

Environmental Management Accounting (EMA): Is there a need?

Avylin Roziana Mohd Ariffin

Faculty of Economics and Muamalat,
Universiti Sains Islam Malaysia,
Bandar Baru Nilai, 71800 Nilai,
Negeri Sembilan, Malaysia
Email: mjlynn9700@yahoo.com

Abstract:

Mounting awareness among various stakeholders of environmental management issues has motivated companies to place sustainability development on their business agenda. However, the conventional accounting system is not able to capture environmental concerns which this has hindered companies from identifying opportunities for improving their environmental performance. Environmental Management Accounting (EMA) therefore becomes an important innovation to be applied by business firms to allow them to identify ways for more efficient processes and better consumption of resources that may lead both to positive environmental and economic performance. Unfortunately, this system is not widely implemented yet. Therefore, this paper outlines the motivation for the uptake of the practice. Based on diffusion of innovation perspective, it is found that environmental concerns are not currently perceived as a priority. Due to this, companies do not feel the need to change to another system and dismissed EMA as impractical for them.

Keywords: Environmental Management Accounting, Accounting innovation, DOI

1.0 Introduction

Accounting, particularly management accounting, has a valuable role in supporting environmental management (Collins, Lawrence, Roper & Haar, 2011; Contrafatto & Burns, 2013; Gray, 2010). Unfortunately, conventional management accounting is inadequate to cope with environmental concerns and business changes (Doorasamy & Garbharran, 2015; Johnson & Kaplan, 1987). Therefore, applying environmental accounting, particularly Environmental Management Accounting (EMA), which is considered contemporary accounting and the solution to such a problem, is seen as an important approach that should be applied by business firms, especially by companies whose operations have greater impact on the environment (Dayana, 2010; Frost & Wilmshurst, 2000). EMA is a system that identifies, measures, traces and analyses environmental costs and physical environmental flows (Burritt & Saka, 2006; Gibson & Martin, 2004). Generally, EMA helps companies to go beyond the capability of their conventional management accounting system by uncovering, and then having a full measure of business's environment-related costs and benefits, and to later integrate this information into day-to-day business decision making.

This practice is especially critical to those companies operating in industrializing countries since environmental impacts are much more apparent in these contexts. The focus of this study is Malaysia, one of the developing nations where environmental issues have become a very serious concern and there appears to be growing public awareness of such issues (Bakhtiar, Maliah & Nik Nazli, 2009; Haslinda, Lehman & Noraini, 2006; Ramasamy & Ting, 2004).

2.0 Diffusion of EMA

According to Bennett, Richardsson and Schaltegger (2003), EMA is still in its developing stage, thus most literature tends to concentrate on tools, describing how they can be applied in organisations. The few studies that look at the diffusion of EMA include Osborn et al. (2002), Gadenne and Zaman (2002), Christ and Burritt (2013), Lee, Jung and Chun (2002), Kokubu and Nashioka (2005), Xiaomei (2004) and Dayana (2010). The results from all these studies are more or less the same; though some organisations have been employing EMA, the uptake of the practice is still considered low. Gadenne and Zaman (2002) indicate that many companies have not yet developed a holistic approach to environmental costing and that some of them even acting reactively towards environmental issues, with the majority of companies measuring environmental cost only to the extent of compliance with legal environmental requirements. Schaltegger, Windolph and Herzig (2012) and Burritt and Tingey-Holyoak (2012) discuss on the application of various sustainability management tools (including sustainability accounting instruments) among companies in German and South Australia. Schaltegger et al. (2012) found that both application and relative application have increased over time within the period of 2002 to 2010. Meanwhile, Burritt and Tingey-Holyoak (2012) revealed that fifty percent of firm in sample are using sustainability-related cost accounting. However, the authors found that many other accounting tools related to sustainability are ignored and need greater promotion. Even though there are many companies and stakeholders who are interested in environmental issues since the 1990s, but the absence of guidelines has caused slow development and low adoption rates of EMA (Lee et al., 2002; Lee, Jung & Kim, 2005; Lee, 2011). Meanwhile, a study by Qian, Burritt and Monroe (2011) who describes the adoption of EMA in the context of government agencies found that relevant information is being collected and used by all councils. However, the practice varied between one another. Studies in developing countries are scant, but the work of Xiaomei (2004) and Dayana (2010) provides some positive findings with regard to EMA dissemination in the context of a developing nation. The study by Xiaomei (2004) noted that government and business companies in China are endeavouring to keep pace with global trends in environmental protection. Dayana (2010) found low rates of adoption of EMA among manufacturing companies in Malaysia. Both studies show that the majority of companies in developing countries are still far behind advanced countries in terms of understanding and applying environmental accounting techniques and methods; however, the results show that EMA has the potential to be further developed in the future within these nations.

