

Factors Affecting The Application Of Environmental Management Accounting In Manufacturing Enterprises: Experimental Research In Vietnam

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Abstract

Environmental management accounting is a part of environmental accounting, which can be used to assist administrators in assessing the impact on the environment caused by the activities of enterprises, especially providing environmental information for administrators to make appropriate economic decisions. This article focuses on the factors affecting the application of environmental management accounting in manufacturing enterprises, from the perspective of stakeholders. The results of 212 survey samples from managers, chief accountants, accountants in 68 manufacturing enterprises in Vietnam by quantitative research and regression analysis show that 4 main factors have a significant influence on the application of environmental management accounting in manufacturing enterprises are arranged in descending order, as follows: Awareness of the usefulness when applying environmental management accounting; Awareness of the difficulty when applying environmental management accounting; Normative pressure; and Coercive pressure. The findings from the empirical research are the basis for the author to make recommendations and suggestions to stakeholders to increase the application of environmental management accounting in manufacturing enterprises in Vietnam in the coming time.

Keywords: Management accounting, environmental management accounting, Vietnam.

1. Introduction

Environmental issues are increasingly receiving serious attention around the world, as there are more and more serious environmental threats to the future of humanity. These include, but are not limited to, not only natural but also man-made disasters caused by the over-consumption of non-renewable resources, global air pollution (Jones, 2010). Meanwhile, sustainable development is an inevitable development trend of modern society, which is the development that can meet the current needs without affecting the ability to meet the needs of future generations (Keeble & war, 1988). According to research by Keit (2011), sustainable development must ensure that there is effective economic development, fair society and the environment is protected and preserved. The challenge now is to balance the three pillars: economic efficiency, social justice and environmental protection. If there is a

breakthrough in any pillar, it will affect the remaining goals (Keit, 2011). According to O'Neill et al., (2005), although green economic development has become a business trend in developed countries, the majority of developing countries temporarily give priority to the goal of economic growth, and the operation of manufacturing enterprises can have bad effects on the environment. However, under the pressure of all stakeholders, businesses have been conducting business more and more responsibly. Kärnä et al., (2003) argued that economic entities in the decision-making process must implement green social responsibility, by ensuring ethical values, compliance with legal requirements, respect for people, communities and the environment. These are key foundational values for sustainable development. More than ever, administrators understand that the money spent on controlling and reducing environmental

pollution is not entirely a cost but an investment in the future, in order to add value, image, brand to the business. Therefore, in order to serve the business decision making, in addition to the information about revenue, costs and profits as before, the administrator also needs more information related to the environment. Environmental management accounting emerged in the 1970s, which can provide information to meet this requirement (Mohd et al., 2012).

Environmental management accounting, as part of environmental accounting, can assist administrators in addressing the environmental impacts of organizations when operating, through the provision of relevant environmental information for decision-making. Many recent studies on environmental management accounting from different perspectives reflect the importance of accounting when pursuing environmental management strategies (Schaltegger et al., 2011). There are many studies on environmental governance systems and initiatives that have been implemented in developed economies (Hsiao et al., 2014). However, research on environmental management accounting in developing countries is modest (Bouma & Veen, 2002), and studies by Xiaomei (2004), Jalaludin (2010) in China and Malaysia show that the majority of enterprises in developing countries still lose out to advanced countries in understanding and applying environmental management accounting techniques and methods. Particularly in Vietnam, environmental management accounting is a new field in both research and practical application. According to Pham Thi Bich Chi et al., (2016), environmental management accounting is still not common in enterprises and there are few in-depth studies on environmental management accounting. Some studies approach the importance of environmental management accounting, such as the study of Nguyen Van Tram (2016), or the study on environmental accounting of countries in the world and lessons learned for Vietnam by Huynh Duc Long (2015). Recently, there has been some research on environmental cost management accounting, which is a part of environmental management accounting, and only research for a specific area

of production. For example, such as: Pham Thi Bich Chi et al., (2016) research on environmental cost management accounting in brick manufacturing enterprises, Nguyen Thi Nga (2016) research on factors affecting the ability to apply environmental cost management accounting in steel manufacturing enterprises, or research on company characteristics and organization level of environmental management accounting implementation of Nguyen Thi Hang Nga et al., (2017). Thus, the current research on environmental accounting in Vietnam is still quite obscure and lack of system, especially the research on factors affecting the application of environmental management accounting in manufacturing enterprises seems to be very limited.

Therefore, this study was carried out to identify and measure the influence of factors on the application of environmental management accounting in manufacturing enterprises in Vietnam. The research results are the basis for the author to make recommendations and suggestions to stakeholders to improve the quality of auditing in Vietnam in the future. From there, make a number of recommendations to stakeholders to contribute to promoting the application of environmental management accounting to become popular and help businesses in specific business activities. The results of the study may also be useful for enterprises in developing countries, where the economic and social conditions and the development of the accounting profession are similar to the reference Vietnam in the application of environmental management accounting in practical activities.

