A Literature Review on Environmental Management Accounting (EMA) Adoption

Christophor S. K. Tsui

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Abstract

Sustainability development is a hot issue facing corporations. Studies showed that financial accounting could not fully support sustainability development since the highly regulated financial accounting had specific accounting rules that resulted in incomplete capturing and presentation of environmental costs. In the relatively less regulated accounting application, the management accounting, studies found that environmental costs were usually absorbed in overheads. The communication between accountants and environmental experts were usually limited and this lead to misallocation or incorrect calculation of environment costs. As a result, managers did not have the correct environmental information for managing environmental costs for sustainability development.

To address the limitations of management accounting, environmental management accounting (EMA) was developed. EMA could address both monetary and physical aspects of environmental accounting. Physical EMA included the flow of water, energy, while monetary EMA measured the costs of the firm's consumption of natural resources and the costs for controlling or preventing environmental damages. Studies found that EMA could help firms to identify cost savings opportunities and to develop more efficient production processes.

The application of EMA is still having problems at firm level. Studies found that lack of promotion on the use of EMA, lack of collaboration between accountants and environmental management departments were major barriers of EMA adoption. Accountants did not have sufficient training on EMA and they believed that implementing EMA was costly. Firms have their own definitions of environmental costs, which make collection, analysis and comparison of environmental costs difficult. Finally, managers did not want to be held responsible for the significant environmental costs also prohibit the EMA adoption.

Keywords: Environmental management accounting, environmental cost, physical EMA, monetary EMA, EMA adoption

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1. Introduction

In the business environment, the primary goal of a firm is to maximize the shareholders’ wealth. As economic activity grows, people are simply taking too much from the ecosystem. The 2012 Living Planet Report, published by World Wide Fund for Nature (WWF) disclosed the following alarming facts (WWF, 2012):

- Biodiversity has declined globally by 30% between 1970 and 2008.
- Demand on natural resources has doubled since 1966 and we are currently using the equivalent of 1.5 planets to support our activities.
- We are currently using 50% more natural resources than the Earth can sustain.
- The Earth needs 1.5 years to generate the natural resources that we use in a year.
- If we continue with our current consumption pattern, by 2050, we will need 2.8 planets to provide for our consumption and to store the carbon we generate from the combustion of fossil fuels, land use change and chemical processes.

We are likely to use up all the resources from our planet if we do not change. Our future generations will be in danger. Thus, sustainable development is not a fashion but a necessity.

Elkington explained the root cause of our unsustainable planet is from cannibals – the capitalist businesses (Elkington, 1997). In meeting firms’ primary objectives, that is, making profits and to survive in the competitive market, firms have to beat their competitors without taking into considerations the impacts they have on their environment and on the society. To make our planet sustainable, firms need to have radical change in the way they are doing business. Elkington’s “trip bottom line” (TBL) is often used to measure the sustainability of an organization. He argued that businesses should not concern only their accounting profit, but also their environmental and social performance and they should manage and report them. TBL is becoming popular to assess the social, economic and environmental achievements of a firm. It plays an important role in shaping many sustainability initiatives including the Global Reporting Initiative (GRI), the sustainability indices of the stock markets (e.g. Dow Jones Sustainability Indexes, FTSE4Good Index Series, etc).

For hundreds of years, accounting has been used to provide information to internal stakeholders (e.g. management) and external stakeholders (e.g. shareholders) of the firms. Accountants can be a catalyst to make firms to become more sustainable. The
focus of this paper is to identify how accounting can support better decision making in firms towards sustainable business performance. This paper tries to answer the following questions:

(1) What are the limitations of traditional accounting on addressing sustainability issues?
(2) How accounting can support sustainability development? (3) What are the barriers in EMA adaption?