3.0 The Needs for Adopting EMA

Even though EMA is evidenced to have successfully improves both the environmental and the economic performance of a firm (Burritt & Saka, 2006; Gadenne & Zaman, 2002; Gale, 2006a; Jasch, 2003), unfortunately the system is not widely implemented, as been discussed in the previous section. This demands the need to develop investigation on the reasons why it happened this way. Furthermore, there are lack of empirical literature explaining on the factors that influence the adoption of EMA (Burritt, 2004; Christ & Burritt, 2013; Christ & Burritt, 2014), with studies failing to identify the impact of many influential factors that usually prove to be significant in the external environmental accounting literature (for example, Bouma & van der Veen, 2002; Dayana 2010). This study looks at EMA from an innovation perspective to

improve understanding of the process of EMA adoption within the Malaysian context. As mentioned by Geroski (2000), any innovation is subject to the innovation cycle, with invention, diffusion, and adoption and rejection patterns, and that, adopting an innovation is not a spontaneous decision; in fact, firms carefully calculate for it, with the process following systematic stages (Sisaye, 1999). Adoption of an innovation will not happen if the innovation is not felt to be needed. The “need/problem” is posited at the first stage of an organisation’s innovation-decision process, with recognition of the need/problem providing the catalyst for stimulating innovative research and development activities designed to meet the need or solve the problem (Rogers, 2003, p.137). The problems pertaining to environmental concern and the traditional accounting system raise the need of using EMA as a corrective innovation. For this reason, this study investigates on the environmental issues faced by organizations in Malaysia and the perceived impact of such issues on their operations. This is to describe the need for EMA and whether the issues influence the adoption of such practice.

4.0 Methodology

This paper uses a quantitative study approach, using a survey design. The main unit of analysis was the public listed organisations operating under the category of construction, plantation, mining, industrial product, consumer products, trading and services, and property industries was selected. This followed Romlah (2006), who refers to them as environmentally problematic companies, with accountants and those in equivalent positions (for companies that use a different name for the same scope of the task) being the respondents in this study. A survey questionnaire was sent to 757 firms listed on Bursa Malaysia. From this number, 70 questionnaires were returned, yielding 9.25 percent of response rate. Even though the rate is low, but it is consistent with the response rate from other studies on management accounting practices that have been addressed to the management accountants in Malaysia, for example, Aliza, Zairul Nurshazana, Suzana and Rosni (2013), Suzana, Aliza and Mitchell (2008) and Tuan Zainun, Smith and Djajadikerta (2010). However, after preliminary analyses were performed, only 66 cases were used for further analysis. Respondents were asked to indicate whether they have adopted EMA or not, and the extent to which eleven environmental-related issues could have impacted their company’s operation. The items were triggered by the study of Burritt, Schaltegger, Kokubu and Wagner (2003) and from the data gained from the pre-test. The respondent had to assess the relevance of each issue based on a score of 1 to 5, with the lowest score representing “not at all” and the highest score reflecting the “extreme” impact of the issue. SPSS software was used to analyse the data.

