

Environmental Management Accounting Practices: The Use, Motivations and Barriers for Large Manufacturing Firms in Lower Northern Provinces Group I, Thailand

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Abstract This work studies environmental management accounting practice (EMAP) that enterprises apply to ensure the prevention of environmental damage caused by their daily operational activities, including motivations and barriers to adoption. A descriptive study was performed in 10 large manufacturing enterprises in the lower northern provinces group I Thailand via semi-structured interviews and in-depth qualitative interviews with manager/ owner. The result shows that half of the enterprises have implemented EMAP as a requirement for qualifying for ISO 14001 certification. The rest only prepare internal reports for planning, controlling and making operational decisions related to environmental information. The result also indicates that strict legislation, integrating environment into corporate strategy, and sufficient resources play a vital role in EMAP adoption. In addition, this study indicates that the key barriers limiting the implementation of EMAP are lack of resources, knowledge/ expertise/ guidance, and internal difficulties, respectively. This study gives contributions to the government, managers and relevant authorities by providing useful information on the motivations and barriers influencing EMAP adoption, which can help them to establish policy in the field of environmental management. Furthermore, it suggests that managers value EMAP for internal management not only for improvement of environmental performance but also increasing the role of accounting in business.

Keywords Barrier; Environmental management accounting practice; ISO14001; Large manufacturing firm; Motivation; Organizational sustainability

Received: May 31, 2023

Revised: October 26, 2023

Accepted: June 7, 2024

Introduction

The economic growth and industrial expansion have effects on environmental issues and ecosystem, including air pollution, water quality, chemical waste and global warming. Most manufacturing industries are part of environmental problems because they are related to material and energy resources that release wastes. These are environmental damage caused by their daily operational activities. A survey conducted by IQAir (2019) stated that Thailand was ranked 28th in the world for the level of pollution produced. In addition, the manufacturing sector showed the highest increasing average annual rate of carbon dioxide emissions (1.5%) and reported approximately 8% of industrial waste (Data for 2022 of The National Statistical Office, Ministry of Digital Economy and Society, Thailand). Thus, the industrial sector is considered to be one of the most polluting sectors (Nassar et al., 2018).

To show the role and responsibility of businesses towards the environment, Environmental Management Accounting Practices (EMAP) have become more indispensable in managing environmental performance and reporting environmental information not only financial but also non-financial information regarding the companies' environmental issues (Fuadah et al., 2018; Jovanovic et al., 2020; Phan et al., 2017). Meanwhile, many firms have implemented of the ISO 14001 Environment Management Systems (EMS) standard to manage the environment more efficiently and to also reduce the negative impacts of their operations on the environment. Many stakeholders expect their companies to protect the environment including the increasing awareness of the environmental issues. Customer are increasingly aware about environmentally friendly products (Labella et al., 2020; Sari et al., 2020). Banks take environmental factors into account when evaluating loans (Tian & Lin, 2019; Zhang, 2021). Most of the investors are also integrating impacts on the environment into their investing criteria (Biswas et al., 2019; Fuadah et al., 2021; Nuleg et al., 2021). For these reasons, the pressures from various stakeholders resulted in the implementation of EMAP. The trend of stakeholders is to reject companies that do not operate in an environmental-friendly manner. Companies that neglect environmental responsibilities tend to be less considered by stakeholders (Dienes et al., 2016; Elhossade et al., 2021; Fuadah et al., 2021; Le et al., 2019; Nuleg et al., 2021; Ratanasongtham et al., 2017; Safitri & Wahyuningrum, 2021). On the other hand, companies that pay attention to the environment have better image and profitability (Biswas et al., 2019; Deb et al., 2022; Fuadah et al., 2018; Jovanovic & Janjic, 2018; Labella et al., 2020; Marelli, 2015; Ntalamia, 2017). Consequently, EMAP is becoming a major factor in managerial perspective.