2. Review Method

A systematic literature review is conducted on EMA adoption. A search on literature in Emerald Insight and Business Source Premier was performed using the following search phrases in the abstracts in academic journals and the results were presented in Table 1:

<table>
<thead>
<tr>
<th>Search phrases</th>
<th>Entries in Emerald Insight</th>
<th>Entries in Business Source Premier</th>
</tr>
</thead>
<tbody>
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<td>186</td>
<td>680</td>
</tr>
<tr>
<td>“financial accounting”</td>
<td>1,082</td>
<td>8,028</td>
</tr>
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<td>“management accounting”</td>
<td>1,050</td>
<td>3,600</td>
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<td>“environmental management”</td>
<td>1,278</td>
<td>3,401</td>
</tr>
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<td>12</td>
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<td>9</td>
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<td>“environmental accounting” and “management accounting” or “environmental management” and “management accounting”</td>
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<td>43</td>
</tr>
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<td>“environmental accounting” and “management accounting” or “environmental management” and “management accounting” or “environmental accounting” and “financial accounting” or “environmental management” and “financial accounting”</td>
<td>0</td>
<td>49</td>
</tr>
</tbody>
</table>

Table 1
Results in a search survey in Emerald Insight and Business Source Premier on 15 April 2013
The abstracts were searched because it was assumed that the main themes of an article can be found in the abstract. The search in the full text was not performed because it generated a large amount of articles and the search on the subject was also not performed because it could only look at the classification of the subjects.

After selecting the articles from the search survey, a review on the abstracts of the articles were performed in order to verify the appropriateness of articles in answering the research questions. The verification process resulted in 22 journal articles being reviewed (see table 2). The selected journals were then reviewed in detail.

<table>
<thead>
<tr>
<th>Articles from the following academic journals</th>
<th>Year</th>
</tr>
</thead>
<tbody>
<tr>
<td>Accounting Forum</td>
<td>2000</td>
</tr>
<tr>
<td>Accounting, Organizations and Society</td>
<td>2006</td>
</tr>
<tr>
<td>Critical Perspectives on Accounting</td>
<td>2003</td>
</tr>
<tr>
<td>EuroMed Journal of Business</td>
<td>2010</td>
</tr>
<tr>
<td>ISO Management Systems</td>
<td>2009</td>
</tr>
<tr>
<td>Journal of Banking and Finance</td>
<td>2002</td>
</tr>
<tr>
<td>Journal of Cleaner Production</td>
<td>2003, 2006(4)</td>
</tr>
<tr>
<td>Management Accounting</td>
<td>1996, 1997</td>
</tr>
<tr>
<td>Production and Operations Management</td>
<td>2001</td>
</tr>
<tr>
<td>Social Responsibility Journal</td>
<td>2011</td>
</tr>
</tbody>
</table>

Table 2 List of selected articles from academic journals

Before looking at the relationship between accounting and sustainability development, it is important to point out the limitation of this study. It is possible that some relevant articles may be missed from this study. It is never possible to collect a full population of articles by this method because the abstracts may be absent from the database and also depend on the subscription of the individual journal articles by the library.

3. Accounting and Sustainability Development

Accounting has been used to provide information to internal stakeholders (e.g. management) and external stakeholders (e.g. shareholders, investors, etc.) of the firms. Accounting is broadly classified into management accounting and financial accounting. Financial accounting is used for producing financial statements to serve the information needs of external stakeholders (e.g. investors, creditors and regulators). The objective of financial accounting is to provide standardized information on the firm’s financial performance. Furthermore, financial accounting is regulated by international and local
accounting standards as well as local laws and regulations. The reporting of environmental costs in financial accounting is usually limited to those that can be separately identified like pollution control equipments, fines, etc. Environmental costs cannot be completely presented in financial statements and result in distortions in the calculations for improvement options (UNDSD, 2001). Thus, financial accounting cannot provide relevant information in improving the social and environmental aspects while supporting cost reductions. In 1992, The European Union (EU) called for a ‘redefinition of accounting concepts, rules, conventions and methodology so as to ensure that the consumption and use of environmental resources are accounted for as part of the full cost of production and reflected in market prices’ (European Commission, 1992).