5.0 Findings

Table 5.1 shows the mean and standard deviation value for each set of these environmental issues. It was found that all of the issues had a relatively low mean value (with a mean score less than 3.00). This value indicated that companies who took part in this survey considered environmental issues to be not relevant and not having a significant impact on their business operations. The results contradict what has been found in developed countries like Germany, Japan and Australia, where the environment is perceived to be a high or very high priority (Burritt et al., 2003). This comparison suggests that cultural differences may influence business values about the importance of such issues and proves that specific environmental issues which are deemed relevant to the affected parties might differ between countries (Burritt et al., 2003). We can see that the highest mean score was for the issue related to non-hazardous waste management (mean score 2.94), followed by the issue of waste water management (mean score 2.82). This suggests that most of the respondents’ firms had to deal with the issue of non-hazardous waste management and waste water management in their daily operations.

Table 5.1 Environmental issues

	Mean	Std. Deviation
Non-hazardous waste management	2.94	1.08
Wastewater management	2.82	1.27
Protection of air quality	2.78	1.18
Land management and development	2.66	1.21
Noise pollution	2.60	1.13
Protection of biodiversity and landscape	2.52	1.15
Hazardous waste management	2.48	1.14
Protection of soil and groundwater	2.46	1.22
Other natural resource use or management	2.36	1.18
Damage from surface water	2.24	1.24
Damage from atmospheric or climatic conditions	2.23	1.13

The result in Table 5.2 shows a comparison of the score for environmental issues between adopters and non adopters. As it turns out, EMA adopters gave a higher score for environmental issues and their impact on the company's operation. The difference of scores between the two groups is in fact significant ($t(64) = -2.95, p = .004$). This supports the suggestion that those who adopt EMA are those who feel EMA is important. As suggested by Rogers (2003), EMA will be more likely to diffuse if potential adopters perceived the need for the practice to be applied. Independent sample t-test shows that the mean for environmental issues differs significantly between adopter and non adopter groups (Table 5.2). We can see that the adopters tend to rate higher for environmental issues and their impact on their companies (mean value 3.19) compared to non adopters (mean value 2.43). This implies that the adopters believed that their traditional accounting system was unable to address environmental problems and that EMA was needed to remedy the situation. As mentioned previously, most of the statements on environmental issues had low mean values. This suggests that the issues were not a high priority for the companies.

Table 5.2 Comparison of mean score for environmental issues – Independent sample t-test

Variable	Adopters		Non -adopters		F	Sig. (2-tailed)
	Mean	Std. deviation	Mean	Std. deviation		
Environmental issues	3.19	0.810	2.43	0.740	0.050	.004

Further Kendall-tau b correlation testing was performed to see whether a relationship exists between the issues and EMA adoption. The result, presented in Table 5.3, confirms that environmental issues and their impacts are significantly associated with EMA. In fact, some issues are playing a significant role in adoption of the practice.

Table 5.3 Kendall-tau b for environmental issues

	Correlation Coefficient	Sig. (2-tailed)
<u>Environmental issues</u>	.281**	.007
Non-hazardous waste management	.190	.094
Hazardous waste management	.317**	.005
Protection of biodiversity and landscape	.209	.064
Protection of soil and groundwater	.099	.374
Protection of air quality	.291**	.009
Land management and development	.174	.118
Other natural resource use or management	.287*	.011
Damage from atmospheric or climatic conditions	.092	.418
Damage from surface water	.099	.385
Noise pollution	.220*	.049

** Correlation is significant at the .01 level (2-tailed).

* Correlation is significant at the .05 level (2-tailed).

These issues included wastewater management, hazardous waste management, air quality, other natural resources management and noise pollution. Consistent with Liu et al. (2010), the finding suggests that the more companies perceived that they have to deal with environmental issues and the issues impacted their operation, the more likely were they to adopt EMA practice. Therefore, we can assume that companies' perception that environmental issues are not important has contributed towards the slow diffusion of EMA in Malaysia.