Generally, the larger the organization, the greater the various environmental practices. The reason is that large organizations have more diverse environmental investments such as equipment, system, and people to improve their EMAPs. Moreover, large firms involve multiple stakeholders. Therefore, larger organizations have more impacts and tend to be more ready to adopt EMAPs compared to small and medium-sized enterprises. This fact agrees with several studies (Chandok & Singh, 2017; Dienes et al., 2016; Elhossade et al., 2021; Karaman et al., 2018; Nkundabanyanga et al., 2021; Ntui et al., 2021; Safitri & Wahyuningrum, 2021; Welbeck et al., 2017) indicating that firm size positively influences environmental information disclosure. Larger firms disclose more environmental information to assure the public that their activities are safe for the environment.

The relative adoption of EMAP in many countries: Sri Lanka, Bangladesh, Vietnam, South Africa, Middle East and North Africa region, Tanzania, Libya, Portugal, and Ghana is low (Asiri et al., 2020; Biswas et al., 2019; Chathurangani & Madhusanka, 2019; Elhossade et al., 2022; Le et al., 2019; Ntui et al., 2021; Nyahuna & Doorasamy, 2022; Ribeiro et al., 2016; Welbeck et al., 2017). In contrast, the US, Germany, Australia, Japan, and Greece show moderate levels of implementation (Qian et al., 2017; Skordoulis et al., 2020). In line with Danso et al. (2019) indicated that there was concentrated EMAP attention on developed countries and a few developing countries.

In Thailand, environmental management accounting is still in early stages (Safitri & Wahyuningrum, 2021; Setthasakko, 2015). However, most enterprises are conscious of taking environmental responsibility into account. (Malaipia & Phoprachak, 2018). For listed companies the Stock Exchange of Thailand (SET) took further steps by mandating listed companies disclose environmental performance by submitting the Form 56-1 One Report on an annual basis to both the internal and external stakeholders. Prior studies focus the effect of EMAPs. For instance, the study of Klaprabchone et al. (2018); Nuleg et al. (2021) and Ussahawanitchakit (2017) found that the environmental management practices had a significant positive influence on organizational sustainability. The most important factor affecting the adoption of EMAPs was the environmental responsibility (Laonamtha et al., 2016; Phoprachak & Buntornwon, 2020). Whereas, non-listed companies in the Stock Exchange of Thailand (SET) were not forced to prepare or disclose environmental information by relevant authorities. Thus, preparing, reporting and disclosure environmental information for management accounting of non-listed companies can be undertaken on a voluntary basis. Many enterprises apply EMAP as an accounting tool for helping them effectively manage environmental issues. Some enterprises apply ISO 14001 standard that is one of widely accepted Environment Management Systems. The others prepare voluntary reporting for planning, controlling and making operational decisions related to environmental information.

In this study, we examine the scope of EMAPs in Thailand's lower northern provinces group I: Phitsanulok, Tak, Sukhothai, Petchaboon, and Uttraradit. Lower northern provinces group I was chosen as the location due to the serious environmental issues occurring there, most notably mining industry, bioenergy industry, feed industry and agricultural industry associated with industrial processes (The Office of Strategic Management, Ministry of Interior, Thailand). In addition, there remains little research on EMAP.

For those reasons, there are two questions in this study to be answered:

1. What is the level of satisfaction on current EMAPs that the non-listed enterprises in lower northern provinces group I apply?
2. What are the motivations and the barriers for EMAPs adoption in lower northern provinces group I?

The objective aims to find answers to the research question. Therefore, the objective of this paper is to investigate the level of satisfaction on current EMAPs that the enterprises apply, including their motivations and the barriers to adopt. The results can benefit managements of the government, manufacturing firms and relevant authorities related to EMAPs for more effective management of environmental performance.

Methodology

SME manufacturing enterprises have been defined on the basis of employment (The Office of SMEs Promotion):

- Small enterprises, employment for more than 5 employees, but not more than 50 employees,
- Medium Enterprises, employment for more than 50 employees, but not more than 200 employees

Thus, employment of large manufacturing enterprises has more than 200 employees. In the mentioned provinces group I of Thailand, there were 10 registered large manufacturing enterprises by the time the study was conducted (Data for 2017 of The Office of SMEs Promotion: OSMEP). In this study, the primary data was collected from the group of 10 large enterprises. Thus, the sample in this study is the same as population.