2. Theoretical background and literature review

2.1. Theoretical basis

2.1.1. Accounting for environmental management

Previous studies explained that environmental management accounting is a new tool for environmental management, and that environmental management accounting

represents an extension of management accounting (UNSD, 2001; IFAC, 2005).

According to Birkin (1996), environmental management accounting is a further development of management accounting. In his study, Jasch (2006) also explains that environmental management accounting, as an information system, does not separate from management accounting. However, environmental management accounting focuses on the flow of materials, and the balanced nature of material flow.

A definition proposed by the United Nations Commission on Sustainable Development (UNSD) (2001), "environmental governance accounting is a technique of identifying, collecting, and analyzing environmental information that uses both types of measures of value and artifacts for decision-making. The purpose of using environmental management accounting information is to meet the organization's internal analysis for decision making." The information processing process of environmental management accounting serves the decision making using the measure of artifacts (reflecting the flow of consumption and disposal of raw materials, energy, water) and the measure of value (reflecting the costs incurred, revenue, income, saved costs) related to activities that are likely to affect and impact the environment.

Meanwhile, according to IFAC (2005), environmental management accounting is defined as "Effective management of the economy and the benefits of the environment through the development and implementation of accounting systems and practices that are appropriate for the environment. While this may include reporting and auditing in some companies, environmental governance accounting typically includes life cycle costs, full cost accounting, benefit assessment, and strategic planning for environmental governance".

In addition, according to Bartolomeo et al., (2000), environmental management accounting is "The recording, analysis and use of financial and non-financial information to integrate economic and environmental policies of

the company, in order to develop sustainable business".

Thus, through the concepts of environmental management accounting above, it is shown that environmental management accounting is an internal management information tool to improve economic and environmental performance. It is seen as a toolkit to support the identification, collection, analysis and use of financial and non-financial information for internal decision-making in order to improve economic and environmental performance.

2.1.2. Application of environmental management accounting in enterprises

The contents of environmental management accounting in enterprises can be approached from the following angles: access to the work cycle; access to the subjects of environmental management accounting; access to the types of information of environmental management accounting.

The author approaches the content of environmental management accounting according to the work cycle, and includes the following contents: organizing information collection, information processing, information analysis and providing environmental information (Nguyen Thi Hang Nga, 2019). Thus, the application of environmental management accounting is understood as environmental management accounting is used by accountants to provide monetary and material information for the decision-making process, assess environmental performance against the set objectives, help administrators take responsibility and take responsibility for their management activities in improving environmental responsibility.

2.2. Literature review

According to Research by Vasile & Man (2012) study, conventional management accounting systems do not seem to add value in terms of providing adequate and relevant information meaningfully used to support environmental governance. And this has led to a reduction in the benefits that would normally be achieved by businesses if they adopted or implemented

appropriate environmental governance accounting tools (Christ & Burritt, 2013). Recently, there have been more and more investigations into environmental governance accounting to fill this gap and researchers have also shown that the implementation of environmental governance accounting tools in enterprises is influenced not only by internal factors but also external factors (Mensah, 2014). In order to identify the factors affecting the application of environmental management accounting in enterprises, the author extracts a few theories to underpin this study, including: institutional theory, indeterminate theory and technology acceptance model.

Institutional theory refers to changes in the behavior of the organization (changes in models, strategies, processes, methods, techniques,...) due to the impact from the pressure of stakeholders and how organizations can work to survive and develop legally. Recent studies on institutional theory show that this is not a single theory. Institutional theory has two main schools: old institutional theory (Burns & Scapens, 2000) and new institutional theory (DiMaggio & Powell, 1983, Bouma & Veen, 2002). The old institutional theory suggests that changes in an individual's behavior may be rooted in organizational regulations, or may also be rooted in an individual's perception of what one must do (normality). The new institutional theory adds the effect of cognition on the interpretation of individuals' behaviors, whereby individuals adhere to the institution simply because if they do not, they will become different from other individuals (Scott, 1995). In other words, the new institutional theory suggests that organizations themselves influence each other through the process of imitation (peer group pressure) and that the external environment can also change the values and structure of organizations (Peters, 2000). In this study, the author uses the perspective of the new institutional theory to analyze the effects on the application of environmental management accounting. That is to say, the activities of the organization implementing environmental management accounting, in addition to being governed by efficiency objectives, are also influenced by

cultural and social factors and considerations of legitimacy, such as the pressure from power institutions, the requirement to comply with professional standards and simulate successful models. Legitimate and socially acceptable organizational behavior can result from various mechanisms, such as through imitation, learning, or coercion (Meyer & Rowan, 1977). In his study, Scott (1995) grouped 3 elements of institutional theory that influence organizational behavior, including: compulsive pressure, normative pressure, and simulated pressure.

First, compulsive pressure: interpreted as the formal or informal pressure from the institutions of external power. Accordingly, governments and other organizations such as regulators, customers, suppliers often intervene and influence businesses, causing them to change systems and processes to comply with legal regulations.

