

Factors Affecting an Application of Environmental Management Accounting: A Case Study of the Automobile Industry in Vietnam

Ngoc Hung TRAN¹, Thi Thuy Hanh NGUYEN², Thi Phuong NGUYEN³

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Abstract

This study aims to find out and measure the level of factors affecting the applicability of environmental management accounting (EMA) in Vietnamese automobile industry enterprises. Data was collected using both quantitative and qualitative methods. First, in general research, qualitative methodology was used to find out factors (variables) that can impact the possibility of implementing EMA in Vietnamese automobile enterprises. Second, in detailed research, all variables are measured using a quantitative method by collecting data through sampling and sending questionnaires. 500 questionnaires were sent to automobile enterprise managers and only 352 questionnaires met the criteria for the data analysis. The study used a mixed research design approach- a procedure for collecting, analyzing, and “mixing” both quantitative and qualitative research and methods in a single study to understand the research problem. Results show that 7 factors affect the possibility of implementing EMA in Vietnamese automobile industry enterprises. These factors are coercive pressure, normative pressure, mimetic pressure, business environmental uncertainty, environmental strategy, benefits when applying EMA, and task complexity. Based on the results of the study, promoting EMA in the automotive industry should depend mainly on the role of governmental departments.

Keywords: Environmental Management Accounting, Affecting Factors, Automobile Industry

JEL Classification Code: M40, M41, M14

1. Introduction

People in the world are becoming conscious about energy use. They are aware of the dangers of climate change and environmental pollution, now more than ever. Amazon burning, COVID-19 pandemic, etc. have been originated from noticeable environmental threats, and seriously affecting the human future. Especially, the automotive industry has been considered as the largest contributor to air pollutant emissions (Sharma & Sharma, 2014). Therefore,

to lead the world to sustainable energy consumption, people are actively seeking a healthier alternative for transportation such as electric vehicles. Most of the activities related to the automobile industry, directly or indirectly, have a significant impact on the environment. For the automotive enterprises whose operations have a greater impact on the environment, applying EMA is especially critical since environmental impacts are much more apparent in this industry.

For the 2025–2035 Vietnamese Automobile Industry Development Strategy, the automotive industry in Vietnam must ensure the overall socio-economic efficiency as well as environmental requirements. This means that the Vietnamese automobile industry must also catch up with the trend of saving energy as well as meet domestic demand, and participate in the worldwide manufacturing chain. Therefore, there is a great need for an efficient and systematic economic system to provide accounting information for the management of the automobile manufacturing industry in Vietnam. To catch up with the trend of stable development by saving energy when participating in the worldwide manufacturing chain, there is a need for efficient and systematic management methods to provide accounting information related to environmental issues for making decisions in the automobile manufacturing

¹First Author and Corresponding Author. Lecturer, Faculty of Accounting and Auditing, Industrial University of Ho Chi Minh City, Vietnam [Postal Address: 12 Nguyen Van Bao St., Ward 4, Go Vap Dist., Ho Chi Minh City, 08408, Vietnam]
Email: tranngochung@iuh.edu.vn

²Lecturer, Faculty of Accounting and Auditing, Industrial University of Ho Chi Minh City, Vietnam. Email: nguyenthithuyhanh@iuh.edu.vn

³Faculty of Accounting and Auditing, Industrial University of Ho Chi Minh City, Vietnam. Email: nguyenthiphuong@iuh.edu.vn

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industry. So, this study has provided important insights into the factors that influence the acceptance and adoption of EMA in general, and specifically in the Vietnamese automobile industry. More importantly, this study has opened up possibilities for further research into EMA adoption in Vietnam and worldwide.

2. Literature Review and Hypotheses

EMA practices become important for enterprises because of internal and external implications. EMA addresses the management information needs of managers for corporate activities that affect the environment, as well as environment-related impacts on the corporation. EMA information disclosure can help to enhance a firm's image. EMA is the identification, collection, analysis, and use of two types of information for internal decision making. The first is physical information on the use, flows, and rates of energy, water, and materials (including wastes). The second is monetary information on environment-related costs, earnings, and savings (Jamil et al., 2015). Hence, EMA helps firms in identifying and estimating the costs of environment-related activities. Based on that, it helps decide better pricing strategies and also leads to effective performance evaluation.