This paper presents a qualitative study. In order to achieve the research objectives, the study was carried out by gathering data from primary sources by using semi-structured interviews and in-depth qualitative interview with large manufacturing enterprises owner/manager. The semi-structured

interviews were developed in this study based on the theoretical framework and literature in line with the research objective. Semi-structured interviews were divided into four topics: large manufacturing enterprise profiles, the use of EMAP and level of satisfaction, the motivations, and the barriers of adoption. This research method was chosen because it allowed us to obtain the information which can be measured.

We contacted the people to be interviewed for an appointment by phone. Data were collected by fieldwork and key informant interviews who understood the concept of sustainability and that environmental management accounting practices together with the reasons that had led to the use of EMAP and level of satisfaction, motivations and barriers of their adoption. We explained the purpose of the interview including audio-recorded with the interview permission, consisting of interviewing 30 people. The average duration of an interview was 2 hours. The fieldwork was carried out between April and July 2022.

The participants of this research were highly experienced such as top manager, chief accountants and environmental employees. These interviewees are directly involved in the implementation of EMAP in the enterprise. Therefore, they are sufficiently knowledgeable regarding the companies' practices to provide relevant information about EMAP to increase the reliability of the data obtained by the interviews in order to verify and confirm the collected data and to enrich the results of the study. Thematic analysis has been used in this work by identifying, organizing, and analyzing in detail, and thereby provide themes determined from the information collected, thus inferring results that propitiate the adequate understanding and interpretation. In addition, it links several concepts with the opinions of the participants and compares them with the data in different situations at different times during the interviews. The analyzed data was arranged under themes that reflect the research objectives.

Descriptive statistics including frequency and percentage were performed in order to analyze data derived from a qualitative approach. This method takes information gathered from the interviews and turns it into tables because it reduces lots of data into visualizable simpler summary.

Results and discussion

1. Large manufacturing enterprise profiles

Table 1 Large manufacturing enterprise profiles participated in this study

Profiles of firms	Number of large manufacturing enterprises	Percent
years of operations		
16-20	3	30
21-30	2	20
More than 30	5	50
Total	10	100
number of employees		
151-200	1	10
201-250	3	30
More than 250	6	60
Total	10	100
years of manager experiences		
11-15	1	10
16-20	4	40

Profiles of firms	Number of large manufacturing enterprises	Percent
More than 20	5	50
Total	10	100
the presence of environmental department		
Yes	2	20
No	8	80
Total	10	100
the presence of ISO 14001 certification		
Yes		
No		
Total	5	50
	5	50
	10	100

Source: Survey data (2022)

Profiles of large manufacturing enterprises were collected to gain a broad overview of enterprises participated in this study. Five questions gathered the information about years of operations, the number of employees, years of manager experiences, the presence of an environmental department and the presence of ISO 14001 certification. The gathered information is useful to understand the background of large manufacturing enterprises. The results are summarized in Table 1. Half of the large manufacturing enterprises have been in business for more than 30 years, and 90 % of them have more than 200 employees. The majority of managers have more than 15 years of experience (90%). Most of the large manufacturing enterprises do not have an environmental department. The number of enterprises with and without ISO certifications are equal.

2. Current EMAP and level of satisfaction

The ISO 14001 standard is considered one of several frameworks that guide the development of an environmental management system (EMS). The result of this study shows that half of the enterprises obtained ISO 14001 certification (Table 1). The other half, even though without the ISO certification, have prepared partial internal report on environmentally-related issues to guide their decision-making processes. The main factors blocking them from obtaining the ISO certificates are related to costs and benefits. Those factors can come either from the customers or other stakeholders that don't focus on ISO standard or imbalanced costs relative to the benefits. This is the same reason from the study of Danish companies by Mosgaard and Kristensen (2020).