Management accounting is developed to serve the information needs of internal management of the firm. Management accounting practices and information is tailor-made to address specific organizational culture and specific management needs. The environmental performance of TBL could be managed by accounting based methods of management and control (Bennett et al., 2011) which felt into the major functions of management accounting. Management accounting should become an integral part of the modern environmental management process. However, conventional management accounting pays little or no attention to attributing environmental costs to an organization's operations (Deegan, 2003; Epstein, 1996; UNDSD, 2001). There are a number of reasons that make management accountants difficult to collect and evaluate environmental costs effectively (Burritt, 2004). These limitations typically include the allocation of environmental costs to overhead accounts, misallocation and underestimation of environmental costs, poor communication between managers with the accounting and environmental management functions (Deegan, 2003; Epstein, 1996; UNDSD, 2001).

Society is ‘a series of individual “social contracts” between members of society and society itself’ (Gray et al., 1996). These contracts define the rights and responsibilities of the parties in that relationship and also create the risks and opportunities for companies. In the past, profitability was the highest priority for companies and managers seldom pay intention to minimize their organizations’ environmental impacts and to manage their environmental costs (IFAC, 2005). Environmental performances of companies are becoming the new social contracts between companies and the society. Pollution, global warming and climate change have get people’s attention and people are becoming more demanding on companies’ environmental performances. Failure to meet the expectations will result in the removing the firm’s ‘license to operate’ and affect its long-term survival (Deegan, 2002; Donaldson & Dunfee, 2002). For example in China, Dalian government ordered relocation of a chemical plant after
thousands of Dalian residents protested in the street (BBC News, 2011). Changes to accounting are necessary to support sustainable development. This starts the development of environmental accounting.

### 3.1 Environmental Accounting

Environmental accounting covered national income accounting, financial accounting and management accounting (USEPA, 1995). It could be applied at a firm, regional or national level (Bennett & James, 2000; Deegan, 2003; USEPA, 1995). Environmental accounting provided environmental-related information to internal and external stakeholders of a company which could discharge the accountability of the firm. It explicitly considered environmental impacts caused by organizational activities (Burritt et al., 2002). Gauthier, Leblanc, Farley, & Martel (1997) explained accountability within the context of environmental accounting as ‘the obligation imposed on a manager (leader, administrator, etc) by the law or a regulation or contract to demonstrate that he or she has managed or controlled, in accordance with certain explicit or implicit conditions, the resources with which he or she has been entrusted. Accountability, therefore, requires disclosure of the information deemed necessary to account for the company’s performance with respect to the issues and objectives previously established. In the context of environmental accounting, a company must account for its overall performance, including its performance with regard to environmental issues’.

Other researchers also gave different definitions for environmental accounting at different periods (see Bartolomeo et al., 1999; Bennett & James, 2000; Birkin & Woodward, 1997; Gray & Bebbington, 2001; Gray et al., 1996; Schaltegger & Burritt, 2000). Although their definitions differ, there was consensus that environmental accounting had to consider both monetary and physical environmental information for internal management and external reporting.

Gray and Bebbington suggested that environmental accounting included the following:

- Accounting for contingent environmental liabilities/risks
- Accounting for asset re-valuations and capital projections as they relate to the environment
- Cost analysis in key areas such as energy, waste and environmental protection
- Investment appraisal to include environmental factors
- Development of new accounting and information systems to cover all areas of
environmental performance

- Assessing the costs and benefits of environmental improvement programs

- Developing accounting techniques which express assets and liabilities and costs in ecological (non-financial) terms. (Gray & Bebington, 2001)

Physical measures (e.g. weight of raw material used, volume of water used, weight of wastes, etc.) are used by management accountants and managers for long time to evaluate production efficiency, to assess process performance, and to allocate product costs. However, the physical data is usually considered independent of the monetary data in their decision making process. The relationship between accounting and environmental accounting is shown in Figure 1.

