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Applying Environmental Cost Management Accounting in Brick Production Companies – Evidence from Vietnam

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Abstract
Application of environmental cost management accounting (ECMA) in companies is becoming increasingly clear, especially in production sector. ECMA has attracted significant attention and it is a useful tool for improving environmental performance and enhancing financial benefits. However, in Vietnam, ECMA has not really become popular and is considered a new field in both research and practice. Thus, the paper will focus on researching application of ECMA in brick production companies that has negative impacts on the environment. Research objectives is to determine factors that influence application of ECMA in Vietnamese brick companies. So that author presents two theories to construct five hypotheses about factors impacting on ECMA application including contigency theory and institutional theory. The study uses qualitive research methods to explore influence factors. Results show that five factors including government coercion pressure, normative pressure, memitic pressure, positive environment strategy and managers' perceipt of environmental uncertain have positive relationships with ECMA application. Derived from factors, the study provides some recommendations on brick production companies, the government and stakeholders to increase level off ECMA application.
Keywords: Brick Production Companies, Environmental Cost Management Accounting (ECMA), Contigency Theory, Institutional Theory, Vietnam.

1. Introduction

In the process of international economic integration, Vietnamese companies are facing many challenges including environmental issues. It is fact that business activities of companies are causing negative impacts on the environment and this will reduce their image, prestige and peformance efficiency. In order to integrate more deeply into the world and regional economies as well as to achieve the goal of sustainable development, companies need to control and prevent negative environmental impacts. This can only be solved by linking environmental information into company's accounting system.

At present, in the world a large number of companies collect, use and report on environmental costs. This reflects a significant change over the past two decades (Rikhardsson et al., 2005; Ahmad, 2012). Environmental impacts have resulted in significant increases in environmental costs when regulations become increasingly stringent, such as environmental penalties, waste disposal costs, pollution prevention and management costs, investment costs of producing environmentally friendly products (Niap, 2006). Therefore, to manage and control environmental costs, companies needs to collect, analyze and provide environmental costs. Environmental cost management accounting (ECMA) becomes a useful tool to meet the above requirements. Bennett & James (1998) argue that ECMA is to measure and use financial information (monetary information) and non-financial information ((physical information) related to the environment to improve environmental efficiency (increasing environmental responsibility, reducing environmental risks, producing environmentally friendly products), and increase financial performance (using resources efficiently, saving costs, increasing profits). Thus, ECMA can integrate environmental aspects into management accounting system and make decision (Epstein, 1996).

ECMA application is becoming increasingly clear. In fact, ECMA has paid in attention and is appreciated as a supporting tool for environmental management. ECMA is no longer a Western phenomenon because it is spreading all over the world including developed and developing countries, and it has been widely adopted at a rapid speed in Asian countries (Rikhardsson et al., 2005; Bennett & James, 2005). However, ECMA is not popular in Southeast Asian countries and very few research of ECMA application in these countries are available (Herzig, 2012). In Vietnam that is no exception, ECMA is considered a new field in both research and practice.

Vietnam is striving to become an industrialized country by 2020. Building material production companies in general and brick production companies in particular play a significant role in the development for industrialization and modernization of the country. High economic growth along with rapid urbanization make the demand for urban space increase and the number of bricks raise. However, technology of producing bricks in present causes negative impacts on the environment such as: consuming a huge amount of resources, causing erosion which seriously affects ecosystems and landscapes. In addition, brick production has created toxic emissions that impact on the environment, human health and increase environmental disposal costs as well as polluted prevention and management costs. With the large number of brick production companies in Vietnam and the importance of this sector in the economy, environmental cost information needs to be managed.

The main content of the paper is to focus on reseaching factors affecting to ECMA application through

qualitive research method. From the results of the study, the author gives some implications for promoting ECMA practice in Vietnamese brick production companies such as: on the side of companies, on the side of the government and on the side of stakeholder.