In general, managers can use EMA tools to identify the impact of the organization's activities on the environment. In addition, they can also use related environmental information for making decisions. However, in a developing economy such as Vietnam, implementing EMA practices are affected by both internal and external factors. Nguyen et al. (2020) investigated Environmental Accounting Information (EAI) as well as factors affecting the environmental accounting implementation by the construction firms listed on the Ho Chi Minh Stock Exchange (HOSE), Vietnam. After eliminating seven enterprises that lacked data, the authors selected a sample of 112 observations from 28 construction businesses listed on the Ho Chi Minh Stock Exchange in the period 2015-2018. This study used research data extracted from the companies' annual reports. The results showed that construction companies listed on the Ho Chi Minh Stock Exchange have both internal and external factors affecting EIA implementation.

2.1. Coercive, Normative, and Mimetic Variables and EMA

Government could apply the environmental rules to create coercive pressures on enterprises to choose and implement EMA. Jamil et al. (2015) investigated factors and barriers, which influence the practice of EMA. This study focused on SMEs, specifically, Malaysian manufacturing SME firms. The study argued that coercion is a dominant factor for practicing EMA and therefore, the Malaysian government and other authorities should resolve barriers to EMA

development. Their study was in line with institutional theory, which considers the processes by which structures, including schemes, rules, norms, and routines, become established as authoritative guidelines for social behavior. However, their results concluded that both normative and mimetic pressures do not contribute significantly to EMA practices. Nguyen et al. (2020) found that Vietnamese governmental regulations, as well as environmental management agencies' legal documents have the strongest influence on environmental information disclosure of listed companies.

H1: Coercive pressure will have a positive impact on the possibility of implementing EMA in Vietnamese automobile enterprises.

H2: Normative pressure will have a positive impact on the possibility of implementing EMA in Vietnamese automobile enterprises.

H3: Mimetic processes will have a positive impact on the possibility of implementing EMA in Vietnamese automobile enterprises.

2.2. Environmental Variables and EMA

Al Kisher (2013) examined the factors that influenced EMA adoption. Specifically, it investigated the influence of the dominant factors in the organizational, environmental and technological contexts on firms' intentions to adopt EMA. The results revealed that age, education level, and tenure in position were among the influential factors on firms' intention to adopt EMA. Furthermore, the results also revealed that organizational, environmental, and technological variables significantly influenced firms' intention to adopt EMA. The results of this study complied with Qian et al. (2011)

H4: The business environmental uncertainty will have a positive impact on the possibility of implementing of EMA in Vietnamese automobile enterprises.

H5: The environmental strategy will have a positive impact on the possibility of implementing of EMA in Vietnamese automobile enterprises.

2.3. Benefit, Task Complexity Variables, and EMA

According to contingent theory, the application of EMA is affected by internal and external factors. As a result, previous research had concluded that task complexity had an impact on EMA adoption (Qian et al., 2011). Task Complexity is the rule of performing a given task under certain conditions that the performer needs to take into account for completing the task as required. Besides pressure and barriers to EMA practices, there are some common benefits that could motivate organizations to comply with environmental sustainability, respond to stakeholder influences, and achieve competitive

advantage (Burritt et al., 2003; Doody, 2010). According to Gray and Bebbington (2001), motivation for implementing EMA is divided into legislative motivation and market-based motivation, which can lead to additional revenue streams and cost-saving opportunities for an organization (Bennett et al., 2003; Burritt et al., 2003; Doody, 2010; Lee, 2011; Schaltegger et al., 2011).

H6: *The benefit will have a positive impact on the possibility of implementing of EMA in Vietnamese automobile enterprises.*

H7: *The task complexity will have a positive impact on the possibility of implementing of EMA in Vietnamese automobile enterprises.*

Based on the hypotheses above, the conceptual framework of this study is depicted in Figure 1.

3. Research Methods

3.1. Research Model

In general, based on previous research and some theories, the model is as below:

$$Y = \beta_1 \times \text{COER} + \beta_2 \times \text{NORM} + \beta_3 \times \text{MIME} \\ + \beta_4 \times \text{BUEU} + \beta_5 \times \text{ENVS} + \beta_6 \times \text{BEN} \\ + \beta_7 \times \text{TASK} + \varepsilon$$

where:

Y: possibility of implementing of EMA in Vietnamese automobile enterprises;

α : constant term;

β_i : coefficient of variables;

ε_i : Residual.

