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## Environmental management accounting practices in small medium manufacturing firms

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### Abstract

This study investigates factors and barriers which influence the practice of environmental management accounting (hereafter known as EMA). The institutional theory is employed and data is collected via questionnaire. This study focuses on small medium enterprises (hereafter known as SMEs) specifically, Malaysian small medium manufacturing firms. The results indicate that most firms have a budget allocation for environmental activities and practice physical EMA. The study argues that coercion is a dominant factor for practicing EMA and therefore, barriers to EMA development should be resolved by the Malaysian government and other authorities.

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### 1. Introduction

EMA has emerged as a response to the challenges faced by traditional management accounting systems in relation to environmental activities (see Birkin, 1996; Ferreira et.al. 2010). Chang (2007) defined EMA as a tool that assists firms to manage environmental performance and report environmental information to both the internal and external stakeholders. Greater environmental impact and its related costs, as well as failure of conventional accounting systems to provide required information for reducing these impacts and costs, have led significantly to the emergence of EMA (Gale, 2006 and Jasch, 2006). Most environmental costs are invisible and cannot be identified due to these costs being

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allocated as overhead costs under conventional accounting systems (Ditz et al., 1995). The International Federation of Accountants (IFAC) (2005) argues that EMA is not a separate system; it adds value to the conventional management accounting system and provides useful information to firms to manage and improve performance and bring about sustainable development. Bartolomeo et al. (2000) posited that conventional management accounting systems often do not consider the portion of raw materials that have been converted to wastes as environmental costs, leading to incorrect estimations of these costs, and often showing a lower figure than the actual.

Despite the importance and benefits of EMA, the level of adoption and implementation of EMA practice is still weak in firms in many countries, especially in developing countries, like Malaysia. Most managers do not realize the benefits of improving environmental performance and reducing environmental impacts (IFAC, 2005). Hence, many opportunities to reduce environmental costs are lost (Chang, 2007). This is due to low environmental awareness, lack of effective role of professional bodies, lack of stakeholders' pressure, as well as weak environmental legislation and difficulties faced by firms (Burrit, 2004). This weakness is more obvious in smaller firms as mentioned by Mitchell and Reid (2000); where the expertise and capacity to innovate in management accounting is less likely to exist. In addition, customers nowadays demand for the companies to be more responsible for environmental matters. Although EMA is an important strategic management accounting tool to improve a firm's environmental performance (Gray et al., 1993; Schaltegger and Burritt, 2000), the green practice among SMEs has not received much attention from researchers (Ki-Hoon Lee, 2009).

Therefore, this situation leaves a significant gap in studies on management accounting practices related to environmental activities in SMEs. Nonetheless, EMA has begun to receive significant attention now and has become an important topic of discussion among researchers. However, there is still a lack of investigation on EMA and the use of management accounting techniques related to environmental issues by the SMEs.

## **2. Literature review**

### *2.1 Environmental management accounting (EMA)*

EMA has been defined as the management of environmental and economic performance through the development and implementation of an appropriate environment-related accounting system and practice which may include reporting and auditing (IFAC, 2005). Given the increasing importance of environmental management and its role in managing and reducing environmental impacts, the development of an environmental management system (EMS) has begun to attract greater interest and attention. This system can assist the management of firms to achieve their goals. An EMS comprises resources, processes, practices, procedures, responsibility, planning activities and structure, to develop, implement, achieve, review and maintain environmental policies (Wilmshurst and Frost, 2001). The accounting should play an active role in the practice and success of the EMS and should be integrated into the environmental process. EMA has become an important part of environmental accounting infrastructure. In this context, Yusoff and Norzima (2000) stressed on the importance of examining both internal and external factors which may contribute to a firm's success and performance. Accordingly, failure to create a clear vision and direction, adopt changes, develop effective strategies, and have a clear understanding of this system will result in the failure of achieving the firm's targets (see Yusoff and Norzima, 2000). Thus, this current study argues that proper techniques of EMA are crucial for the SMEs to be successful and attain sustainable development.

### *2.2 Institutional theory*

The institutional theory perspective is mainly based on social and economic theoretical views (DiMaggio and Powell, 1983). This theory explores how organizational structure and actions are shaped by institutional forces, such as the government, the professional bodies and society that surround organizations. An important element in the institutional theory is the isomorphic concept (DiMaggio and Powell, 1983). Generally, there are three mechanisms through which institutional isomorphic changes can occur: coercive pressures, mimetic pressures and normative pressures. First, coercive pressures are explained as regulatory compliance to existing regulations (DiMaggio and Powell, 1983). Under coercive pressures, the government and regulatory bodies are likely to intervene and influence firms to adhere to existing regulations. Second, mimetic pressures are responses of a firm to proven techniques or

practices of competing firms when faced with ambiguous and uncertain situations (DiMaggio and Powell, 1983). Third, normative pressures emphasize the importance of voluntary adoption to mitigate coercive pressures. These three types of pressures are not empirically distinct and tend to overlap (DiMaggio and Powell, 1983).