2. Theoretical framework

The paper uses two theories consisting of Institutional Theory and Contigency Theory to analysis factors effecting ECMA application in brick production companies in Vietnam.

2.1. Institutional theory

According to this theory, institutional context in which awareness of the environment is increasing has affected the ECMA practice (Chang, 2007). If institutional pressure on ECMA adoption increases, the organization will act consciously to match the expectations of the society. Through institutional theory, Qian & Burritt (2009), Jalaludin et al. (2011), Jamil et al. (2015) have developed a relationship between application of ECMA and three pillars including: *Coercive pressure of the government, Normative pressure, Mimetic pressure.*

(1) Coercive pressure of the government

The first and most obvious institutional process was the coercive pressure of the government. This pillar reflects the regulatory provisions that provide organizations with power as well as rules to explain information (DiMaggio & Powell, 1983). According to Namakonzi & Inanga (2014), the key role of the government is to establish laws, regulations, standards and policies towards sustainable development. Governments can help organizations to recognize ECMA role in internal governance decisions (Mia, 2005; Doorasamy, 2014). Governments such as Japan, Korea, the United States, the Czech Republic have issued the ECMA guidelines which encourage organizations to monitor, collect and report environmental costs. This shows that the legal obligation has a significant influence on the organization's decision including the decision for applying ECMA (Setthasakko, 2010).

Organizational changes to environmental performance can be viewed as a direct response to the government's mandatory environmental requirements (DiMaggio & Powell, 1983,150). Doorasamy (2014) argues that companies are not ready to apply ECMA unless they are required to do by law. A number of studies have suggested that government's coercive pressure which is a significant motivation for achieving sustainability goals and strongly impact on application of ECMA (Mia, 2005; Qian & Burritt, 2008; Doorasamy, 2014). So, the first hypothesis was proposed:

Hypothesis 1: Government's coercive pressure is positively relationship with ECMA application in Vietnamese brick production companies.

(2) Normative pressure

Normative pressure arises primarily from professionalism which can occur through education and professional development (DiMaggio & Powell, 1983). Education and professional development are the foundations of values and habits within a specific field. The result of education and professional development is that trained staff will have a say in influencing and legalizing the habits and activities of the organization where they work. Professional behavior can be transmitted through two channels. One channel is through education and the other channel is the building and expansion of professional networks within organization (Qian & Burritt, 2008). Thus education and professional development are very important factors for the development of ECMA (Jalaludin et al., 2011).

A comprehensive ECMA system will emphasize the involvement of professionals in the relevant departments and the link between their expertise. ECMA practice requires a team with skills in accounting and environmental management. As the more robust, the more closely the connectivity from individuals directly holding the management accounting and environmental management functions becomes, the greater applicability of ECMA in Vietnamese brick production companies is. The second hypothesis is developed:

Hypothesis 2: The normative pressure is positively relationship with ECMA application in Vietnamese brick production companies.

(3) Mimetic pressure

Qian & Burritt (2008) argues that when certain behaviors or social relationships are accepted and absorbed in one area, members tend to behave in ways that are acceptable or attentive from other members. This mechanism is called mimetic pressure which emphasizes the effects of social network. This network creates an internal field where organizations engage and interact frequently together (DiMaggio & Powell, 1983). When there are enough actors in the field that the organization works in the same way, the concrete action is institutionalized and other agents must choose to imitate it as a safe and effective strategy or to gain competitive advantage ((DiMaggio & Powell, 1983; Fernando & Lawrence, 2014).

Jennings & Zandbergen (1995) argue that if the practice appears to have ecognized values or standards (such as green market development, waste recycling), the organization will have an actions to imitate other organizations instead of doubt about the values and standards of the practice. Similarly, if ECMA concepts and

methods are widely considered in a particular field, organizations operating in the field are more likely to mimic other organizations to apply those ECMA concept and methods. Therefore, the development of ECMA may be encouraged by mimetic pressure (Qian & Burritt, 2008). The next hypothesis is developed:

Hypothesis 3: Mimetic pressure is positively relationship with ECMA application in Vietnamese brick production companies.