6.0 Conclusions

As the use of EMA reflects the highest embeddedness of environmental values and issues within organisation (Perez, Ruiz & Fenech, 2007), this result is unexpected because it gives the impression that even environmentally sensitive industries in Malaysia take an indifferent attitude towards environmental accounting. However, the result is consistent with many other studies in relation to the EMA adoption rate, including studies conducted in more developed countries such as Korea, Japan and Australia (Christ & Burritt, 2013; Kokubu & Nashioka, 2005; Lee, 2011). The slow diffusion of EMA can be related to the lack of motivation for companies to develop and implement such practice. The EMA method arises in response to the increasing concern for sustainability and the limitations of conventional management accounting systems in addressing this issue (Burritt, 2004; Gale, 2006a; Gale, 2006b; Jones, 2010). However, such concerns are not currently perceived as a priority. Only the adopters felt that environmental problems affect their business operations, which led them to practice EMA; the majority of respondents, who were the non adopters did not agree. The underrating scores for perceived environmental impact demonstrate that environmental issues are not catching the attention of many companies in Malaysia. These companies believe that the issue brings no problems or negative effects to their businesses. For that reason, they have not explored solutions for environmental problems, and dismissed EMA as impractical for them. In other words, companies in Malaysia do not find the need to implement EMA. Perhaps future studies could carry out interviews so that this issue could be discuss further as well as to reveal other reasons for non adoption

of EMA. It is also believed that the perception of the management of the importance of environmental issues might be shaped by companies' external environment, especially through professional bodies, more stringent environmental disclosure rules and the demands of customers and shareholders for environmental performance (Christofi, Christofi & Sisaye, 2012; Gale, 2006a; Kumpulainen & Pohjola, 2008). Therefore, future studies may want to look into this matter.

REFERENCES

- Aliza, R., Zairul Nurshazana, Z., Suzana, S., & Rosni, M. (2013). Changing roles of management accountants in Malaysian companies: A preliminary study. *International Journal of Finance and Accounting*, 2(2), 89-93.
- Bakhtiar, A., Maliah, S., & Nik Nazli, N.A. (2009). A longitudinal examination of environmental reporting practices in Malaysia. *Gadjah Mada International Journal of Business*, 11(1), 37-72.
- Bennett, M., Rikhardsson, P., & Schaltegger, S. (2003). Adopting environmental management accounting: EMA as a value-adding activity. In Tukker, A. (Ed.), *Environmental Management Accounting – Purpose and progress*, Vol. 12, Kluwer Academic Publishers, Dordrecht, 1-14.
- Burritt, R.L., & Saka, C. (2006). Environmental Management Accounting applications and eco-efficiency: Case study from Japan. *Journal of Cleaner Production*, 4(10), 1262-1275.
- Bouma, J.J. & van der Veen. (2002). Wanted: A theory for environmental management accounting. In Bennett, M., Bouma, J.J. & Wolters, T. (Eds), *Environmental Management Accounting: Informational and institutional developments (279-290)*. Dordrecht: Kluwer Academic Publishers.
- Burritt, R.L. (2004). Environmental Management Accounting: Roadblocks on the way to the green and pleasant land. *Business Strategy and the Environment*, 13(1), 13-32.
- Burritt, R.L., & Saka, C. (2006). Environmental Management Accounting applications and eco-efficiency: Case study from Japan. *Journal of Cleaner Production*, 4(10), 1262-1275.
- Burritt, R. L., & Tingey-Holyoak, J. (2012). Forging cleaner production: the importance of academic-practitioner links for successful sustainability embedded carbon accounting. *Journal of Cleaner Production*, 36, 39-47.
- Burritt, R.L., Schaltegger, S., Kokubu, K., & Wagner, M. (2003). Environmental management accounting for staff appraisal: Evidence from Australia, Germany and Japan. In Bennett, M., Rikhardsson, P.M. & Schaltegger, S. (Eds), *Environmental Management Accounting – Purpose and progress (151-188)*. The Netherlands: Kluwer Academic Publishers.
- Christ, K.L., & Burritt, R.L. (2013). Environmental management accounting: the significance of contingent variables for adoption. *Journal of Cleaner Production*, 41, 163-173.
- Christ, K.L., & Burritt, R.L. (2014). Material flow cost accounting: A review and agenda for future research. *Journal of Cleaner Production*, 41, 1-12.
- Christofi, A., Christofi, P., & Sisaye, S. (2012). Corporate sustainability: Historical development and reporting practices. *Management Research Review*, 35(2), 157-172.
- Collins, E., Lawrence, S., Roper, J., & Haar, J. (2011). Sustainability and the role of the management accountant. *CIMA Research Executive Summary Series*, 7, 14.
- Contrafatto, M., & Burns, J. (2013). Social and environmental accounting, organisational change and management accounting: A processual view. *Management Accounting Research*, 24(4), 349-365.
- Dayana, J. (2010). Environmental management accounting: A study of manufacturing companies in Malaysia. Unpublished PhD thesis, International Islamic University Malaysia, Kuala Lumpur.