The variables COER, NORM, MIME, BUEU, ENVS, BEN, and TASK represent coercive pressure, normative pressure, mimetic processes, business environmental uncertainty, environmental strategy, the benefit gained when implementing EMA, and task complexity in Vietnamese automobile enterprises.

3.2. Data Collection

During the research process, data was collected using both quantitative and qualitative methods. First, in general, research, the qualitative methodology is applied to find out factors (variables) that can impact the possibility of implementing EMA in Vietnamese automobile enterprises, and then the researchers adjust and add more factors from group discussion and interviews of experts. Second, in detailed research, all variables are measured using a quantitative method by collecting data through sampling and sending questionnaires. Using the software SPSS 26.0, the researchers check the research model, theoretical model, and hypotheses with the EFA. 500 questionnaires were sent to automobile enterprise managers and only 352 questionnaires met the criteria for data analysis. The study used a mixed research design approach- a procedure for collecting, analyzing, and “mixing” both quantitative and qualitative research and methods in a single study to understand the research problem. The response rate was 70.4% - higher than expected - since EMA is still new in Vietnam.

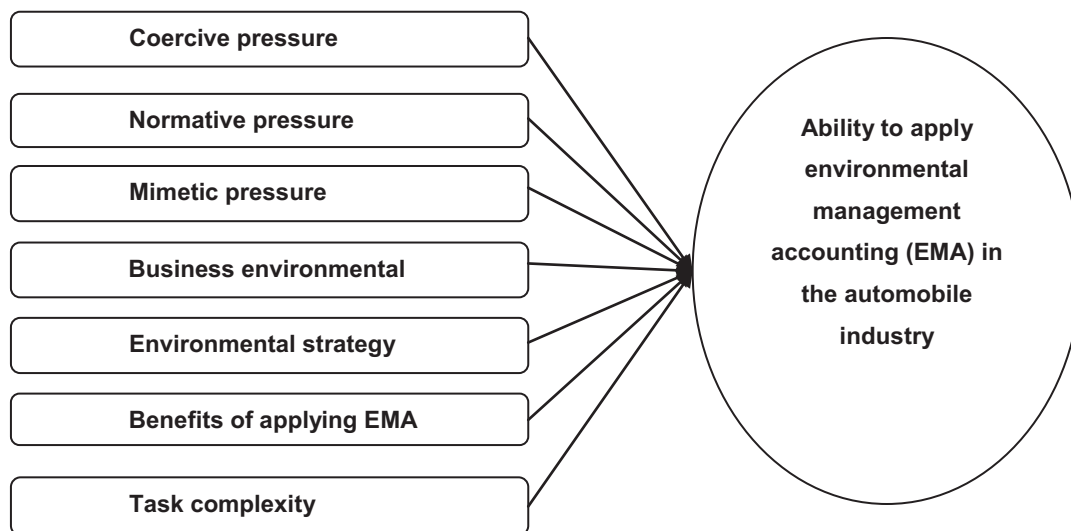


Figure 1: Research Model

4. Results

The finding shows that the majority of the respondents are from enterprises with 100% foreign investment capital (40.06%) and State-owned enterprise (28.13%); respondents from other types constitute only a minority (see Table 1). The result also reveals that the majority of

the respondents are from small and medium enterprises (94.89%); it also shows the degree of the accountant has improved recently with 54.27% with a bachelor's degree or higher. This result suggests “accounting human resources” in the automobile industry field are aware of EMA activities as well as how these activities are vital for global sustainability in the future.