2.2. Contingency theory

Contigency theory and institutional theory are used the most commonly to explain the reasons for EMA practice in general and ECMA in particular (Schaltegger et al., 2011; Qian et al., 2011). Bouma & Van der Veen (2002) argue that contigency theory has the potential to explain environmental accounting, especially EMA. From the viewpoint of contigency theory, two factors for application of ECMA were developed by many scientists including positive environmental strategy and managers' perception of environmental uncertainty (Parker,1997; Chang,2007; Qian & Burritt,2009).

(*1) Positive environmental strategy*

Parker (1997) was the first person to apply the contigency theory to consider environmental strategies affecting accounting systems in organizations. Parker (1997) suggests that the accounting system is expected to improve and change in order to support the environmental strategy. If the organization has a proactive and preventive environmental strategy in the future, a broad and innovative accounting system will be used to support and facilitate the implementation of the environmental strategy (Parker, 1997; Qian & Burritt, 2009). Guo (2008) argues that organizations with different environmental strategies may require different management information systems to improve organizational performance. Information systems can impact on the success of an organization by shaping its strategy. As part of the information system, the accounting system also affects application and implementation of environmental strategies. Therefore, in order to facilitate the linkage of environmental strategies into the management information, accounting system needs to be changed.

When an organization chooses to adopt a positive and active environmental strategy, it is certain that the organization will change the management accounting system and practice it more efficiently (Chang, 2007). In contrast, with organizations pursuing negative and passive environmental strategies, the management accounting system is less likely to be improved. Therefore, the positive environmental strategy helps the ECMA system to innovate and become more sophisticated (Parker, 2000). It is proposed:

Hypothesis 4: Positive environmental strategy is positively relationship with ECMA application in Vietnamese brick production companies.

(2) Managers' perception about the uncertainty of the environment

Lewis & Harvey (2001) proposes a scope for measuring environmental uncertainties including: changes in government environmental policies; changes in environmental resources used by organizations; green competition; changes of environmental technology in the industry; changes in behavior of the stakeholders in the organization and the major environmental issues affecting the organization (Quoted in Chang, 2007, pp.72). It seems that environmental uncertainty is a potential contingency variable affecting the decision to adop or not to adopt ECMA.

In contigency theory, environmental uncertainty is considered as an important variable used in general management accounting practice. When environmental factors are perceived by managers as more difficult to measure, managers will tend to process information more appropriately to address uncertainties (Gordon & Narayanan, 1984). ECMA play a very important role in providing environmental cost information and deal with uncertainties (Qian & Burritt, 2009). Chang (2007) agrees that it is necessary to classify and re-establish the traditional management system to meet the increasing need for environmental information. Therefore, if managers are aware that the organization is suffering from high levels of environmental uncertainty, they will innovate their accounting systems to provide information that minimizes environmental impact and manage environmental costs better.

Environmental management is becoming significant interest of brick production company because it affects the image and reputation of the enterprise, then influence the efficiency of business operations. If managers increase awareness of the environment, they will make efforts to find an effective environmental management tool. Therefore, the seventh hypothesis is:

Hypothesis 5: The managers' perception of environmental uncertainty is positively relationship with ECMA application in Vietnamese brick production companies.

3. Research methodology

3.1. Data collection

The study collected qualitative data by using in-depth interview method. Interviewees include chief accountants, environmental managers, directors and deputy directors in size - medium and large companies. The number of managers interviewed are 15 people, including 4 directors, 3 deputy directors, 4 chief accountants and 4

environmental managers. The average length of experience is 7.2 years with the longest time by 12 years and the shortest time by 4 years.