Table 2 Level of satisfaction on EMAP

Level of satisfaction	Number of large manufacturing enterprises	Percent
Low	2	20
Moderate	6	60
High	2	20
Total	10	100

Source: Survey data (2022)

In addition, results from the extensive interviews with the owners/ managers show that 60 % of large manufacturing firms were moderately satisfied with the use of the current EMAP (Table 2). Meanwhile, 20 % of them were highly satisfied. This is because these firms have determined environmental responsibility in part of their organizational structures. Thus, they can receive environmental information quickly, correctly, and reliably for decision making. The remaining 20% reported low satisfaction due to the lack of staff and guidance which could result in difficulties in the preparation of environmental reports. This is because accountants assume EMAP to be external to their responsibility (Nyahuna & Doorasamy, 2022). Thus, they are not actively participating in the environment management. Moreover, Jovanovic and Janjic (2018) also identified that the managers of manufacturing firms partly recognize the role of accounting in the EMAP adoption. Therefore, there is a need for better recognition and participation by managers and accountants ought to perform EMAP in order to improve manager satisfaction.

3. The motivation of adoption EMAP

Table 3 Motivation of adoption EMAP

The motivation to the adoption	Number	Percent
Strict legislation	8	80
Sufficient resources	6	60
Corporate image	1	10
Stakeholder pressures	4	50
Partner firms/Program for training/guidance	4	50
Integrating environment into corporate strategy	7	70
Improvement process	1	10
Awareness in environment responsibility	4	50

Source: Survey data (2022)

Table 3 shows main motivations that lead companies to implement EMAP. The most impactful ones are strict legislation (80%), integrating environment into corporate strategy (70%) and sufficient resources (60%), respectively. In accordance with the studies of Asiri et al. (2020); Chathurangani and Madhusanka (2019); Elhossade et al. (2022); Poll (2022); Le et al. (2019) and Moses et al. (2019) agree that government enforcement and strict legislation play a vital role in adopting EMAP. This means that the increasing government enforcement may urge manufacturing firms to comply with its regulations in order for EMAP to be widely accepted. Any firms that breaks the rules and laws will be harshly penalized. In accordance with the result from Poll (2022) and Elhossade et al. (2021) indicated that the developing countries have accepted EMAP by coercive pressures.

In addition, the policymakers of manufacturing firms should integrate environmental policy into the business strategies of the company that aims to motivate managers/employees is probably more effective than a policy that imposes rules with a top-down approach that latter could negatively impact on performances. In accordance with Daddi et al. (2019) and Jovanovic et al. (2020) indicated that improving environmental performance cannot be achieved if companies fail to integrate environmental issues into corporate strategy.

It can also be observed that there are both external and internal motivations to adopt EMAP. Although this study does not show which motivation has more effect, a previous study by Alvarez-Garcia and RioRama (2016) and Hung et al. (2022) indicated that the internal motivations have stronger influences on the benefits than the external motivations.

Moreover, Table 3 shows that corporate image and improvement process have the least impact on the adoption of EMAP. This result is opposite to that from Marelli (2015) and Ntalamia (2017) which found that the main factors for EMAP adoption are the corporate image and improvement process. By having EMAP, manufacturing firms have a tool that will provide information to improve production process and support green practice in mitigating harmful effects on environmental sustainability (Sari et al., 2020). This will also creation a good image social responsibility (Jovanovic & Janjic, 2018). These positively influenced the attractiveness of the firm to the investors and allow them to recognize the intention of the firms in being environmental-friendly (Nuleg et al., 2021). Those previous studies have stakeholders in large number especially investors. Whereas, the sample firms are non-listed companies which have no investor involvement. Therefore, the sequence of motivations was opposite the above-mentioned studies.

