Journal of Asian Multicultural Research for Social Sciences Study
ISSN: 2708-969X
Vol. 4 No. 2, 2023 (page 041-052)
DOI: https://doi.org/10.47616/jamrsss.v4i2.404

Research on the Factors Affecting Environmental Accounting in Manufacturing Enterprises in Tuyen Quang Province, Vietnam

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Received: June 5, 2023 Received in Revised: July 14, 2023 Accepted: August 2, 2023

Abstract

The paper is based on fundamental theories such as contingency theory, legitimacy theory, and stakeholder theory to evaluate the factors affecting environmental accounting in manufacturing enterprises – a case study in Tuyen Quang province, Vietnam. To solve the research objective of this article, the author used a qualitative method combined with exploratory factor analysis (EFA) by sending a survey to managers and employees in the enterprises. Research results show that there are 5 factors including (1) Enterprise size, (2) Stakeholders, (3) Regulations, (4) Qualifications, (5) Line of business that affect environmental accounting in manufacturing enterprises in Tuyen Quang province. The results are a basis for influencers to propose solutions to promote businesses in the area and apply environmental accounting.

Keywords: Environmental, Accounting, Manufacturing Enterprises

Introduction

According to Md. Hafiz Ullah et al. (2014) indicate that the environment is a vital part of human life that cannot be separated. Wendisch & Heupel (2005) assesses the importance of environmental accounting and the calculation of environmental costs for businesses. This is a considerable advance in the development of environmental accounting (Tsai et al., 2010). Environmental accounting provides information and expenses for environmental accounting to help managers enact policies to operate business activities to bring economic efficiency and improve the environment to develop more sustainably.

According to the results of previous studies in some developed countries such as Germany, Norway, and England, there have some regulations on environmental reporting, especially for industrial enterprises. Nikol (2003) has proved this point with his research results convincingly, on that basis to see how the environmental accounting of each enterprise has operated to protect the environment. Patten (2004) supposed that enterprises make the environmental reports are the enterprises which cause less environmental pollution. In contrast, the enterprises not making the reports have higher pollution risks.

In developing countries such as Malaysia, and India, more and more enterprises are carried out to publish and prepare environmental reports in their reporting system (Chatterjee and Mir, 2008). However, according to Wang Wei (2016), currently listed companies also face some difficulties in the process of making environmental reports as well as disclosing environmental information. According to the author, the reason that listed companies are facing is legal difficulties that companies are not required to prepare environmental reports. Meanwhile, Morsyahiha Mokhtar et al. (2014) presented the reason that it is mandatory for enterprises to prepare environmental reports under the laws, otherwise, it will be difficult to encourage

enterprises to prepare but to do so. Therefore, the reliability of the environmental accounting report is not high.

In Vietnam, Nguyen Anh Tuyet and Nguyen Chi Quang (2006) stated that environmental costs in enterprises account for a large proportion of product costs. Nguyen Thi Hang Nga (2018) studied manufacturing enterprises in Vietnam to see that the environmental costs of these businesses are very low, which is because the perception of business owners about environmental accounting is not high. Currently, environmental accounting is really new to enterprises in Vietnam.