The first interviewees are director and deputy director. They are responsible for management, allocation and use of resources in their enterprise and environmental issues are a part of their management operations. The next interviewees are head of management accounting department or equivalent position responsible for collecting, processing and providing information for internal management needs. This is related to how environmental costs is calculated, aggregated and distributed, whether environmental costs is considered in the business decisions. The fourth interviewees are environmental managers who track and monitor environmental performance, understand environmental policy, environmental regulatory and supply environmental reports. However, not all businesses have their own environmental management department and so related managers will also be selected for alternative interviews. In addition, some additional individuals suggested by the interviewees are also contacted by phone or email to obtain detailed and necessary information on a number of questions.

Prior to the interviews, an invitation letter and interview questionnaire were sent to managers to facilitate the preparation answers before interviews were conducted. Participants are advised that the interview will take up to 2 hours. The information collected is recorded fully and is confidential at the request of the interviewees. Information is used as a basis for next research and is important evidence. When additional data is needed, the author contacts back by phone or email if the previous answers are unclear or missing. In-depth interviews are not also guided by development proposals from theory, but also allow participants to talk freely in order to discover new perspectives.

3.2. Process and analyze data

Participants are encrypted with their own notation, ensuring confidentiality of their information. Qualitative data were analyzed by the following steps (Nguyen Van Thang, 2013):

Step 1: Synthesize the data into the word file. The answers of 15 respondents were recorded carefully and completedly in the word file.

Step 2: Define the keywords. The author reads each quotation in the data file and identifies the key phrases that best describes the content of the quote. This is also a step for the author to find new concepts and views from the data.

Step 3: Create excel file to enter and process interview data. The excel file contains the characteristics of the respondent (name, gender, age, position, work unit, work experience, training) and response content (ECMA, Factors impacting on application of ECMA and selected EC methods). Key words and phrases in the same content are grouped into a research topic to make it easier to compare, analyze and synthesize answers.

4. Research results

(1) Government pressure is positively relationship with application of ECMA

ECMA practice in Vietnam is developing in the early stages. Brick production companies are facing many barriers to integrate environmental issues into the management accounting system. One of the main barriers is the lack of pressure from the government. Respondents said that they felt there was not much pressure from the government to increase accountability on the environment therefore ECMA pays less attention in brick production companies. Although the government issues regulations on environmental management, the government does not require mandatory disclosure of environmental cost accounting related issues. There are also no guidelines of ECMA from the government to help companies adjust accounting practices to address environmental issues, as some managers said:

There are many institutional regulations such as penalties causing environmental consequences, environmental fees and taxes, but the disclosure of environmental costs does not appear in government regulations. (Environmental Manager)

We do not have any external pressure for managing environmental costs. There is no legal regulation other than compliance with environmental regulations therefore there is no pressure to force us to account for environmental costs. (Deputy Director)

Vietnamese government is not promulgate ECMA regulations or guidelines which encourage brick production companies to put environmental issues into practice. It may lead to difficulties in collecting, identifying and evaluating environmental cost data, especial related to decisions for waste management and polluted prevention. Therefore, in order to develop ECMA, the government should issue environmental accounting rules, standards and guidelines to enable brick companies to identify, measure and disclose environmental cost information.

Respondents support that the government should have regulations to control or manage environmental costs. As a result, businesses will change their current accounting system to comply with regulations. The viewpoints of some managers explain this such as:

We live and work under the law so government regulations are very coercive. If businesses are required to provide environmental cost information from the government, they will inevitably have to collect them. (Director)

The government does not require us to disclose information about environmental costs. This is voluntary and we are entitled to take the initiatives. However, if there is an explanation of environmental costs, then we must do it. I think government is a very decisive factor to help businesses control their environmental costs. (Environmental Manager)

(2) Regulatory pressure is positively relationship with ECMA application

It is found that there was a low level of management accounting department for environmental management practices. Management accountants have few roles for environmental management and they are significant influenced by traditional accounting rules and regulations. Management accountants believe that the environmental management department address environmental issues better. They do not look at measuring and evaluating environmental costs as part of their work. This is explained by the fact that management accountants are limited by their knowledge and skills in environmental information and they are not aware themselves as leaders in the ECMA system. As a result, environmental issues are not integrated into current accounting practices and managers do not have opportunities to use environmental information for making appropriate decisions.