### 3. Methodology

This study employs a postal survey to collect data. Firms are derived from the directory of the Federation of Malaysian Manufacturers (FMM). Out of 350 samples of questionnaires sent to SME managers, only 32 (9%) were returned and found to be usable. The low response rate of 9% was expected since EMA is a new accounting tool in SMEs. According to Che Rohana (2007), a mail survey on emerging issues in Malaysia also revealed a pattern of low but acceptable response. This study uses descriptive analysis and regression analysis to analyze the data.

### 4. Data analysis

#### 4.1 Respondent's profile

The finding shows that the majority of the respondents are from medium enterprises (84.4%) and respondents from small enterprises constitute only 15.6% (see Table 1). The result also reveals that the majority of the respondents are local owners (68.8%) and come from the electrical industry (25%). This result suggests that majority of these companies are owned by Malaysian residents and they may likely market their products solely to the Malaysian market. Most of them have budget allocation for environmental activities (75%) and plan to procure any EMS certificate in the near future. Therefore, the study suggests that most of the SME manufacturing firms are aware that environmental activities are vital for global sustainability in the future.

Table 1: Profile of Respondents (N = 32)

Characteristics	Classification	Frequency	Percentage
Size	Small	5	15.6
	Medium	27	84.4
Industry Sector	Chemical/wood	7	21.9
	Electrical	8	25
	Plastic/rubber	3	9.4
	Automotive/machinery	7	21.9
	Food/tobacco	3	9.4
	Others	4	12.5
Ownership	Local	22	68.8
	Foreigners	5	15.6
	Joint venture	5	15.6
EMS certificate	ISO 9001/2005	7	21.9
	ISO/TS/16949	7	21.9
	Planning to have	11	34.4
	None	7	21.9
Budget allocation for environmental activity	Yes	24	75
	No	8	25

#### 4.2 EMA practice

According to Burrit et. al. (2002), EMA practices involve the tracking, tracing and treatment of costs, earnings and savings incurred in relation to the company's environmental-related activities. Adapting from Burritt et.al.(2002) and Jalaludin et al. (2011), respondents were asked to measure on a scale of 1 (not at all) to 5 (to a great extent) the extent of EMA practices. Table 2 shows the practices of EMA and indicates that the mean scores for the two continuums of EMA types are 2.483 and 2.560, respectively. Physical EMA has the highest mean (2.560) compared to monetary EMA (2.483). This result implies that most of the SME manufacturing firms tend to practice physical EMA (PEMA) than monetary EMA (MEMA). However, the mean score of both MEMA and PEMA shows low EMA practices in manufacturing SMEs. It seems that managers in manufacturing SMEs may likely not know or do not participate much in EMA practices, although they are alert and allocate some budget for environmental activities (refer to Table 1).The results suggest that the practice of EMA is not at an encouraging level. It could be due to SMEs in Malaysia viewing EMA as a less important accounting tool in their internal management control system. As mentioned by Jalaludin et.al. (2011) in their study, manufacturing firms in Malaysia tend not to adopt EMA as they view EMA as a less significant aspect of their internal management system.

Table 2: Overall result of descriptive statistics for EMA practices (N = 32)

EMA Practices		Mean	Std. Dev	Min	Max
1	Monetary EMA (MEMA)	2.483	0.63949	1.15	3.54
2	Physical EMA (PEMA)	2.560	0.65803	1.18	3.73

Table 3 and Table 4 show the result of each item of MEMA and PEMA, where the highest four scores in MEMA are on the practice of cost accounting (3.125); lifecycle costing (3.125); target costing (3.125); and relevant environmental costing (3.000). The highest four scores in PEMA are on the practice of material flow assessment (3.375);energy flow assessment (3.375);lifecycle inventories (3.531) and lifecycle analysis (3.250). The highest variability with a standard deviation is 1.07 for the five items in PEMA practices. The result shows that Malaysian manufacturing firms seem to adopt and practice more PEMA.

Table 3: Descriptive statistics for MEMA practices (N = 32)

MEMA Practices		Mean	Std Dev	Min	Max
1	Cost Accounting	3.125	0.87067	1	4
2	Lifecycle costing	3.125	0.87067	1	4
3	Target costing	3.125	0.87067	1	4
4	Relevant environmental costing	3.000	0.95038	1	4
5	Lifecycle budgeting	2.844	0.91966	1	4
6	Lifecycle target pricing	2.813	0.93109	1	4
7	Monetary environmental operational budgeting	2.188	0.82060	1	4
8	Capital expenditure and revenue	2.125	0.79312	1	3
9	Monetary environmental project investment appraisal	2.094	0.68906	1	3
10	Post-assessment of environmental costing decision	2.063	0.84003	1	3
11	Monetary environmental capital budgeting	1.197	0.78224	1	4
12	Post-investment of individual environmental projects	1.907	0.81752	1	4
13	Environmental long-term financial planning	1.906	0.64053	1	4

It is obvious that manufacturing SMEs do not focus on the monetary aspect of EMA since they may likely be more involved in physical related environmental activities, without concentrating on the costing process. As mentioned by Jalaludin et.al. (2011), the role of accounting is not perceived as important in supporting the EMS of the companies, particularly environmental-related activities. Therefore, it is likely that environmental performance may not be

improved.