Manufacturing enterprises have played a huge role in the industrialization and modernization development in Tuyen Quang province. According to the report of the People's Committee of Tuyen province, by September 2022, there were about 2,334 enterprises in Tuyen Quang province (including enterprises producing agriculture, forestry and industry, and services). The activities of manufacturing enterprises in the area have many violations of the environment. Specifically, in July 2021, the Inspector of the Department of Natural Resources and Environment of Tuyen Quang province decided to sanction administrative violations of 4 companies related to the field of minerals and environmental protection with a total amount of 300 million VND of which Tan Quang Cement Joint Stock Company was fined up to 120 million VND; Tuyen Quang Automobile Trading Company Limited, Viet Italy Wood Processing and Export Joint Stock Company, Bao Ngoc Trading Investment and Production Company Limited, each company was fined 60 million VND. On January 26, 2022, the Provincial People's Committee issued Decision No. 09/QD-XPHC sanctioning administrative violations with Tan Quang Cement Joint Stock Company- VVMI on the act of emitting dust and emissions containing environmental parameters exceeding the permitted technical regulations with a fine of 3.3 billion VND, causing serious damage to the environment. The People's Committee of Tuyen Quang province, along with departments and authorities regularly direct and have drastic policies in the management of production enterprises to avoid environmental pollution. In addition, the province also issued many policies to support loans and reduce loan interest rates for businesses to encourage production enterprises to develop. Specifically, on July 16, 2021, the People's Council of Tuyen Quang province issued Resolution No. 03/2021/NQ- People's Council on policies to support the development of agricultural, forestry, and fishery production; OCOP products and new rural construction in Tuyen Quang province in the period of 2021-2025. However, the current process of planting, producing, processing agricultural and forestry products, and exploiting minerals has caused negative impacts on the environment. Therefore, to control and manage the environment well, manufacturing enterprises in Tuyen Quang province need to apply environmental accounting.

Environmental Accounting

The USEPA (1995) and IFAC (2005) have given the definition of "Environmental accounting in enterprises is the collection, processing, examination, analysis, and reporting of environmental related information in the form of value and also in-kind to objects inside and outside the enterprise". Thus, the content of environmental accounting in enterprises includes stages from collecting, analyzing, and reporting all issues of enterprises related to the environment, including environmental assets, environmental costs, environmental estimates, environmental information disclosure, environmental material flows, and environmental reports. Thus, the study of environmental accounting in enterprises includes environmental financial accounting and environmental management accounting.

From the overview research and the current situation of enterprises producing and processing agricultural and forestry products in Tuyen Quang province, it shows that enterprises apply environmental accounting at a very low level, which is one of the reasons for limiting taking

initiatives and making decisions that help improve environmental efficiency. Environmental efficiency includes: Producing green and clean products, increasing environmental responsibility, and reducing environmental risks. Since then, there are policies to enhance the efficiency of financial activities for businesses that have not been really focused on by manufacturing enterprises.

Theoretical Basis and Research Models

The Selected Theories in Studying

Contingency theory is a theory developed from organizational theory. The first person to apply this theory to the field of accounting was Khaled Abed Hutaibat (2005). Currently, contingency theory has been applied by many researchers such as Ferreira et al. (2010) and Altohami Otman Alkisher (2013) to assess the effects of enterprise size and staff qualifications affecting the financial resources of the business. Specifically, in this study, the author used theory to assess the size, policies, and qualifications of the staff in the company that affect environmental accounting in manufacturing enterprises in Tuyen Quang province.

Legitimacy theory provides a corridor about the relationship of social organizations with an organization. According to Fernando & Lawrence (2014), business is not an isolated unit, but its existing relationship with society. Meanwhile, Pfeffer & Salancik (1978) explained that businesses are consumers of society's resources, and society will evaluate them through the usefulness and legitimacy of the activities that businesses have created. At the same time, the legitimacy theory also proves that the provision of business information is essential because it affects the enterprise's survival. Therefore, the enterprise can implement its strategy to achieve the goal as well as maintain legitimacy (Chang, 2007).