If environmental costs are measured, I think we can control it and increase the chances of cost savings, more reasonable cost allocation, and more accurate product pricing. However, qualifications and professional experience is major obstacles for my business. We have very little knowledge in this field. (Director)

In order to promote ECMA, brick production companies should provide a learning mechanism for the management accounting department, including enhancing understanding and skills in environmental management and grasping the way in identifing and measuring environmental costs. This mechanism not only helps environmental information to be reflected clearly in the accounting system but also enhances the position and role of the management accountants in enterprise.

The accounting department need to research both the production and waste treatment processes in the plant to increase environmental awareness and integrate environmental issues into accounting practices. (Management Accountant)

The manager of a company supports the role of management accountants: *Management accountants play a very important role and to some extent they also make decisions regarding their professional issues. When they are trained and developed professionally, they will give the company a lot of values, ideas or otherwise their opinions will be highly supported. (Director)*

Besides, management accounting department and the environmental management department are clearly divided responsibilities and play an important role in making business decisions in brick production companies. However, the situation shows that the communication between two departments for environmental cost management is not strong enough to promote ECMA practice. Environmental managers is responsible for resource control and environmental management. They collect mainly physical information such as annual input of natural resources (the amount of clay extracted, the amount of coal used) as well as the waste generated out and the level of pollution of the waste. But they have little knowledge about enviromental cost accounting. The study found that environmental managers almost did not have access to actual accounting documents and they only knew about a small range of enviromental costs. In contrast, management accounting department has most of the financial and economic information but they can not isolate environmental factors because of the limited understanding of the field of environmental management. The result leads to limited visibility of the negative environmental impacts of business operations as well as the importance of the ECMA system and therefore ECMA is less likely to be exposed to brick companies. In addition, there are different viewpoints between two departments. For example, they may not agree on who will be responsible for managing the environmental costs.

We are only responsible for calculating the cost of using resources because we control the budget. We are not responsible for any environmental costs incurred. (Chief Accountant)

Of course, the responsibility of monitoring and controlling the environmental activities belongs to us. But we are not the only ones responsible for environmental costs. The responsibility be long to the production department because they generate waste. (Environmental Manager)

Yes, I am the head of environmental management deparment, I think it would be my responsibility to manage the use of resources efficiently. However, that also needs to be shared with everyone in the organization. (Environmental Manager)

Thus, ECMA practice is a multifunctional task and its success depends on the cooperation between management accounting department and the environment management department. An ECMA work team should be established that includes environmental management staff and cost accounting staff to create a full picture of environmental issues and associated costs. By linking the two divisions, information can be provided sufficiently for reviewing environmental costs in decisions relating to financial analysis, investment evaluation, product pricing, product research and design. In addition, a close connection between accounting and environmental management is very important to collect physical and monetary information.

(3) Mimetic pressure are positively relationship with ECMA application

Mimetic pressure is also considered a factor affecting ECMA practice. When there are many companies are participating application of ECMA and have benefited enormously from the ECMA practice, mimetic pressure will appear. Other businesses will also imitate action by other businesses that will also expect that ECMA will bring many benefits. There have been some suggestions that ECMA is a new accounting system or a new governance standard, and if many companies adopt this system and then companies will be ready to revise current management accounting system.

As far as I understand that ECMA is a new accounting system and it is considered as a new governance standard. If it value is recognized by the organization, there is no reason we do not apply it. (Director)

(4) Positive environmental strategies have a positive relationship with ECMA application

The results of in-depth interviews with managers show that positive environmental strategies are one of the factors that positively influence application of ECMA. An active environmental strategy means that companies will apply technical measures to manage and prevent environmental pollution rather than treat end-of-pipe technique.