Secondly, simulated pressures: are the reactions of enterprises to techniques that have been successfully tested by competing companies or other models in society, in the case of facing unclear and uncertain situations. Enterprises tend to emulate each other in society (DiMaggio & Powell, 1983). In other words, if an experience or methodology has proven its worth, or is recognized as a benchmark for the industry as a whole, then businesses will reimagine it instead of questioning its value.

Thirdly, compliance pressure: enterprises are required to comply with professional standards in order to professionalize their professional activities. Experts of the business are under pressure to comply with regulations, rules and professional ethics. The pressure to comply with the norm comes mainly from professionalization with two forms: education and professional associations. These two dimensions of professionalization are the main drivers for change in organizational practices and professional attitudes (DiMaggio & Powell, 1983).

Institutional theory can be applied to study the application of environmental management accounting in enterprises. Many authors have used institutional theory in research works on environmental management accounting

such as Bourma & Veen (2002), Rikhardsson et al., (2005). The studies of Chang & Deegan (2010), Qian et al., (2011), Jalaludin et al., (2011), Jamil et al., (2015) all imply the potential usefulness of three mechanisms in explaining why companies apply environmental management accounting. The authors suggest that the change of institutional environment may stimulate or hinder the application of a new management activity, including accounting. Without institutional pressure, environmental governance accounting may not be applied, especially when the benefits brought by environmental governance accounting are not easily seen. Thus, it can be proposed that the three mechanisms of institutional pressure (coercive pressure, simulated pressure, normative pressure) will affect the application of accounting and environmental management of the enterprise.

Uncertainty theory studies the accounting of environmental governance in any organization in an interactive relationship with its operating environment. From Luft & Shields (2003), the uncertainty theory explains the complex relationship between changes in the management accounting system and internal and external factors of the organization. The accounting and management system appropriate to the enterprise depends on the characteristics and environment of the enterprise. Therefore, it is not possible to build a pattern management accounting model applicable to all types of enterprises, but must depend on each sector, each sector, each organizational structure, enterprise size, technology level, strategy of the organization in each period. In this study, the author uses the theory of uncertainty to explain the perception of the implementation object about the fluctuation of the corporate environment when changing in the management accounting system. This means reacting to complexity: financial difficulties, difficulties in finding, collecting, handling, difficulties in handling problems,... for the application of environmental management accounting. This theory is used by some studies to assess the impact of factors

affecting the application of environmental management accounting, such as Research by Hoffman (2001) study emphasized that much of the success of implementing environmental management initiatives is due to cooperation and communication among members in various positions. The application of environmental management accounting in enterprises also requires support from many individuals directly involved in environmental management activities and the department of management accounting. This has also been confirmed in studies on the same subject, such as: Hirst (1981), Parker (1997), Jamil (2008), Chang & Deegan (2010), Qian et al., (2011), Mokhtar (2015).

Environmental management accounting is also a part of an organization's information system and one of the useful tools in explaining its intention to accept a new product is the technology acceptance model (TAM). According to Legris et al., (2003) the TAM model has predicted about 40% success in using a new system. According to Davis (1985) the cognitive factor usefulness in the TAM model expresses the level at which the individual believes using a specific system will enhance their performance, Perception of ease of use expresses the level at which a person believes using a specific system will require no effort. Many studies have been carried out to identify the benefits that environmental management accounting brings to enterprises. For example, research by Burritt et al., (2002), Ferreira et al., (2010) has introduced the benefits of environmental management accounting, business support, such as: identifying cost saving opportunities, making decisions on improving product and price structure, avoiding future costs related to investment decisions, improving financial efficiency.

3. Research Method

3.1. Research models and hypotheses

Based on the theoretical basis and the research overview, the theoretical model is proposed as follows:

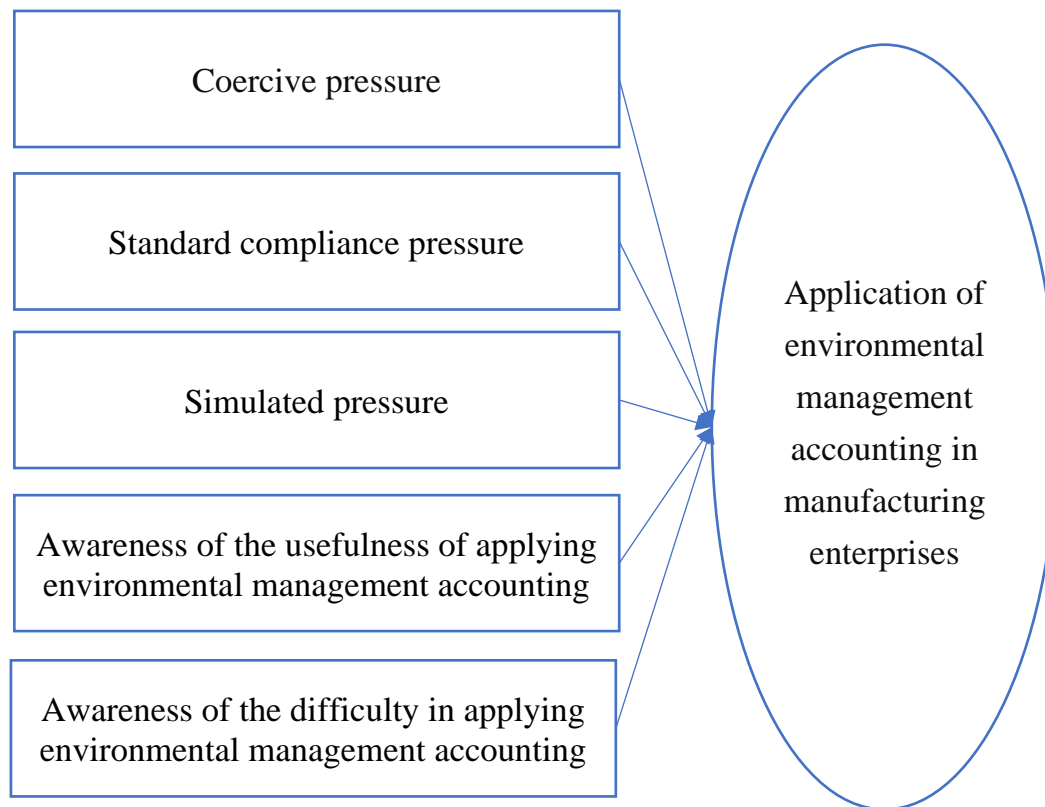


Figure 1. Research model on factors affecting the application of environmental management accounting in manufacturing enterprises

(Source: Author's suggestions)

With multiple regression model as follows:

$$KTQTMT = \beta_0 + \beta_1 * NTHI + \beta_2 * ALCC + \beta_3 * ALMP + \beta_4 * ALQC + \beta_5 * NTKK + \varepsilon$$

In which:

β_1, β_2, \dots is the regression coefficient, β_0 is the blocking coefficient, ε is the residual

Dependent variable

KTQTMT: Applying environmental management accounting in manufacturing enterprises

Independent variables, including:

NTHI: Awareness of the usefulness of applying environmental management accounting

ALCC: Coercive Pressure

ALMP: Imitation pressure

ALQC: Normative pressure

NTKK: Awareness of the difficulty in applying environmental management accounting
The hypotheses are stated as follows:

H1: Awareness of the usefulness of applying environmental management accounting has a favorable influence on the application of environmental management accounting in manufacturing enterprises.

H2: Coercive pressure has a favorable effect on the application of environmental management accounting in manufacturing enterprises.

H3: Simulation pressure has a favorable influence on the application of environmental management accounting in manufacturing enterprises.

H4: Normative pressure has a favorable influence on the application of environmental management accounting in manufacturing enterprises.

H5: Awareness of the difficulty in applying environmental management accounting

has an adverse effect on the application of environmental management accounting in manufacturing enterprises.

3.2. Data collection and processing

In order to realize the research objective, the author used a deductive approach, i.e. based on the theory of previous studies and the results of qualitative research through expert interviews proposing models. With this study, the author performs with experts from the Board of Directors, chief accountant with long experience in manufacturing enterprises in many fields, such as chemicals, textiles, construction materials... and experts are lecturers of universities with knowledge of environmental management accounting, teaching management accounting. Using qualitative research methods through interviews with experts, the author develops the selection of factors affecting the application of environmental management accounting in manufacturing enterprises to include in the research model.

Next, the author conducts an in-depth survey through a questionnaire with 30 observation variables to collect the opinions of managers, chief accountants, accountants in manufacturing enterprises on the influence of factors on the application of environmental management accounting in enterprises. The Department of Research selects the survey subjects as managers, chief accountants and accountants because these are directly involved in the implementation of environmental management accounting in the enterprise, so there will be objective and accurate assessments of the research problem.

Through the review of previous studies, to evaluate the application of environmental management accounting in manufacturing enterprises (dependent variables), the author uses the Likert scale of 5 levels of agreement, from: (1) Strongly disagree to (5) Strongly agree. Evaluating independent variable factors, the author uses the Likert scale with 5 levels of influence, from: (1). Very low to (5). Very high. The number of scales for measuring variables is presented in **Appendix 1**.

In addition, to ensure the study sample size, based on the minimum sample size requirements for EFA analysis and regression, in Bollen's view (1989), the sample size is calculated according to the formula $n = 5 * i$ (i is the number of variables observed in the model), corresponding to this study, the minimum sample size required is $5 * 30 = 150$.

The author uses a convenient sampling method and 212 valid slips obtained out of 530 slips sent through sending and receiving questionnaires via Google forms and email to managers, chief accountants, accountants in 68 enterprises in Vietnam. The implementation period is from March 2022 to July 2022. Based on the collected data, the author uses quantitative techniques such as testing the reliability of the scale, exploratory factor analysis... with the use of SPSS software²² to summarize and present the basic results of the study.

4. Results and discussion

Of 212 valid replies, 31 were from leather manufacturing enterprises, accounting for 14.62%; 32 were from garment manufacturing enterprises, accounting for 15.09%; 18 replies were from chemical manufacturing enterprises, accounting for 8.49%; 27 replies were from construction materials enterprises, accounting for 12.73%; 28 replies were from furniture manufacturing enterprises, accounting for 13.20%; 14 replies were from metallurgical and mining enterprises, accounting for 6.60%; 34 replies were from food manufacturing enterprises, accounting for 16.03%; the remaining 28 replies were from manufacturing enterprises in other sectors, accounting for 13.24%.