Stakeholder Theory, a book about successful management written by Freeman (1984) used the stakeholder theory to explain that the success of a business must be concerned with the interests of stakeholders. Prakash (2001) makes a point to classify the power of stakeholders when participating in specific economic activities. Meanwhile, the theory of stakeholders consists of two aspects of the norm (ethics) and management proposed by Deegan (2002), in which the aspect of management refers to satisfying the desire of the stakeholders while the ethical perpective reflects the balancing of the interests of the stakeholders (Fernando & Lawrence, 2014). Thus, this theory deals with the rights and duties of stakeholders but also points out the complexities created by stakeholders, which include accounting accountability (Laan et al., 2009) and environmental management practices (Lai & Fryxell, 2004). Based on these theories, the author builds groups of factors affecting environmental accounting in manufacturing enterprises in Tuyen Quang province, including factors; (1) Enterprise size, (2) Stakeholders; (3) Regulations; (4) Qualifications; (5) Line of business

Research Models

Based on the research results, Mohd and Faudziah (2013), Mia (2005), Doorasamy (2014), Setthasakko (2010) Mousa & Hassan (2015), Lee et al (2005), Lewis & Harvey (2001), Chang (2007), Jamil et al (2015), Pham Duc Hieu & Tran Thi Hong Mai (2012), Le Thi Tam (2017), Jasch (2003), Qian & Burit (2008) these studies have pointed out five factors that affect the application of environmental accounting in organizations and enterprises, specifically as follows;

(1) Enterprise size: From the research results of Mohd and Faudziah (2013), Omar Juhmani (2014) shows that the size of the business has an effect on environmental accounting. For large enterprises, environmental accounting is affected more than for small enterprises. This is proven by studies that show that large enterprises are often interested in social responsibility to affirm their position in the business environment. Therefore, the size of the enterprise has an

influence on environmental accounting in the manufacturing industry in Tuyen Quang province.

(2) Stakeholders: Based on the theoretical framework and inherited research from Bartolomeo et al. (2000) and Faiah Mohd Khalid et al. (2012) to see the binding of organizations and individuals when participating in the business market has mutual rights and responsibilities. Studies have shown that it is required for enterprises to implement whenever customers ask them to ensure their reputation in business, not only product quality but also environmental protection. Besides, the pressure of inspection and examination organizations on the environmental violation indicators of enterprises, enterprises under pressure will perform better environmental accounting. Therefore, in Vietnam, when the departments are involved in the inspection, examination, and verification of environmental indicators, it is imperative that enterprises have to carry out environmental accounting more effectively.

(3) Regulations: According to the research results of CIMA (2009), Che et al. (2015) show that the enterprises implementing environmental management accounting are almost from developed countries because the regulations of developed countries are strict, which requires the enterprises to follow. Thus, the rules of the government, organizations, and agencies affect environmental management accounting.

(4) Qualifications: Altohami Otman Alkisher (2013) affirmed that the qualification factor of accountants has an influence on accounting work in general and environmental accounting in particular. The results of the study were gathered from a survey conducted by the author - a case study of the employees working at the enterprises. The study showed that the staff with high education levels have a better ability to understand and apply environmental accounting than those who are less qualified. Ismail and King (2007) had the same opinion and prove that the qualification factor of staff has a positive influence on the application of accounting in companies.

(5) Line of business: Based on legitimacy theory, it showed that environmental accounting is also affected by the business lines of each type of enterprise. The research results of Kemi C. Yekini et al. (2018) have shown that enterprises operating in the fields of industry, processing, and mining that are contaminated are bound to more strict regulations from the law. Therefore, they always try to hide and limit the provision of information related to environmental pollution, or they will be fined by law. Thus, the business lines also directly affect the data in the accounting report, namely environmental accounting.

Thus, there are 5 factors affecting environmental accounting in manufacturing enterprises in Tuyen Quang province (Figure 1). These factors affect the environmental accounting in enterprises in general and manufacturing enterprises in particular

Methods

Based on an overview of research documents and theoretical basis related to the topic, the author proposes a research model of factors affecting environmental accounting for enterprises in general and manufacturing enterprises in particular, including 05 factors as follows: (1) Enterprise size, (2) Stakeholders; (3) Regulations; (4) Qualifications; (5) Line of business. From the above reasonings, hypotheses for the research model are proposed as follows:

Hypothesis 1: Enterprise size has a positive relation to environmental accounting in manufacturing enterprises in Tuyen Quang province.