In addition to profit target, we also identify environmental factors such as issues related to emissions, noise, vibration. We have to pay attention to them because it is sustainable in production. Our business is being supported by society and government becauses our production technology has changed to create more environmentally friendly products. (Director)

Many executives support the positive environmental strategy because it not only increases the benefits of economics but also the benefits of society.

Investing in pollution control and management systems may cost more. However if we consider the social aspect, it will be cheaper. Each person should contribute a little to make the society better. (Environmental Manager)

Positive environmental strategies will help managers to be aware of the issues that need to be addressed such as complying with environmental regulations, making voluntary environmental initiatives, and measuring environmental costs and environmental benefits. As a result, it help to minimize environmental impacts and increase financial benefits.

There is a big difference between companies pursuing positive environmental strategies with companies pursing passive environmental strategies. Environmental strategies oriented law enforcement such as end-of-pipe waste treatment regulations may prevent the development of ECMA. The deputy director of a company emphasizes compliance with the regulation and he shows that environmental information is not included in environment report which is complied by government regulatory. Therefore, it is unnecessary to collect and track environmental costs by managers.

Obviously, an active environmental strategy helps businesses become more active in ECMA practice. One of the action plans of the business to achieve positive environmental strategic objectives is that environmental cost information is available. This information motivates companies to make solutions for managing the environment effectively and to ensure sustainable development.

We comply with environmental protection legislation such as waste disposal regulations, waste discharge regulations, environmental taxes. But there are not all that we do. We also look at different options to prevent and reduce wastes, invest in advanced modern technologies which are imported from Belgium, Japan. We calculate the benefits and costs for each option. I think that it is what we should do. (Management Accountant)

Sustainable development is target that we are pursuing. We have been aware of the role of waste management in terms of operational efficiency. Therefore, information on the type of wastes, amount of wastes and associated costs should be provided to support the decision-making process towards reducing wastes and improving environmental performance. (Environmental Manager)

(5) The manager's perceptions of environmental uncertainty are positively relationship with ECMA application.

Although the long-term goal of Vietnamese brick production companies is sustainable development, they do not pay much attention to resources consumption (land, coal, electricity, water, etc.) or change consumer behavior. This leads Vietnamese brick production companies not create efforts for environmental management and control from managers. Very few brick production companies offer clear environmental goals or set up an aggressive environmental strategy in their plan. This is due to the limited understanding of the environment by managers. Therefore, the perception of the managers is also considered the factor that affects application of ECMA. Managers have the authority to make decisions and captures the whole business of company. They know what to do and how to do, so they will decide what the goals are. As a result, proposals as well as policies are implemented.

Managers in Vietnamese brick production companies want to create a stable and sustainable environment because it allows them to control their operations more easily and to improve their performance. However, the environment is becoming more and more flexible and unpredictable, such as the stricter environmental policy of the state, scarcity of resources, demand for products and markets, green growth and technological

change. These changes have become a major concern for managers and it affects the collection and review of environmental information.

One of the main raw materials for brick production is coal. To ensure the quality of products, we have to transport coal from Quang Ninh. The price of coal is rising because it is a non-renewable resource. We are worried about the wasteful use of coal. One of the direct benefits of collecting environmental information is that we know the level of resources use, the cause of wastes, and how to deal with them effectively. (Chief Accountant)

We do not currently have any fines on the environment. Dust and emissions to the environment is in the allowable limits. However, if the state's environmental regulations change, such as reducing emissions, we will think about replacing new production technology. Although the initial costs is high, we will control them by using the environmental information that is collected and bring many benefits in the future. (Management Accountant)