- Doorasamy, M., & Garbharran, H. (2015). The role of Environmental Management Accounting as a tool to calculate environmental costs and identify their impact on a company's environmental performance. *Asian Journal of Business and Management*, 3(1).
- Frost, G.R., & Wilmshurst, T.D. (2000). The Adoption of Environment-related management accounting: An analysis of corporate environmental sensitivity. *Accounting Forum*, 24(4), 344-65.
- Gray, R. (2010). Is accounting for sustainability actually accounting for sustainability...and how would we know? An exploration of narratives, of organisations and the planet. *Accounting, Organizations and Society*, 35(1), 47-62.
- Gadenne, D., & Zaman, M. (2002). Strategic environmental management accounting: An exploratory study of current corporate practice and strategic intent. *Journal of Environmental Assessment Policy and Management*, 4(2), 123-150.
- Gale, R. (2006a). Environmental costs at a Canadian paper mill: A case study of Environmental Management Accounting (EMA). *Journal of Cleaner Production*, 14(14), 1237-1251.
- Gale, R. (2006b). Environmental Management Accounting as a reflexive modernization strategy in cleaner production. *Journal of Cleaner Production*, 14(14), 1228-1236.
- Geroski, P.A. (2000). Models of technology diffusion. *Research Policy*, 29(4-5), 603-625.
- Gibson, K.C., & Martin, B.A. (2004). Demonstrating value through the use of Environmental Management Accounting. *Environmental Quality Management*, 13(3), 45-52.
- Haslinda, Y., Lehman, G., & Noraini, M.N. (2006). Environmental engagements through the lens of disclosure practices: A Malaysian story. *Asian Review of Accounting*, 14(1/2), 122-148.
- Jasch, C. (2003). The use of Environmental Management Accounting (EMA) for identifying environmental costs. *Journal of Cleaner Production*, 11(6), 667-676.
- Johnson, H. T., & Kaplan, R.S (1987). *Relevance lost*. New York: Harvard Business Scholl Press.
- Jones, M.J. (2010). Accounting for the environment: Towards a theoretical perspective for environmental accounting and reporting. *Accounting Forum*, 34 (2), 123-138.
- Kokubu, K., & Nashioka, E. (2005). Environmental Management Accounting practices in Japan. In Rikhardsson, P.M., Bennett, M., Bouma, J.J. & Schaltegger, S. (Eds), *Implementing Environmental Management Accounting: Status and challenges* (321-342). The Netherlands: Springer.
- Kumpulainen, A., & Pohjola, T. (2008). Success factors in developing EMA – Experiences from four follow-up case studies in Finland. In Schaltegger, S., Bennett, M., Burritt, R.L, & Jasch, C. (Eds), *Environmental Management Accounting for cleaner production* (477-490). The Netherlands: Springer.
- Lee, B.-W., Jung, S.T., & Chun, Y.O. (2002). Environmental accounting in Korea: Cases and policy recommendations. In Bennett, M., Bouma, J.J. & Wolters, T. (Eds), *Environmental Management Accounting: Informational and institutional developments* (175-186). Dordrecht: Kluwer Academic Publishers.
- Lee, B.W., Jung, S.T., & Kim, J.H. (2005). Environmental accounting guidelines and corporate cases in Korea: Implications for developing countries. In Rikhardsson, P.M., Bennett, M., Bouma, J.J. & Schaltegger, S. (Eds), *Implementing Environmental Management Accounting: Status and challenges* (239-256). The Netherlands: Springer.
- Lee, K.H. (2011). Motivations, barriers, and incentives for adopting environmental management (cost) accounting and related guidelines: A study of the republic of Korea. *Corporate Social Responsibility and Environmental Management*, 18, 39-49.