Hypothesis 2: The pressure from stakeholders has a positive relation to environmental accounting in manufacturing enterprises in Tuyen Quang province.

Hypothesis 3: Regulations have a positive relation to environmental accounting in manufacturing enterprises in Tuyen Quang province.

Hypothesis 4: Staff qualifications have a positive relation to environmental accounting in manufacturing enterprises in Tuyen Quang province.

Hypothesis 5: Line of business has a positive relation to environmental accounting in manufacturing enterprises in Tuyen Quang province.

Research model is shown in the figure 1 as follows:

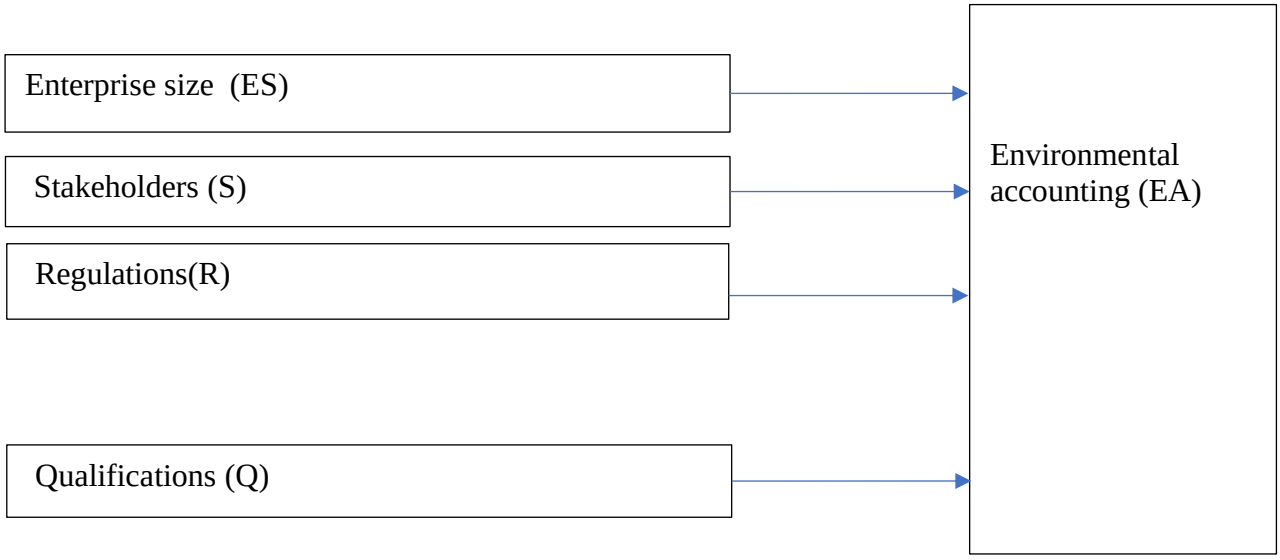

Figure 1. Research Model

To accomplish the research objective, the author used a deductive approach. It means the author based on the theory of previous studies and the results of qualitative research through interviews with experts who proposed the model. At the same time, combined with the inductive method to verify, add observed variables to the questionnaire to conduct quantitative research. Inheriting the research results of Nguyen Thanh Tai (2020), Le Thi Tam (2017), Pham Duc Hieu & Tran Thi Hong Mai (2012) and combining the use of qualitative research methods through interviews with experts, the author used 5 factors affecting environmental accounting in manufacturing enterprises in Tuyen Quang province.

Next, the author conducts a survey through 27 observed variables and is measured by a 5-point Likert scale, the lowest 1 point (least influence) and the highest 5 points (most influence) (Table 1)

The method of data collection is carried out through a survey. The survey subjects are directors, deputy directors, environmental managers and management accounting departments at manufacturing enterprises in Tuyen Quang province.