The above answers clarify that the change (uncertainty) of the environment generates considerable pressure for managers in Vietnamese brick production companies to control and manage the environmental costs through integration them into the current accounting system. Because when changes is viewed as a negative factor, businesses are geared towards collecting and using the environmental cost information needed to address them. This issue is also illustrated in the following answer:

We are facing many challenges including raw materials, waste treatment technologies and green markets. We need to take measures to address these challenges. As far as I know, environmental cost management accounting is a good tool for us to effectively use raw materials, to select clean production technologies and to develop a green market. (Deputy Director)

5. Conclusion and Suggestions

5.1. On the side of Vietnamese brick production companies

Through qualitative research, the author identifies five factors that influence application of ECMA: government's coercive pressure, normative pressure, mimic pressure, positive environmental strategy and managers' perception of environmental uncertainty. As a result, the author proposes some recommendations to promote Vietnamese brick companies to apply ECMA. Specifically:

** Positive environmental strategy*

Positive environmental strategy will motivate towards improvement measures to maintain and achieve effective environmental control. Therefore, commitment from senior managers on positive environmental strategy as well as increased awareness of environmental responsibility are great potential for promoting ECMA practice. Without attention and support of internal managers to the environmental strategy, ECMA implementation will face many challenges and difficulties. An active environmental strategy requires senior managers to set environmental goals, environmental programs that prioritize cleaner production development, and voluntary environmental information disclosure.

** Education and professional development for management accounting and environmental management department*

To help ECMA application succeed, departments also have a common understanding of importance and usefulness of ECMA. Therefore, at the first stage of ECMA project, training program for all members in companies should be prioritized to help them better understand the link between business growth with environmental efficiency and establish a more detailed plan for ECMA practice.

** Improve the connection between accounting and environmental management department*

Findings show that the more closely accounting department and environmental management department are connected, the higher ECMA application in Vietnamese brick production companies is. Therefore, a team of professionals should be established that includes environmental managers and management accountants, cost controllers to get a complete picture of environmental performance and related environmental costs. Because environmental staff are much knowledge about environmental issues such as flow of materials, information related to treating, handling and controlling environment. However, they have little knowledge of how to reflect those issues into the accounting system. In contrast, management accounting department play an important role in accessing and analyzing data, but they often have little understanding of the environmental issues that organization is facing. As a result, management accountants do not often provide environmental information for decision-making fully. And it is clear that a closely linked relationship between management accounting and environmental management department is essential to track, calculate and report environmental costs accurately and completely.

** Raise awareness of environmental managers about environmental information*

The fact showed that managers have a low priority for ECMA practice. Because they are only responsible for environmental activities within a certain range and they are limited by traditional management accounting systems that leads to discouraging individuals in organization to enhance their environmental responsibility.

However, their attitudes and perspectives may be altered if environmental costs are set in the broader context that is in development of environmental concerns from managers. Awareness of environmental information (environmental regulations, green competition, environmental concerns, clean technology, etc.) from managers is a factor which motivate ECMA application for internal management functions. It is explained that when managers raise environmental awareness, they will focus on cleaner production decisions or measures to improve environmental performance and therefore environmental cost information will must be collected, measured and processed. Increased awareness of managers about environmental information is a problem that needs to be addressed early because introduction of ECMA application are proposed by managers especially management accountants and environmental managers.

5.2. On the side of the government

The study emphasizes that the more coercive pressure of government for environmental cost management and control increases, the higher ECMA application in brick production companies is. Thus, government pressure can be seen as a good starting point for businesses to assist environmental managers, accountants and board of directors in overcoming barriers related to value and professional practice of ECMA.

Herzig (2012) argues that developing countries using ECMA is lower than for developed countries because they often lack institutional capacity to motivate and encourage businesses to integrate environmental cost information into business decisions. Therefore, governments of developing countries such as Vietnam need to adopt policies to implement ECMA and consider ECMA as a strategy in the 21st century to address current environmental problems. If the government and companies soon promote ECMA, ECMA will certainly bring them financial and environmental efficiency.