Regarding the level of education: 198 respondents with university level or higher, accounting for 93.39%; 14 respondents with college and intermediate level, accounting for 6.61%.

About the work unit: 82 replies were received from managers (members of the board of directors, chief accountant), accounting for 38.67%; 130 replies were received from accounting staff, accounting for 61.33%.

Regarding the size of enterprises: 102 replies came from large-scale manufacturing enterprises, accounting for 48.11%; 62 replies came from medium-sized enterprises, accounting for 29.24%; the remaining 48 replies came from small-scale manufacturing enterprises, accounting for 22.65%.

The sample surveyed belongs to many different subjects in terms of education level, job position, size of enterprises and especially the production and business sectors with many impacts on the environment. Thus, it is possible to ensure that the answers are reliable and of quality.

Statistical results describing the scale show that most of the observed variables have an average value around the expected average value (3.0) and there is no significant difference between the observed variables in the same group. This shows that the surveyed subjects have similar opinions and all agree with the scale of variables.

4.1. Results of testing the quality of the scale

The results of the first Cronbach's Alpha test showed that: independent variables Simulated pressure; Normative pressure; and dependent variables Application of environmental management accounting in manufacturing enterprises was measured by 22 observation variables. The results of the reliability analysis of

the scale all have Cronbach's alpha coefficient greater than 0.6. At the same time, the observed variables have a total variable correlation > 0.3 and Cronbach's alpha coefficient if the variable type of the observed variables is less than the common Cronbach's alpha. Therefore, the above independent and dependent variables meet the reliability. Independent variable Awareness is useful when applying environmental management accounting with observation variable NTHI8 with a total variable correlation coefficient equal to 0.210 (less than 0.3). The independent variable Coercive Pressure with Observed Variable ALCC1 has a total variable correlation coefficient equal to 0.198 (less than 0.3). Independent variable Awareness of the difficulty of applying environmental management accounting has the observation variable NTKK1 with a total variable correlation coefficient equal to 0.126 (less than 0.3). Therefore, it is likely that these observation variables will create false factors when analyzing EFA. Therefore, the author of variable type NTHI8, ALCC1 and NTKK1 observed and conducted the second test of the scale.

After running Cronbach's Alpha for the second time. It can be seen that the results of testing the scales of factors affecting the application of environmental management accounting in manufacturing enterprises with 27 observation variables, shown in Table 1:

Table 1: Results of testing the reliability of the scale of factors in the model

No.	Factor	Cronbach's Alpha	N
1	Awareness of the usefulness of applying environmental management accounting	0.840	7
2	Coercive pressure	0.924	8
3	Imitation pressure	0.797	3
4	Normative pressure	0.710	2
5	Awareness of the difficulty in applying environmental management accounting	0.852	4
6	Application of environmental management accounting in manufacturing enterprises	0.856	3

(Source: Analysis results from SPSS 22.0)

Thus, the model retains 6 factors to ensure good quality, with 27 characteristic variables (Cronbach's Alpha coefficient) of the whole

greater than 0.6; The coefficient of correlation of variables - the sum of the observed variables is greater than 0.3.

4.2. Explore factor analysis EFA

The EFA exploratory factor analysis was performed separately for 02 groups of independent variables and dependent variables by the full-angle rotation method (Varimax).

EFA analysis results for the first independent variable

After evaluating the reliability of the scale, 24 variables were included in the first exploratory factor analysis, the results were as follows:

KMO factor = 1.814 and Barlett test with Sig.= .000 < 0.05 shows that an EFA analysis is

appropriate. At Eigenvalue = 1.112, 5 factors are extracted, (no new factors formed) and the variance is 64.628%. Thus, the extraction variance is satisfactory. However, the NTHI2 observation variable and the ALMP3 observation variable have a factor load factor of less than 0.3. Therefore, these 2 observation variables will be eliminated to continue performing the second EFA analysis with 22 observation variables.

EFA analysis results for the second independent variable

Table 2 : KMO and Bartlett test results for independent variables

KMO and Bartlett's Test		
Kaiser-Meyer-Olkin Measure of Sampling Adequacy	0.810	
Bartlett's Test of Sphericity	Approx. Chi-Square	2064.288
	df	242
	Sig.	0.000

(Source: Results of data analysis on SPSS 22)

- KMO value = 0.810 satisfies the condition of $0.5 \leq \text{KMO} \leq 1$ so EFA analysis is appropriate for actual data.

- Check the correlation between the variables observed in the scales

Sig. (Bartlett's Test) = 0.000 (Sig. < 0.05) showed that the observed variables were correlated with each other in the overall and the data used for EFA analysis were consistent.

- Check the level of explanation of the observation variables with the factors: The final result of the factor analysis explores only 5 groups with the total number of observation variables is 22 variables with the following results:

+ Percentage of variance = 68.380% > 50% means that the 5 factors cited in the EFA reflect 68.38% of the variance of the data.