According to Hair et al. (2006) for the survey in the EFA model, the sample size must be at least 5 times as much as the total number of observed variables. So N = 5 x 27 = 135 observations. To ensure the statistics as well as ensure the reliability of the answers, the author issued 350 survey votes and collected 340 votes. After checking the information on the questionnaire, there were 335 votes to ensure sufficient information to insert information and carry out analysis. Out of 335 surveys collected, about 60 accountants and environmental managers are female, accounting for 17.9%, and the remaining 275 people are male, accounting for 82.08%. Among them, 127 people are working as directors and deputy directors, accounting

for 37.9%; 150 accountants and management accountants accounted for 44.77%; the rest were 58 environmental managers, accounting for 17.31%.

In this study, the author used exploratory analysis method EFA and regression analysis by the SPSS20 software to determine the relationship among factors affecting environmental accounting in manufacturing enterprises in Tuyen Quang province.

Table 1. Observed variables

Variable codes	**Observed variables**
Enterprise size (ES)	
ES1	Revenue of large manufacturing enterprises
ES2	The large number of staff in manufacturing enterprises
ES3	Capital source of large manufacturing enterprises
ES4	Manufacturing enterprises with large market capitalization
ES5	Total assets of large manufacturing enterprises
Stakeholders (S)	
S1	The customers who have demands for information related to environmental accounting such as pollution, product quality and so on.
S2	Investors require information related to environmental accounting such as manufacturing procedure, product quality, food safety, and so on.
S3	The government and agencies have a close supervision on manufacturing procedure.
S4	The employees who have demands for the information related to environmental accounting
Regulations (R)	
R1	Documents with regulations on information disclousure related to environmental accounting
R2	Instructions for implementing environmental accounting
R3	Sanctioning of violations during the implementation of environmental accounting
R4	Regulations on sanctioning of violations related to wastewater, air pollution and so on
Qualifications (Q)	
Q1	Staff with qualifications
Q2	Staff who have been trained on intensive course of environment
Q3	Staff with full of experience
Q4	Staff who are skilled at working
Q5	Staff who are fluent in English and information technology application
Line of business (LB)	
LB1	Enteprise spends money to protect the environment
LB2	Enterprise manufactures the products affecting the environment
LB3	Enterprise cares for environmental reports.
LB4	Line of business of enterprises causes pollution to the environment
Environmental accounting (EA)	
EA1	Environmental accounting for the part of environmental assets
EA2	Environmental accounting for the part of liabilities to the environment
EA3	Environmental accounting for environmental income
EA4	Environmental accounting for the part of expenses for the environment
EA5	Environmental accounting for the part of information disclosure to the environment

Results and Discussion

Cronbach's Alpha Results

To be able to conduct factor analysis, it is essential to check the reliability of the scales through two coefficients, such as Cronbach's Alpha and correlation with the total variable. The condition is that Cronbach's Alpha coefficient must be greater than or equal to 0.6, and the correlation coefficient with the sum variable must be greater than 0.3 (Nunnally & Burnstein, 1994).

From the results of the scale test, it indicates that the largest Cronbach's Alpha coefficient is 0.894 and the smallest coefficient is 0.715, and the correlation coefficients of the total variables are all greater than 0.3. Thus, the scale is guaranteed to be able to conduct analysis based on the EFA model.

Exploratory factor analysis results (EFA)

After checking the scale, select appropriate scales to conduct exploratory factor analysis. Before the analysis, we conducted the KMO and Bartlet coefficient tests. (Table 2)

Table 2: KMO and Bartket Testing

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		0.785
Bartlett's Test of Sphericity	Approx. Chi-Square	3995.321
	Df	231
	Sig.	0.000

To be able to analyze factors, we consider the KMO value, in the study KMO coefficient = 0.785 > 0.5, which means that the data is suitable. In addition, the Barlett test has Pvalue = 0, so the correlated variables are calculated over the population range. The coefficient of variance extracted from the model is 68.374%, which means that the extracted factor will explain 68.374% of the variation. Thus, exploratory factor analysis (EFA) is suitable for the data, and observed variables are correlated with one other (Gerbing & Andersen, 1998), and should use for further analysis.