Table 4: Descriptive statistics for PEMA practices (N = 32)

	PEMA Practices	Mean	Std. Dev	Min	Max
1	Material flow assessment	3.375	0.94186	1	5
2	Energy flow assessment	3.375	1.03954	1	5
3	Lifecycle inventories	3.531	0.80259	2	5
4	Lifecycle analysis	3.250	0.98374	1	4
5	Relevant environmental impacts	2.375	1.07012	1	4
6	Physical environmental investment appraisal	2.281	0.92403	1	4
7	Physical environmental budgeting	2.188	0.86901	1	4
8	Long-term physical environmental planning	2.156	0.91966	1	4
9	Environmental capital impact assessment	1.968	0.69488	1	4
10	Post-assessment of short-term environmental impact	1.875	0.79312	1	3
11	Post-investment of physical environmental investment appraisal	1.781	0.65915	1	4

### 4.3 Factors Influencing EMA practices

In Table 5, coercive factors have the highest mean (2.6953), followed by normative factors (2.5938) and mimetic factors (2.3203). A similar study by Husain and Gunasekaran (2002) which linked these three factors to non-financial performance measurement also found that coercive pressure is the most influential factor, followed by normative and mimetic pressure.

Table 5: Overall result of descriptive statistics for factors influencing EMA practices (N =32)

	Our EMA practices are influenced by	Mean	Std. Dev	Min	Max
1	Coercive factor	2.6953	0.52347	1.42	3.67
2	Normative factor	2.5938	0.39015	1.50	3.00
3	Mimetic factor	2.3203	0.61969	1.00	3.50

The results of the descriptive statistics for each of the factors influencing EMA practices are reported in Table 6. The highest mean is for pollution incidents law (3.2813) and government pollutions standard (3.2500). These two items are related to coercive factors and the results on factors influencing EMA practices are consistent with the view of institutional theory

Table 6: Factors influencing EMA practices (N = 32)

	Our EMA practices are influenced by	Mean	Std. Dev	Min	Max
<b>Coercive</b>					
1	Pollution incidents law	3.2813	0.99139	2	4
2	Government pollutions standard	3.2500	0.71842	2	4
3	Government regulations	2.9688	0.59484	2	4
4	Company’s shareholders	2.9375	0.84003	1	4

5	Newspaper and TV	2.9063	0.89296	1	5
6	Environmental laws	2.9063	0.58802	2	4
7	Local communities	2.6250	0.90696	1	4
8	Company's customers	2.5938	1.01153	1	5
9	Environmental groups	2.5625	0.84003	1	4
10	Company's head office	2.3125	0.69270	1	4
11	Financial institutions	2.0313	0.47413	1	3
12	Company's labor union	1.9688	0.59484	1	3
<b>Normative</b>					
1	Motivation from staff training	3.2188	0.60824	1	4
2	Membership of an accounting body	1.9688	0.53788	1	3
<b>Mimetic</b>					
1	Competitors	2.8750	0.87067	1	4
2	Other industrial organizations	2.2500	0.80322	1	4
3	Other leaders in the industry	2.1250	0.65991	1	3
4	Multinational organizations	2.0313	0.59484	1	3

#### 4.4 Barriers to EMA practice

Adapting from Chang (2007), respondents were asked to measure on a scale of 1 (strongly disagree) to 5 (strongly agree) on factors hindering EMA practices. The result shows that financial barriers are one of the most important factors that prevent the organization from practicing EMA. Absence of resources (3.6563), efficiency of financial considerations (3.6250) and lack of focus on environmental costs (3.6250) are the three main barriers to the implementation of EMA practices in Malaysian manufacturing SMEs. With regards to informational barriers, the study shows that the difficulties in collection and allocation of environmental costs (3.6250) also lead to the decision not to implement EMA practices. This finding is consistent with Johnson (1993) that indicates the lack of guidance on EMA, in particular recognizing future environmental costs, leads to difficulty in measuring and recognizing future liabilities. The decision not to implement EMA is further supported by Setthasakko (2010) that advocates the lack of information framework leading to the difficulties in effectively collecting, identifying and evaluating environment-related data, especially in pollution prevention, waste management decisions and performance evaluation.