Table 1: Profile of Respondents (N = 352)

Characteristics		Frequency	Percentage
Degree of the accountant at the business	From intermediate / college or higher	175	49.72
	From bachelor or higher	177	50.28
Academic level	College	161	45.74
	Bachelor's degree	153	43.47
	The Master degree	21	5.97
	Doctor of Philosophy	17	4.83
Working position	Financial accountant	128	36.36
	Management accountant	146	41.48
	Chief accountant	49	13.92
	Chief Financial Officer	16	4.55
	Other	13	3.69
Time working in the accounting field	Less than 5 years	151	42.9
	From 5 to less than 10 years	155	44.03
	From 10 to less than 20 years	25	7.1
	Over 20 years	21	5.97
Time working in the auto industry	Less than 5 years	149	42.33
	From 5 to less than 10 years	141	40.06
	From 10 to less than 20 years	43	12.22
	Over 20 years	19	5.4
Business size	Small (10–200 staffs)	161	45.74
	Medium (200–300 staffs)	173	49.15
	Large (>300 staffs)	18	5.11
Type of business ownership	State-owned enterprise.	99	28.13
	Enterprises with 100% foreign investment capital	141	40.06
	Joint-venture company	43	12.22
	A joint-stock company with state-owned capital	19	5.4
	A joint-stock company without state-owned capital	35	9.94
	Other form type	15	4.26
The enterprise has an organized management accounting segment	Not having an independent management accounting segment	102	28.98
	Financial accounting / Chief accountant takes over the work of management accounting.	184	52.27
	Having an independent management accounting segment	66	18.75

The test results in Table 2 show that $KMO = 0.738 > 0.5$, and Bartlett test is statistically significant with $P\text{-value} < 0.05$. Thus, it is appropriate to use the EFA model to evaluate the scale values of the independent variables.

The analytical results in Table 3 show that 59.299% (> 50%) of change in the factors is explained by the observed variables. Hence, we can conclude that the factor analysis model (EFA) is suitable and the scale is accepted.

Using 35 observed variables, to achieve the reliability of the factors of 7 independent variables, the researchers perform a factor analysis test (EFA), and the results are shown in Table 4.

Factor analysis results (EFA) for independent variables of the rotation factor matrix (Table 4) show that all factor loading of the observed variables satisfy the condition (that is values are greater than 0.5) and the number of factors created in factor analysis is 7. This is consistent with the initial hypothesis of the corresponding measurement variables for each factor.

The results in Table 5 showed that adjusted R^2 coefficient = 68.9% > 50%, at the same time, the F -test in the ANOVA

table (Table 6) showed that this value was statistically significant for Sig. < 0.05. From that conclusion, the model is appropriate and the independent variables (COER, NORM, MIME, TASK, ENV5, BEN, BUEU) explained 68.9% of the change in the dependent variable Y (ABIL). The balance 32.1% is explained by factors that are not considered in the model.

From the results in the regression weight table (Table 7), the regression equation is determined as follows:

$$Y = 0.407 \times \text{COER} + 0.313 \times \text{NORM} + 0.178 \\ \times \text{MIME} + 0.245 \times \text{TASK} + 0.232 \times \text{EVNS} \\ + 0.250 \times \text{BEN} + 0.239 \times \text{BUEU}$$

5. Discussions and Conclusion

The above sections mention that the pressure from governmental departments has the most significant influence on the possibility of implementing EMA practices, followed by pressure from related parties such as environmental protection organizations, environmental interdisciplinary management agencies, customers' interest, etc. More detailed circulars, decrees, guidance books from governmental offices and environmental agencies can push Vietnamese automobile enterprises to adopt EMA activities. In addition, managers are willing to implement EMA-related tools if they are confident that the enterprise will be financially benefited or be able to improve the product costs, increase competitive advantage, etc. Contrary to the benefit, coercive, or normative factors, task complexity has a negative impact on EMA implementation. In the automobile industry, it is not easy to

Table 2: KMO and Bartlett Testing for the Scale of Independent Variables

Kaiser-Meyer-Olkin Measure of Sampling Adequacy		0.738
Bartlett's Test of Sphericity	Approx. χ^2	6966.1228
	Df	595
	Sig.	0.000

Table 3: Table of Variance Extracted for the Scale of Independent Variables

Total Variance Explained									
Component	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	4.419	12.625	12.625	4.419	12.625	12.625	3.72	10.629	10.629
2	4.106	11.731	24.356	4.106	11.731	24.356	3.281	9.375	20.004
3	3.215	9.186	33.542	3.215	9.186	33.542	3.103	8.866	28.87
4	2.865	8.186	41.728	2.865	8.186	41.728	2.964	8.468	37.338
5	2.346	6.703	48.431	2.346	6.703	48.431	2.759	7.882	45.22
6	2.058	5.88	54.31	2.058	5.88	54.31	2.6	7.428	52.647
7	1.746	4.9859	59.299	1.746	4.989	59.299	2.328	6.652	59.299
								

Extraction Method: Principal Component Analysis.