+ Eigenvalue = 1.244 is greater than 1, so all factors are retained in the analysis model. This data gives 5 factors and these 5 factors represent the best characteristics of the data compared to giving the remaining factors.

- The matrix of factors after rotation, the results are divided into 5 groups, the groups are separated into separate columns and the observed variables have the same convergence properties to the same factors as in Table 3 below.

Table 3: Rotation matrix of factors
Rotated Component Matrix^a

	Component				
	1	2	3	4	5
ALCC5	.808				
ALCC2	.803				
ALCC6	.779				
ALCC8	.777				
ALCC9	.770				
ALCC4	.694				

ALCC7	.664				
ALCC3	.589				
NTHI7		.818			
NTHI5		.780			
NTHI6		.670			
NTHI3		.615			
NTHI4		.567			
NTHI1		.513			
NTKK3			.860		
NTKK5			.824		
NTKK4			.817		
NTKK2			.785		
ALMP2				.829	
ALMP1				.770	
ALQC1					.856
ALQC2					.769

(Source: Results of data analysis on SPSS 22)

EFA analysis results for dependent variables:

The indicators show the following coefficients:

- KMO coefficient = 0.742 satisfies the condition of $0.5 < \text{KMO} < 1$, so the analysis of discovery factors is suitable for actual data.

- Sig. = 0.000 satisfies $\text{Sig.} \leq 0.05$ so this test is statistically significant and the variables observed are correlated with each other in the overall analysis, demonstrating that the data used in the analysis are appropriate.

- The analysis of the total variance extracted for the dependent variable shows that the percentage of variance of the entire Percentage of variance = 71.286% > 50%, the value of Eigenvalue = 2.146 > 1, so the model qualifies for exploratory factor

analysis and the load factor of the observation variable is greater than 0.5 so the observation variable has practical significance. So the dependent variable is kept between the original independent variable and the observed variable.

4.3. Results of regression analysis

Pearson Correlation Analysis

Correlation analysis was performed prior to regression analysis to check the correlation between the independent variable and the dependent variable, when independent variables not correlated with the dependent variable would be excluded from the model (if $\text{Sig.} > 0.05$).

Table 4: Pearson correlation analysis results

		Correlations					
		KTQTMT	NTHI	ALCC	ALMP	ALQC	NTKK
KTQTMT	Pearson Correlation	1					
	Sig. (2-tailed)						
	N	212					
NTHI	Pearson Correlation	.684**	1				
	Sig. (2-tailed)	.000					
	N	212	212				
ALCC	Pearson Correlation	.570**	.646**	1			
	Sig. (2-tailed)	.000	.000				
	N	212	212	212			
ALMP	Pearson Correlation	.342**	.302**	.380**	1		
	Sig. (2-tailed)	.000	.000	.000			

	N	212	212	212	212		
ALQC	Pearson Correlation	.388**	.273**	.295**	.333**	1	
	Sig. (2-tailed)	.000	.000	.000	.000		
	N	212	212	212	212	212	
NTKK	Pearson Correlation	-.286**	-.084	-.114	-.035	-.023	1
	Sig. (2-tailed)	.000	.282	.141	.658	.780	
	N	212	212	212	212	212	212

** . Correlation is significant at the 0,01 level (2-tailed)

* . Correlation is significant at the 0,05 level (2-tailed)

(Source: Results of data analysis on SPSS 22)

Pearson correlation analysis results in Table 4 show that there is a close correlation between dependent and independent variables in the model. However, the correlation coefficient between the variables Awareness of the difficulty in applying environmental management accounting to the remaining variables has a sig value > 0.05. The remaining independent variables in the matrix have average correlation coefficients and have Sig values. < 0.05, this suggests that independent variables are more

likely to be able to account for each other, potentially occurring polylinearities. This will be tested more accurately with Durbin - Watson and VIF coefficients.

Regression analysis

Based on the results of EFA analysis, we have an unchanged multiple regression model, the independent and dependent variables remain the same as at the beginning. The following tables show the regression results, in particular:

Table 5: Model summary table^b

Model	R	R Square	Adjusted R Square	Durbin-Watson
1	.765 ^a	.678	.620	1.918

a. Predictors: (Constant), NTHI, ALCC, ALMP, ALQC, NTKK.

b. Dependent Variable: KTQMT
(Source: Results of data analysis on SPSS 22)

Table 6: Model ANOVA^a analysis table

Model	Sum of Squares	df	Mean Square	F	Sig.	
1	Regression	48.688	5	9.737	47.585	0,000 ^b
	Residual	32.458	177	0.183		
	Total	81.146	182			

a. Dependent Variable: KTQMT

(Source: Results of data analysis on SPSS 22)

b. Predictors: (Constant), NTHI, ALCC, ALMP, ALQC, NTKK.