Environmental Protection Law in 2014 shows a great deal of effort from Vietnamese government to manage environmental activities in response to increasing environmental pollution and scarcity of resources. However the government does not have any standards or guidelines related to ECMA. This would reduce motivation for gathering and explaining environmental cost information in production companies in general and brick production companies in particular. And so, in order to promote ECMA system, there needs to be coordination between relevant ministries. They can play a significant role in promoting ECMA through development of standards, guidelines and regulations, as follows:

** Ministry of Finance*

Because Ministry of Finance is a highly competent government agency involved in finance and accounting, Ministry of Finance must be lead agency in understanding the benefits of ECMA. Therefore, Ministry of Finance should develop general framework of ECMA, establish a mandatory environmental accounting standard, develop ECMA principles for companies in the sector; unify environmental cost forms, environmental reports and specific guidelines for each enterprise; use environmental reports to manage and make sustainable decisions for the industry

** Ministry of Natural Resources and Environment*

Ministry of Natural Resources and Environment can implement a series of measures to promote application of ECMA such as:

- Integrate ECMA into standards and guidelines of Environmental Management System such as ISO 14001, EMAS;
- Collaborate with Ministry of Finance and Ministry of Science and Technology to develop and set up ECMA theoretical bases for companies in general and brick production companies in particular, such as classifying environmental costs, establishing methods to determine environmental costs, preparing environmental reports, developing criteria to assess environmental performance; providing case studies for application of ECMA;
- Coordinate with Ministry of Finance and Ministry of Science and Technology to set up a mechanism for environmental cost accounting among companies in the sector;
- Provide environmental reports and specific guidances on how environmental information should be presented in reports;

** Ministry of Science and Technology*

Ministry of Science and Technology can play an important role in promoting the implementation of ECMA by:

- Formulate scientific projects in the direction of saving resources, making use of waste, designing new technologies and raising economic efficiency and environmental protection;
- Support researches related to ECMA and environmental reports, environmental management systems and national environmental accounting.
- Coordinate with Ministry of Finance, Ministry of Natural Resources and Environment to study and complete ECMA standards.
- Exchange information with other countries in design and development of policies to promote ECMA..

5.3. On the side of stakeholders

** Professional associations*

A number of associations such as Association of Building Materials, Vietnam Ceramics Association are established and developed with aim of creating a healthy business environment for its members, finding initiatives to increase resources effectiveness and reducing environmental impacts. Accounting Association helps to improve the quality of professional services, develop management accounting system for companies, integrate with accounting associations in the region and the world to built a modern accounting system.

The associations can develop exchange mechanisms such as: organizing seminars and conferences, announcing on the media, disseminating information to realize benefits of ECMA and increasing importance of ECMA in the community. Relevant topics need to be addressed including: Identify environmental costs and potential investment risks; Evaluate potential costs in implementing environmental activities; Research on financial assessment related to environmental factors; Solve conflict between modern environmental management accounting and traditional accounting. Workshops and conferences are also organized to discuss issues, exchange experiences and share information. In addition, to promote companies to apply ECMA, the associations should also fund research projects on ECMA.

** Educational institutions*

Educational institutions play an especially important role in educating and training human resources. Therefore, educational institutions are also organizations that provide knowledge and skills in ECMA. Education institutions should integrate environmental aspects into their teaching by organizing courses in environmental management, environmental accounting, ECMA so that graduates will be catalysts for promoting ECMA application.

Educational institutions should cooperate with companies to create a practical environment for students and trainees. This not only helps them to improve their professional knowledge but also develops the ability of creation and research. They will become potential human resources for businesses in developing ECMA.

Besides, education institutions should also develop training courses of ECMA for managers and management accountants. It is explained that when they are trained about ECMA, they can give initiatives to introduce concepts, methods in management of their business.

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