![Figure 1 Accounting and environmental accounting](image)

**Figure 1 Accounting and environmental accounting**  
*Source: Adapted from Burritt et al. (2002)*

### 3.2 Environmental Management Accounting (EMA)

Environmental management accounting (EMA) is a subset of environmental accounting which is the ‘accounting systems and techniques that provide decision-makers and management with financial and non-financial information about the firm or organization and its environment.’ (Bouma & Correlje, 2003) Birkin (1996) indicated that ‘EMA is a straightforward development of management accountancy’. Management accountants can apply their expertise and skills to improve the quality of environment-related information in decision-making on investment appraisal, capital budgeting and strategic management (Everett & Neu, 2000; IFAC, 2005). EMA integrates two of the main principles of sustainable development: environment and economics. It helps to significantly improve corporate decision-making. The United Nations Division for Sustainable Development (UNSD) suggested that EMA ‘is simply doing better, more comprehensive management accounting, while wearing an “environmental” hat that opens the eyes for hidden costs.’ (UNSD, 2001) Staniskis and Stasiskiene (2006) suggested that EMA supports the internal management and
decision making process through various techniques of cost allocation, performance measurement and business analysis. Besides using for identify internal and external costs, it can also be used to allocate these costs within existing and emerging environmental and sustainability accounting frameworks. The role of EMA in decision making process is illustrated in Figure 2 below.

![Figure 2 Role of EMA in decision-making process](Source: Staniskis & Stasiskiene, 2006)

Jasch (2003) suggested that EMA was a fusion between management accounting, financial accounting and environmental management system. Deegan (2003) considered EMA was the collection, analysis, and use of environmental cost information for the purpose of supporting environmental management systems and environmental reporting to interested parties. UNSD defined EMA as ‘a combined approach which provides for the transition of data from financial accounting and cost accounting to increase material efficiency, reduce environmental impact and risk and reduce costs of environmental protection.’ (UNSD, 2001) Another definition of EMA from the International Federation of Accountants (IFAC) was ‘the management of environmental and economic performance through the development and implementation of appropriate environment-related accounting systems and practices. While this may include reporting and auditing in some companies, environmental management accounting typically involves life-cycle costing, full-cost accounting, benefits assessment, and strategic planning for environmental management.’ (IFAC, 2005) These definitions suggested that EMA could provide appropriate accounting data to assist management in making environmental related decisions.

EMA includes both monetary and physical aspects of environmental accounting. It provides data mainly for internal decision making on both environmental and financial performance which belongs to the scope of traditional management accounting.
Physical EMA data includes the flow of energy, water, materials and wastes which is essential to the identification of different environmental aspects, and allows the company to assess and report the physical aspects of its environmental performance. It reflects the ‘relevant cost’ of organizations. Monetary data refers to the costs that the company pays for the consumption of natural resources (e.g. water, energy) and materials and other costs that the company pays for controlling or preventing environmental damages and also for clean up and waste treatments.

Physical EMA requires the company to trace resources and materials inputs and outputs and to ensure none of them are unaccounted for. The physical information will be used to create environmental performance indicators (EPIs), which in turn help the managers to set environmental targets and report its environmental performance.

Usually managers do not link up physical data with monetary data in their decision making process and will make unsound purchasing decisions. In this regard, physical EMA should be linked to monetary EMA by supplying the required information on the amounts of resources used and wastes generated to assess the purchase costs.

Burritt, Hahn & Schaltegger (2002) developed an environmental accounting system framework which is introduced next section (see Figure 3).

![Image](http://example.com/image.png)

**Figure 3 Environmental accounting systems framework**
(Source: Burritt, Hahn & Schaltegger, 2002)

### 3.2.1 Monetary Environmental Management Accounting (MEMA)

MEMA tracked, traced and treated environmental costs and associated revenues (or cost
savings) that enabled management to improve environmental performance (Schaltegger & Burritt, 2000). MEMA focused on the financial aspect of organizational activities that had environmental impacts and managers could use the MEMA information to set achievable goals and targets (Burritt et al., 2002; Schaltegger & Burritt, 2000). It was also a control and monitoring device for environmental accountability.