**Table 7: Linear regression results
Coefficients^a**

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Collinearity Statistics	
		B	Std. Error	Beta			Tolerance	VIF
1	Constant	1.056	.334		3.251	.001		
	NTHI	.586	.077	.507	7.645	.000	.0576	1.740
	ALCC	.139	.069	.139	2.020	.046	.539	1.860

	ALMP	.060	.049	.069	1.221	.225	.802	1.250
	ALQC	.174	.053	.183	3.334	.002	.850	1.179
	NTKK	-.232	.054	-.222	-4.376	.000	.988	1.014

a. Dependent Variable: KTQTMT

(Source: Results of data analysis on SPSS 22)

Test the relevance of the model

Multicollinearity test: The error magnification factor (VIF) of all independent variables is less than 10, so the multicollinearity in the model is assessed as not serious.

The Durbin - Watson coefficient used to test the correlation of the residuals shows that the model does not violate when using multiple regression, since the Durbin - Watson value obtained is 1.918 (range 1 to 3). In other words, the model has no correlation of the residuals.

The assessment of model suitability is based on the Analysis of Variance (ANOVA) table. ANOVA test results with a significance level of Sig. = 0.000 shows that the multiple linear regression model has been constructed in accordance with the data set and used, or in other words that this model is significant to derive broadly for the whole.

Evaluate the level of interpretation by the independent variables in the model

The coefficient of R² correction = 0.620 > 0.5 means that the independent variables explain 62% of the change of the dependent variable "Applying environmental management accounting in manufacturing enterprises", and 38% is due to random errors or factors other than the model.

Independent variables NTHI, ALCC, ALQC, NTKK all had statistically significant effects (due to Sig.<0.05) to "Application of environmental management accounting in manufacturing enterprises". The independent variable ALMP alone has a value of Sig. = 0.225 > p=5% does not achieve statistical significance (Sig. value of t test is less than 5%). So this variable will be discarded and not included in the regression equation.

The independent variables NTHI, ALCC, ALQC have a coefficient $\beta > 0$ proving to have a reversible effect on the dependent variable Applying environmental management accounting

in manufacturing enterprises. Therefore, accepting the initial hypothesis (H1, H2, H4), are independent variables that are linearly related to the dependent variable and perfectly fit the model. The independent variable NTKK has a coefficient $\beta < 0$ which proves to have an adverse effect on the dependent variable Applying environmental management accounting in manufacturing enterprises and in accordance with the initial hypothesis (accepting the initial hypothesis H5). From there, we have the regression equation with normalized beta coefficient as follows:

$$\text{KTQTMT} = 0.507 \cdot \text{NTHI} + 0.139 \cdot \text{ALCC} + 0.183 \cdot \text{ALQC} - 0.222 \cdot \text{NTKK}$$

From the results of testing the research model, there are 4 factors affecting the application of environmental management accounting in manufacturing enterprises in Vietnam. This result is similar to the results verified by the predecessor studies, in particular:

The factor Awareness of the usefulness of applying environmental management accounting, in accordance with the results of previous research of Wachira (2014), is that the greater the benefits that environmental management accounting brings, the higher the level of application of environmental management accounting in enterprises. Jalaludin et al., (2011) also mentioned that the economic and environmental benefits of environmental management accounting are related to the application of environmental management accounting.

The coercive pressures factor, in line with previous studies by Jamil et al., (2015), Jalaludin et al., (2011), means that increasing coercive pressures, especially from the government, will simultaneously increase the application of environmental management accounting in enterprises.

The normative stress factor, consistent with previous studies by Jalaludin et al., (2011),

Burritt (2004). The training or education of accountants will affect them through the existence of regulatory pressure.

Factors Awareness of the difficulty of applying environmental management accounting, consistent with previous studies such as: Jamil et al., (2015), Johnson (1993), Setthasakko (2010). Accordingly, enterprises face the greatest barriers to information when lacking information stereotypes or guidelines on environmental management accounting.

5. Conclusion and Recommendation

Through the analysis of 212 survey samples from managers, chief accountants, accountants of 68 manufacturing enterprises in Vietnam. The regression results show that the factors that affect the "Application of environmental management accounting in manufacturing enterprises" in descending order are: Awareness of the usefulness when applying environmental management accounting; Awareness of the difficulty when applying environmental management accounting; Normative pressure; Coercive pressure.

The findings from the experimental study are the basis for the author to make a number of recommendations to stakeholders, specifically as follows:

The factor of awareness of the usefulness of environmental management accounting is the factor that has the greatest influence on the application of environmental management accounting in the research model. Therefore, in order to increase the application of environmental management accounting in enterprises, it is necessary to raise awareness and understanding of environmental accounting, including environmental management accounting and its benefits for enterprises and accountants. For managers and accounting teams who are next need to be trained on the importance of recognizing and monitoring environmental expenses and income items; understanding the implementation of environmental management accounting not only benefits enterprises, society but also for themselves. Through seminars, symposia or training programs for employees before applying environmental management

accounting, those responsible for accounting work (specifically environmental management accounting) will be aware of environmental issues that may arise in the process of production and business activities, at the same time acquire the necessary knowledge about management accounting, environmental management accounting, as well as the skills to apply environmental management accounting tools effectively.