Table 7: Barriers to EMA implementation (N = 32)

Decision not to implement EMA practices in organization due to		Mean	Std. Dev	Min	Max
<b>Attitudinal Barriers</b>					
1	Low priority of accounting for environmental costs	3.5313	0.67127	2.00	4.00
2	Resistance to change	3.5313	0.67127	2.00	4.00
<b>Financial Barriers</b>					
1	Resource constraints	3.6563	0.60158	2.00	4.00
2	Efficiency of financial considerations	3.6250	0.65991	2.00	4.00
3	Environmental costs are not considered significant	3.6250	0.65991	2.00	4.00
<b>Informational Barriers</b>					
1	Difficulties in collecting or allocating environmental costs	3.6250	0.65991	2.00	4.00

2	Low physical environmental uncertainty	3.5938	0.61484	2.00	4.00
<b>Institutional Barriers</b>					
1	Lack of institutional pressure	3.3125	0.82060	1.00	4.00
2	Stakeholder power	2.7500	0.84242	1.00	4.00
3	Shareholder power	2.7500	0.84242	1.00	4.00
<b>Management Barrier</b>					
1	Few incentives provided to manage environmental costs	3.0000	0.87988	1.00	4.00
2	Lack of environmental responsibility and accountability	2.8438	0.76662	1.00	4.00
3	Lack of integrating the environment into strategic planning	2.7813	0.70639	2.00	4.00
4	Lack of advocacy from the university leadership	2.6250	0.70711	1.00	4.00

#### 4.5 The effect of coercive, normative and mimetic pressure on EMA

The results of the regression equation in Table 8 show that the regression model is significant ( $p < 0.01$ ,  $F = 5.346$ ) and  $R^2$  is 0.364. The results indicate that coercive pressure has a positive significant effect on EMA. Table 9 shows the standardised coefficient for coercive-EMA relationship is 0.509 and significant at  $p < 0.05$ . Similarly, when examining normative and mimetic pressures to EMA, the result shows that both pressures do not contribute significantly to EMA practices. This finding contradicts the findings of a study carried out by Jalaludin et al. (2011), which reports normative pressures has significant effect on EMA practices. However, when they did post-survey interviews, they found that none of the normative pressures influences EMA practices.

Table 8: Regression Analysis of Coercive, Normative and Mimetic Pressure and EMA

Pair of variables	Standardised coefficients (beta)	t	Sig.
Coercive-EMA	0.509	2.329	0.027
Normative-EMA	0.182	1.000	0.326
Mimetic-EMA	-0.034	-0.161	0.874

$p < 0.01$ ,  $F = 5.346$ ,  $R^2 = 0.364$

## 5. Discussion and Conclusion

The previous section mentions that coercive factors have a significant influence on EMA practices. With increasing coercive pressures, manufacturing SMEs are more willing to practice EMA. This result is in line with institutional theory that emphasizes the impact of social, economic and political institutions on an organization's behaviour with regards to making changes and adopting new practices (Chang, 2007). Institutional theory asserts that coercive pressures exerted by the government and legalisation can compel organizations to make organizational changes and adopt certain attributes to gain legitimacy for their operations. With respect to EMA practices, coercive pressures can lead to the adoption of new techniques due to the need to comply with environmental regulations (DiMaggio and Powell, 1983). Without pressure from the government (which establishes guidelines that bind organizations to accounting procedures and practices related to environmental management), the organizations will be less likely to adopt EMA (Chang, 2007). Thus, increasing coercive pressures by the government would positively affect the intention and willingness of manufacturing SMEs in Malaysia to adopt EMA. The finding also shows that financial constraint is the main barrier to the development of EMA in the manufacturing SMEs. The insufficient environmental knowledge (with regards to true costs and benefits), and skills also restrict the integration of environmental issues into the accounting systems and practices. Finally, this study finds that the absence of a guide to EMA is also a barrier to the integration of environmental issues into the existing accounting systems and practices. This is in line with Setthasakko (2010) who argued that lack of guidance on EMA causes difficulties in effectively collecting, identifying,

analyzing and evaluating environment-related data, thus posing a challenge to environmental performance evaluation and benchmarking, especially in waste management and pollution prevention.

This study has a number of implications. The Malaysian government, especially the departments involved in manufacturing SMEs, can play a significant role in promoting EMA practices through the issuance of proper guidelines and training. To some extent, tax authorities should come out with tax incentives to stimulate interest among Malaysian manufacturing SMEs to implement EMA because the finding shows that financial constraint is the most important barrier that prevents them from implementing EMA. Accounting professional bodies should also be involved in promoting EMA by providing a better framework for EMA practices. In conclusion, the pursuit of integrating environmental issues into existing accounting systems and practices requires organizational learning mechanisms, greater corporate responsibility and proper guidance on EMA.

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