After the factor rotation, we have 5 factors (Table 3)

The first group includes observed variables: LB3, LB4, LB1, LB2. We named this group as Line of business, denoted by LB.

The second group includes observed variables: ES4, ES1, ES2, ES3, ES5. We named this group as Enterprise size, denoted by ES

The third group includes observed variables: Q2, Q1, Q4, Q3, Q5. We named this group as Qualifications, denoted by Q.

The fourth group includes observed variables: RP3, RP4, RP1, RP2. We named this group as Skateholders, denoted by RP.

The fifth group includes observed variables: R3, R2, R4, R1. We named this group as Regulations, denoted by R.

Table 3. Results of factor rotation

	Component				
	1	**2**	**3**	**4**	**5**
LB3	0.906				
LB4	0.905				
LB1	0.898				
LB2	0.810				
LB4		0.878			
ES1		0.810			
ES2		0.759			
ES3		0.752			
ES5		0.637			
Q2			0.795		
Q1			0.783		
Q4			0.757		
Q3			0.721		
Q5			0.701		
S3				0.818	
S4				0.805	
S1				0.771	
S2				0.657	
S3					0.765
S2					0.755
R4					0.750
R1					0.749

Checking for the convergence of Environmental Accounting variables (Table 4)

Table 4. Component matrix

	Component	
	1	
EA3	0.770	
EA1	0.744	
EA2	0.705	
EA5	0.680	
EA4	0.680	

the components are all greater than 0.5, denoted by EA. Thus, we have enough conditions to carry out the regression.

Table 5 shows the results of the regression analysis.

After having the regression results, we see that the VIF coefficients of all independent variables are less than 2. Thus, there is no multicollinearity here.

Explanatory level of model: According to the results, we have the coeficient R2 (R square) is 0.718 and adjusted R2 (adjusted R square) is 0.713. Thus, the model has explained 71.3%.

Table 5. Regression results

Model		Unstandardized Coefficients		Standardized Coefficients	T	Sig.	Collinearity Statistics	
		B	Std. Error	Beta			Tolerance	VIF
1	(Constant)	0.442	0.127		3.468	0.001		
	LB	0.156	0.026	0.233	6.014	0.000	0.663	1.509
	ES	0.186	0.027	0.251	6.966	0.000	0.764	1.308
	Q	0.117	0.026	0.167	4.464	0.000	0.709	1.410
	S	0.171	0.026	0.247	6.682	0.000	0.725	1.378
	R	0.272	0.035	0.297	7.883	0.000	0.698	1.434

Consistent level of model: Through the analysis of variance results, we have the ratio Sig.<0.01, it can be concluded that the model is consistent with the actual data. In other words, the independent variables are linearly correlated with the dependent variable and the reliability is 99%.

Thus, we have all the independent variables that have a positive impact on the level of environmental accounting application and these variables are all statistically significant.

Conclusion

Through the analysis results, we can see the positive and statistically significant impact of 05 factors: (1) Enterprise size, (2) Stakeholders; (3) Regulations; (4) Qualifications; (5) Line of Business affecting the environmental accounting in manufacturing enterprises in Tuyen Quang province. Based on the research results, the author proposes some recommendations as follows:

Firstly, based on the research results, they show that the factor of Enterprise size has a positive influence on environmental accounting in manufacturing enterprises in Tuyen Quang province. The results of this study are consistent with the study of Mohd Rashdan Sallehuddin, Faudziah Hamin Fadzil (2013). Thus, the size of the enterprise has an effect on environmental accounting. In addition, for large-scale enterprises, the ability to apply environmental accounting is better because the conditions of the enterprise scale such as the number of employees, capital source, and so on have partly affected the implementation of environmental accounting in enterprises.