Table 4: Matrix of Rotational Factors

Rotated Component Matrix							
	Component						
	1	2	3	4	5	6	7
COER2	0.887						
COER5	0.883						
COER3	0.775						
COER1	0.762						
COER4	0.641					0.295	
COER6	0.632					0.3	
NORM2		0.856					
NORM3		0.839					
NORM4		0.838					
NORM1		0.719					
NORM5		0.703					
TASK2			0.851				
TASK3			0.821				
TASK4			0.726				
TASK1			0.685				
TASK5			0.618		0.286		
BUEU1				0.812			
BUEU3				0.733			
BUEU2				0.729			
BUEU4				0.723			
BUEU5				0.682			
BEN1					0.803		
BEN4					0.784		
BEN2					0.768		
BEN5					0.739		
ENVS5						0.737	
ENVS4						0.714	
ENVS3						0.649	
ENVS1						0.643	
ENVS2						0.611	
MIME3							0.703
MIME1							0.697
MIME2							0.695
MIME4							0.621
MIME5							0.58

Extraction Method: Principal Component Analysis.

Rotation Method: Varimax with Kaiser Normalization.

Rotation converged in 6 iterations.

Table 5: Summary of Regression Model

Model Summary										
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics					Durbin-Watson
					R Square Change	F Change	df1	df2	Sig. F Change	
1	0.834a	0.695	0.689	0.21452	0.695	111.956	7	344	0	1.806

^aPredictors: (Constant), BUEU, BEN, COER, ENVS, MIME, NORM, TASK.

^bDependent Variable: Y.

Table 6: ANOVA Table

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	36.066	7	5.152	111.956	0.000b
	Residual	15.831	344	0.046		
	Total	51.898	351			

^aDependent Variable: Y.

^bPredictors: (Constant), BUEU, BEN, COER, ENVS, MIME, NORM, TASK.

Table 7: Regression Weighting Table

Model		Unstandardize Coefficients		Standardized Coefficients	t	Sig.	Collinearity Statistics	
		B	Std. Error	Beta			Tolerance	VIF
1	(Constant)	0.100	0.141		−0.712	0.477		
	COER	0.160	0.012	0.407	13.164	0.000	0.927	1.079
	NORM	0.130	0.013	0.313	10.164	0.000	0.936	1.068
	MIME	0.127	0.022	0.178	5.872	0.000	0.962	1.040
	TASK	0.153	0.021	0.245	7.367	0.000	0.800	1.249
	ENVS	0.180	0.024	0.232	7.630	0.000	0.963	1.038
	BEN	0.155	0.021	0.250	7.554	0.000	0.811	1.233
	BUEU	0.120	0.015	0.239	7.863	0.000	0.963	1.039

^aDependent: ABIL.

apply the EMA tools since the process is too complicated or takes a lot of effort, technical tools and highly qualified staff are required, etc. As a result, there must be a balance between the benefits received from EMA implementation and the cost of EMA implementation. These results are consistent with previous studies such as Qian et al. (2011). Moreover, recent trends of sustainable development have led enterprises, especially in a sensitive industry like automotive, to state their confirmation and declare their responsibility to society

in their environmental strategy (plan). They should have no choice but improve their image by adopting innovation tools such as EMA. Last but not least, this study finds that the implementation of EMA in competitors, including both local and multi-national groups, can also affect the willingness to adopt EMA practices in Vietnamese automobile enterprises.

Based on the results of the study, promoting EMA in the automotive industry should depend mainly on the role of governmental departments. Interministerial agencies

belonging to the Ministry of Industry and Trade and the Ministry of Natural Resources and Environment should work together to issue specific guidelines and continuous training in EMA implementation. Besides, the Ministry of Finance should carry out favored issues concerning investments, tax incentives, etc. to motivate Vietnamese automobile enterprises to adopt EMA. However, due to the limitation of time and resources this study could not examine many other factors that impact EMA implementation. Hence, future research must investigate other factors (not included in the study) that impact the EMA implementation.

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