- Liu, X., Liu, B., Shishime, T., Yu, Q., Bi, J., & Fujitsuka, T. (2010). An empirical study on the driving mechanism of proactive corporate environmental management in China. *Journal of Environmental Management*, 91(8), 1707-1717.
- Osborn, D., Savage, D., Reyes, M.F., & Muradyan, T. (2002). Images of effectiveness, equity and efficiency in the diffusion of environmental management accounting. Australia: Green Measures.
- Perez, E.A., Ruiz, C.C., & Fenech, F.C. (2007). Environmental Management Systems as an embedding mechanism: A research note. *Accounting, Auditing and Accountability Journal*, 20(3), 403-422.
- Qian, W., Burritt, R., & Monroe, G. (2011). Environmental management accounting in local government: A case of waste management. *Accounting, Auditing & Accountability Journal*, 24(1), 93-128.
- Ramasamy, B., & Ting, H.W. (2004). A Comparative Analysis of Corporate Social Responsibility Awareness: Malaysian and Singaporean Firms. *Journal of Corporate Citizenship*, 13, 109-123.
- Rogers, E.M. (2003). *Diffusion of Innovation*. (5th ed.). Free Press, New York.
- Romlah, J. (2006). The environmental reporting practice of 'environmentally problematic companies' in Malaysia. *The International Journal of Accounting, Governance and Society*, 1, 37-47.
- Schaltegger, S., Viere, T., & Zvezdov, D. (2012). Tapping environmental accounting potentials of beer brewing: Information needs for successful cleaner production. *Journal of Cleaner Production*, 29, 1-10.
- Schaltegger, S., Windolph, S. E., & Herzig, C. (2012). A longitudinal analysis of the knowledge and application of sustainability management tools in large German companies. *Society and Economy*, 34(4), 549-579.
- Sisaye, S. (1999). An organizational approach for the study of the diffusion of process innovation strategies in internal auditing and control systems. *International Journal of Applied Quality Management*, 2(2), 279-293.
- Suzana, S., Aliza, R., & Mitchell, F. (2008). What factors drive change in management accounting in Malaysian organisations? *Malaysian Accounting Review*, 7(1), 61-76.
- Tuan Zainun, T.M., Smith, M., & Djajadikerta, H. (2010). Management accounting and organisational change: An exploratory study in Malaysian manufacturing firms. *Journal of Applied Management Accounting Research*, 8(2), 51-80.
- Xiaomei, L. (2004). Theory and practice of environmental management accounting: Experience of implementation in China. *International Journal of Technology Management and Sustainable Development*, 3(1), 47-57.
- Zulkifli, N., Telford, B., & Marriott, N. (2009). Social and environmental accounting in Malaysia: Practitioners' views. *Research in Accounting in Emerging Economies*, 9, 145-167.