4. The barrier to the adoption of EMAP

Table 4 Barrier to the adoption

The barrier to the adoption	Number	Percent
Low employee environmental awareness	2	20
Lack of resources	7	70
Lack of stakeholder pressures	2	20
Absence of top management support	1	10
Firm difficulties	5	50
Lack of knowledge/ expertise/ guidance	6	60

Source: Survey data (2022)

Table 4 shows 6 barriers adopted from this study. The key barriers limiting the implementation of EMAP were lack of resources (70%), lack of knowledge/ expertise/ guidance (60%), and firm difficulties (50%), respectively. This result is similar to that from Hung et al. (2022); Moses et al. (2019); Tian and Lin (2019); Yusoh and Mat (2020) which indicated that these key barriers are financial and resource constraints, lack of guidance and skilled staff on environmental practices. This study will probably mean that qualified technological, human resources including environmentally-friendly equipment are vital but need to be accompanied by sufficient funds to make the EMAP adoption (Asiri et al., 2020). One of the barriers to adopt EMAP is the limited skill and knowledge of environmental issue, the potential of EMAP will not be recognized (Le et al., 2019). In addition, firm difficulties, difficulties in collection and allocation of environmental cost also lead to decision not to adopt EMAP. In line with Bravi et al. (2020) and Labella et al. (2020) indicated that the main barriers on the environmental management system of the companies in Italy and Spain was identified as the increase in bureaucratization, including excessive paperwork and auditing. This is because those firms and firms in this study obtained ISO 14001 certification. Therefore, they have declared documents and procedures compliance of the environmental standard that was time consuming preparation and periodic audits involved in EMAP adoption (Labella et al., 2020).

The least- impactful barrier was low environmental awareness from employees, lack of stakeholder pressures, and absence of supports from management. From the interviews with top-level managers found that they perceived EMAP as beneficial for improving sustainability. However, they did not adopt EMAP due to lack of fund and knowledge/ expertise /guidance to implement. Also, they have not found sufficient organizational and environmental benefits to implement EMAP. The main barriers from this study and those articles are similar, but the order of the barrier's impact has changed.

Conclusions

With respect to the objective, it can be concluded that EMAP adoption is still low and partly recognize the role of EMAP in the management process. Half of the lower northern Thai manufacturing firms apply the ISO 14001 standard for EMAP. The rest has less role in the environmental challenges, so they partly prepare internal reports when they have the need. The owners/managers are moderately satisfied with the current EMAP adoption level. In addition, the results also reveal that the perceptions about the motivations and the barriers of EMAP adoption in manufacturing firms.

With regard to the motivations and barriers, strict legislation, integrating environment into corporate strategy and sufficient resources are the main motivations, whereas lack of resources, lack of knowledge/ expertise/ guidance and firm difficulties are the main barriers. Hence, it is important for manufacturing firms that want to adopt EMAP by knowing how the motivations that lead to enhance the establishment of EMAP among them and understanding the barriers they will have to face during their EMAP adoption. Although the adoption of EMAP can be cumbersome, the fundamental environmental responsibilities are given to ensure the ability to utilize EMAP to benefit both the firms and the society.

This study has several recommendations. First, the government should update and enforce strict environmental regulations and penalties so that managers value EMAP as important for supporting internal management. Second, the manufacturing firms that want to implement an EMAP should integrate environmental policy into their business strategies for environmental management process. Third, the relevant authorities should facilitate guidance documents and the outsourcing of experts who can help with implementing EMAP such as accounting associations, consulting firms and educational institutions. Finally, to reduce firm difficulties such as difficulties in gathering, measuring, allocating and recording environment cost, a solution can be based on digital platforms that is already used to collect and prepare environmental reporting.

Managerial and policy implications are that the government, managers and relevant authorities influences make policies to continuously improve the environmental performance through EMAP that does not only include the implementation of various environmental standards but also the preparation of the internal reports. Furthermore, they must ensure that the level of motivations is adequate and barriers that must be overcome in order for EMAP to be widely accepted.

This study achieved its objective but the main limitations of findings are the small sample sizes of the firm and the geographical region. In future research it would be desirable to increase the sample by collecting data from other provinces and examine the relationship between EMAP adoption and financial performance.

Acknowledgments

This study was supported by the Faculty of Business Economics and Communications, Naresuan University. The author would like to thank the staff and the participants in the Lower Northern Provinces Group 1 of Thailand, who participated in the study.

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