the scale. Exploratory factor analysis (EFA) is used to validate the scale’s value, allowing us to draw weights for observed variables for comparison deciding whether to eliminate or retain them in the study. Regression analysis is conducted to prove the proposed hypotheses.

4. Result

4.1 Operating Hours

From Table 2, 61% of businesses have been operating in the manufacturing sector for over 10 years, 33% for 5 years, and 6% for less than 5 years. The collected data suggests that most businesses have been around long enough to provide reliable information about the research field. Therefore, the study’s 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
From 10 years and above	198	61
Total	323	100

Source: Compiled by the author team

4.2 Age of the Respondent

A frequency distribution table is used to describe the age distribution of those surveyed as presented in Table 3. Table 3 shows that the majority of respondents are in the working age range of 20 to under 50 years old, accounting for 66% of those surveyed. 29% are over 50 years old and only 5% are under 20.

Table 3: Age statistics of respondents

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

Source: Compiled by the author team

4.3 The Financial Effectiveness of the Business

Evaluating the overall financial performance from the findings in Table 3, it’s clear that most employees rate their company as average or slightly above average in terms of financial effectiveness. The evidence shows that most of those asked have a positive perception of the financial effectiveness of manufacturing businesses in Northern Vietnam. The results indicate that the financial performance of business organizations in general is perceived as good by employees and managers. Even when analyzing financial performance metrics based on individual assessments, it’s evident that revenue generation is improving, cash flow is considered to be in a good state, and profitability is increasing. After controlling for traditional variables thought to explain company-level financial effectiveness, Richard P and colleagues (2008) found that poor environmental performance correlates 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). There’s very little evidence because access to the financial reports of most organizations and businesses is not possible.

Table 4: Financial Efficiency of the Company

Evaluation criteria	Average	Standard deviation
1. Asset profitability (ROA)	3.2105	1.03612
2. The profitability of equity capital (ROE)	3.1424	1.08555
3. Profit rate on net revenue (ROS)	3.6068	1.04416
General 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 efficiency" is 3.4501 with a standard deviation of 1.07656. The results indicate that financial efficiency is rated at a fairly average level. Among them, the highest-rated indicator is "Return on Sales (ROS)" (Mean = 3.6081; SD = 1.104416) and the lowest-rated for the scale is "Return on Equity (ROE)" (Mean = 3.1424; SD = 1.08555).

4.4 The Relationship between Cost Accounting for Environmental Management and Financial Efficiency

4.4.1 The Reliability of the Measurement Scale Results

Table 5: Reliability of the scale

	Average scale measurement if variable type	Variance scale measurement if variable type	Correlation variable - Total	Cronbach's Alpha if variable type	Cronbach's Alpha coefficient
Applying managerial accounting for environmental costs					
ECMA1	19.6935	8.344	.630	.865	.877
ECMA2	19.6161	8.070	.730	.848	
ECMA3	19.6068	8.010	.755	.844	
ECMA4	19.4861	8.474	.674	.858	
ECMA5	19.6440	7.913	.710	.851	
ECMA6	19.4923	8.201	.609	.870	
Financial Efficiency					
FP1	7.3591	4.293	.850	.906	.931
FP2	7.2817	4.128	.879	.883	
FP3	7.3220	4.542	.847	.909	

Source: Results processed using SPSS software

The results of the reliability analysis of the scale show a relatively high overall Cronbach's Alpha coefficient. The ECMA variable is 0.877 and the FP is 0.931. All observed variables included in the analysis have relatively good

indices. The correlation coefficient of the total of all observed variables is greater than 0.3. Thus, all observed variables are significant for inclusion in 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: Results processed using SPSS software

Table 7: Factor rotation matrix

Matrix for rotating dependent factors		
Observed variable	Element	
	1	2
FP3	.855	
FP1	.802	
FP2	.779	
ECMA3		.813
ECMA2		.799
ECMA5		.765
ECMA4		.718
ECMA1		.687
ECMA6		.650
Extraction method: Principal Axis Factoring. Rotation method: Promax with Kaiser Normalization. KMO coefficient = 0.877, Bartlett's Test of Sphericity = 0.000 Total variance extracted: 62.372		

Source: Results processed by SPSS software

The analysis of the dependent variable with 9 observed variables gives us a KMO coefficient of 0.762, which is greater than 0.5, indicating that the exploratory factor analysis is suitable. The Bartlett test has a Sig. less than 0.05 (0.000), and the total variance extracted is 62.372, which is more than 50%, making the EFA analysis appropriate. The Eigenvalues coefficient is 3.742, which is greater than 1, meaning that at a stopping point of 3.742, the factors explain 62.372% of the data's variability (see Eigenvalues citation). The loading coefficients of all observed variables are greater than 0.5 for both independent and dependent variables, ensuring the practical significance of the EFA exploratory factor analysis test.

4.4.3 The Results of the Correlation Test between

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

The relationship	Mean	Average difference	Correlation Two variables		T Test	
			r	Level of significance	t	Level of significance
ECMA	3.9365	0.50000	0.250	0.045	8.320	0.000
FP	3.4365					

Source: Results processed using SPSS software

The test results show a connection between the two variables of applying environmental cost management accounting and financial efficiency, with an impact level of 0.250. This impact level is moderate. Thus, applying environmental cost management accounting affects financial efficiency and vice versa, when financial efficiency is good, businesses have more opportunities to enhance the level of application of environmental cost management accounting in manufacturing enterprises in Northern Vietnam. These results are consistent with studies on the relationship

between environmental application, environmental cost management accounting and financial efficiency by researchers. (Stefan Schaltegger and colleagues, 2002; Magara and colleagues, 2015; Do, T.L.A, 2022).

4.4.4 SEM Analysis Results

The SEM analysis results of the impact of environmental cost management accounting on financial efficiency are presented in Table 8 as follows:

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

Variable	Unstandardized Beta coefficient	S.E.	C.R.	P	Degree of model simulation	Impact ranking
FP<---ECMA	.588	.439	86	6,864***	19.3%	

Source: Analysis results of the author's survey data using AMOS software

According to Table 9, the model applying environmental cost management accounting explains 19.3% of the variation in financial efficiency. This means that Northern Vietnamese manufacturing enterprises that effectively implement environmental cost management accounting contribute positively to the financial efficiency of the business.

5. Discussion

Discussing the Research Results

The research concludes that there's a positive and significant relationship between the variables of the study, the extent of applying environmental cost management accounting is significantly and positively related to the financial effectiveness of manufacturing enterprises in Northern Vietnam. Therefore, this implies that these factors positively influence the financial operations of these businesses.

6. Recommendations

The research suggests that:

1. Businesses should utilize specialists and technicians to enhance regular environmental assessments (for instance, twice a year) to monitor environmental activities. Additionally, there needs to be a stronger connection between the environmental management department and the accounting department to ensure comprehensive environmental cost management reports are prepared.
2. Companies need to keep up with the regulatory framework set by the government and managing bodies. This ensures that they invest in improving their environmental operations faster and sooner than their competitors, thereby enjoying the advantage of quicker compliance.

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