Secondly, the stakeholder factor affects environmental accounting in manufacturing enterprises positively. The results of this study are similar to the study of Mia, A. H (2005) and some other studies because it shows pressure from stakeholders that affect the environmental accounting of enterprises. Therefore, when there is enthusiastic and rigorous participation of stakeholders, it will put pressure on manufacturing enterprises to perform environmental accounting better as follows: product quality, environmental pollution, and wastewater treatment to meet the standards that the stakeholders require enterprises to implement in the production process.

Thirdly, the factor of regulations has a positive influence on the implementation of environmental accounting in manufacturing enterprises in Tuyen Quang province. At the same time, through qualitative surveys and in-depth interviews with managers, it indicates that managers will apply environmental accounting in the companies when the state enacts laws and regulations that must follow. In addition, the survey results also show that the government's enforcement plays an essential role in the process of implementing environmental costs, helping environmental accounting in enterprises to take on their duties well in business

activities. The results of this study are similar to the results of Herzig's (2012) study, which has explained that in developing countries, the application of environmental accounting is often not as much as in developed countries because developed countries have the financial capacity and the government's enforcement policy is strong enough for businesses to implement. In Vietnam, there is now a 2014 environmental protection law promulgated to reduce environmental pollution caused by enterprises' production, which shows that the Vietnamese government has been making great efforts in promulgating administrative regulations to help manage the environment more effectively. However, in the content of the 2014 environmental protection law, there is no regulation on the application of environmental cost accounting (ECA), so manufacturing enterprises lack specific guidance in the application of environmental accounting in practice. Therefore, to effectively apply environmental accounting in Vietnamese enterprises, it is necessary to involve the Ministry of Finance, the Ministry of Science and Technology Development, and the Ministry of Natural Resources and Environment to develop sets of standards and regulations, and more specific guidance as well as promulgating environmental parameters, environmental costs for each specific field and production industry as a basis for environmental accounting, management accounting in enterprises to finish the tasks assigned.

Fourth, on the business side, managers need to widen their knowledge and qualifications of staff, research results have shown that the qualification factor has a positive influence on the implementation of environmental accounting. Not only that, but the line of business of each enterprise is different as well. Therefore, the impact on environmental accounting is also different. Thus, managers need to have policies to promote a positive environmental strategy to implement environmental accounting best. Because each business has a positive environmental strategy, it will promote solutions to carry out environmental activities in the most effective way. Therefore, in order to apply environmental accounting to achieve high results, it is necessary to have the commitment of managers in the implementation of specific positive environmental strategies such as; allowing technical staff, environmental accountants, and management accountants to participate in intensive training courses on environmental accounting and realize the importance of environmental accounting for each enterprise, especially manufacturing enterprises.

Fifth, based on the actual survey results of in-depth interviews with managers and accountants, it shows that there are some enterprises that do not know about environmental accounting even though they are still doing it in their company. Therefore, in order to apply environmental accounting in Vietnamese enterprises to achieve high efficiency in the future, educational institutions need to introduce teaching about environmental accounting in accounting and environmental fields. This will equip students with full awareness of environmental accounting and enhance practical lessons at enterprises so that students can understand the application of environmental accounting as well as collective accounting and actual cost allocation. At the same time, the research results also show that the community pressure factor also affects the application of environmental economics in production enterprises, which is understandable because the community is the one who can speak up their mind about the effects that businesses cause on the environment such as pesticides, fertilizers, and chemicals because these things may affect the reputation as well as the image of the company. To overcome these pressures, each manufacturing enterprise in Tuyen Quang province needs to constantly make efforts to innovate technology as well as the management accounting system (MA) to control and operate the environment more effectively.

Authors' Contributions

All the authors have equally contributed in this work.

Conflicts of Interest

There is no conflict of interest

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