Factors Aware of the difficulty in applying environmental management accounting, this is the second group of factors that have a great influence on the intention to apply environmental management accounting in enterprises. In particular, most survey respondents said that the application of environmental management accounting will be difficult because of the lack of experience and guidance documents on the implementation of environmental management accounting. At the same time, financial benefits must be considered when applying environmental management accounting. Therefore, in order to limit difficulties, the author proposes the following solutions: (i) encourage research works on environmental management accounting, especially in-depth research topics on the organization and application of environmental management accounting; (ii) the Ministry of Finance to consider, step by step draft and promulgate environmental accounting standards, regulations, guide the tools and techniques of environmental management accounting that can be applied in enterprises at many levels.

The normative pressure factor, in addition to the group of solutions to raise the awareness of the accounting team on the benefits of environmental management accounting through training, training for employees the knowledge and skills needed to implement the application of environmental management accounting, increasing the pressure from professional associations is also a solution to increase the intention to implement environmental management accounting in enterprises. Professional organizations and associations such as VACPA consider environmental management accounting as a

standard and encourage the application of this system in enterprises will have a positive impact on the views and perceptions of the accounting team, especially members of professional associations.

Forced pressure factor, in order to promote the application of environmental management accounting, the authorities of the state should implement the following measures: (i) Institutionalize the application of environmental management accounting, make this work a part of the accounting system; (ii) Change and strengthen the level of awareness and action of organizations and stakeholders on environmental issues in each enterprise and the whole economy; (iii) Develop legal documents that regulate and guide enterprises in the process of organizing environmental management accounting in their enterprises. In particular, emphasis is placed on the obligation to present and disclose environmental information to society as well as the environmental liability of enterprises.

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Appendix 1: Coding of factors affecting the application of environmental management accounting in manufacturing enterprises

No.	Factor	Number of scales	Source
Independent variable			
NTHI	NTHI1	The application of environmental management accounting will help businesses discover more opportunities to increase profits	Deegan (2003); Gibson & Martin (2004).
	NTHI2	The application of environmental management accounting will help businesses calculate product prices more accurately	
	NTHI3	Information from environmental management accounting will support enterprises in preparing reports for related subjects	
	NTHI4	The application of environmental management accounting helps enterprises build competitive advantage	
	NTHI5	Applying environmental management accounting helps enterprises evaluate the effectiveness of environmental management activities more accurately	
	NTHI6	Enterprises applying environmental management accounting will bring benefits to society	
	NTHI7	Applying environmental management accounting will help improve the brand value of the business	
	NTHI8	Enterprises applying environmental management accounting will benefit employees	
ALCC	ALCC1	Environmental management activities of our enterprise are influenced by labor unions of the enterprise	Jamil et al., (2015) and Jalaludin et al., (2011).
	ALCC2	Enterprises should ensure that they do not violate pollution standards/norms established by the Government	
	ALCC3	Environmental management activities of the enterprise are influenced by shareholders	
	ALCC4	The media are increasingly concerned about the environment, which creates pressure on businesses to improve environmental efficiency.	
	ALCC5	Environmental management activities of enterprises are influenced by the Law on environmental protection of the government	
	ALCC6	Environmental management activities of enterprises are influenced by local communities	
	ALCC7	Environmental management activities of the business are influenced by customers	
	ALCC8	Environmental management activities of enterprises are influenced by financial institutions (banks, insurance, investment funds...)	

	ALCC9	The enterprise should pay attention to pollution incidents that may adversely affect the image and market of the enterprise	
ALMP	ALMP1	Environmental management activities of the enterprise are influenced by competitors	Jamil et al., (2015); Jalaludin et al., (2011).
	ALMP2	Environmental management activities of enterprises are influenced by other enterprises	
	ALMP3	Environmental management activities of the enterprise are influenced by managers in the industry	
ALQC	ALQC1	Enterprises often train employees on issues related to the environment	Jamil et al., (2015); Jalaludin et al., (2011).
	ALQC2	Environmental management activities of enterprises are influenced by members of professional associations such as VACPA, ACCA...	
NTKK	NTKK1	Applying environmental management accounting in our business is not necessary because the costs related to the environment are not significant	Jamil et al., (2015).
	NTKK2	The application of environmental management accounting in enterprises will have difficulty in collecting and allocating costs related to the environment	
	NTKK3	The application of environmental management accounting in enterprises will be difficult because of the lack of cooperation and communication between departments in the issue of organization and application	
	NTKK4	The application of environmental management accounting in enterprises will be difficult because of the lack of experience and guidance documents on the implementation of environmental management accounting	
	NTKK5	The application of environmental management accounting in enterprises will be difficult because they have to consider the financial benefits due to the high cost of implementing environmental management accounting.	
Dependent variable			
KTQTMT	KTQTMT1	Enterprises collect information on environmental management accounting	Nguyen Thi Hang Nga (2019)
	KTQTMT2	Enterprises have information processing and information analysis systems for accounting and environmental management.	
	KTQTMT3	Enterprises provide accounting and environmental management information.	