3.2.2 Physical Environmental Management Accounting (PEMA)

PEMA was an internal management tool that discloses organizational environmental impacts in physical units (e.g. greenhouse gas produced in tones). According to Schaltegger and Burritt (2000), it served as:

- An analytical tool designed to detect ecological strengths and weaknesses;
- A decision-support technique concerned with highlighting relative environmental quality;
- A measurement tool that is an integral part of other environmental measures such as eco-efficiency;
- A tool for direct and indirect control of environmental consequences;
- An accountability tool providing a neutral and transparent base for internal and, indirectly, external communication; and
- A tool with a close and complementary fit to the set of tools being developed to help promote ecologically sustainable development.

3.2.3 External Monetary Environmental Accounting and Reporting (EMEA)

EMEA used the same conventions and principles as conventional financial accounting but with an environmental focus. Managers could use EMEA to decide how to measure environmental assets, how to treat contingent environmental liabilities, etc.

3.2.4 External Physical Environmental Accounting and Reporting (EPEA)

Gray and Bebbington (2001) argued that financial accounting useful in reporting environmental performance and in the collecting and analyzing the consumption of resources and materials. EPEA was the integration of environmental information into accounting records and systems. EPEA focused on preparing annual reports with environment-related information or stand-alone environmental reports for external stakeholders. For example, the Global Reporting Initiative (GRI) issued Sustainability
Reporting Guidelines (often refers as G3.1 Guidelines) that guided organizations to voluntarily report the firm’s sustainability performance. Physical environmental information like greenhouse gas emissions was reported in sustainability reports. It enabled stakeholders to understand and compare organizations’ sustainability performance.

Base on the environmental accounting systems framework, Burritt, Hahn and Schaltegger (2002) further developed the EMA framework which considered four information needs of making management decisions:

- **Monetary or non-monetary information.**
- **Time frame: Is the decision looking into the future or measuring the past?**
- **Length of time frame: Short-term or long-term?**
- **Routineness of information provision: Regular or ad hoc?**

<table>
<thead>
<tr>
<th></th>
<th>Monetary/ Physical</th>
<th></th>
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</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>MEMA</td>
<td>PEMA</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Past/present oriented</td>
<td>Short-term focus</td>
<td>Long-term focus</td>
<td>Short-term focus</td>
<td>Long-term focus</td>
<td></td>
</tr>
<tr>
<td>Routine generated</td>
<td>Environmental cost accounting (e.g. variable costing, absorption costing, activity based costing)</td>
<td>Trend analysis of environmentally induced costs, revenues, etc.</td>
<td>Material and energy flow accounting</td>
<td>Environmental capital impact accounting</td>
<td></td>
</tr>
<tr>
<td>information</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ad hoc information</td>
<td>Ex post assessment of relevant environmental costing decisions</td>
<td>Post investment assessment of individual projects</td>
<td>Ex post assessment of short term environmental impacts</td>
<td>Post investment assessment of physical environmental investment appraisal</td>
<td></td>
</tr>
<tr>
<td>Future oriented</td>
<td>Routine generated information</td>
<td>Monetary environmental operational budgeting (flows) Monetary environmental capital budgeting (stocks)</td>
<td>Environmental long term financial planning</td>
<td>Physical environmental budgeting (flows and stocks)</td>
<td>Long term physical environmental planning</td>
</tr>
<tr>
<td>Ad hoc information</td>
<td>Relevant environmental costing (e.g. special orders, product mix with production constraint)</td>
<td>Monetary environmental project investment appraisal</td>
<td>Relevant environmental impacts</td>
<td>Physical environmental investment appraisal</td>
<td></td>
</tr>
</tbody>
</table>

*Table 3 EMA Framework (Source: Burritt et al., 2002)*

Past oriented EMA tools identifies material costs and energy inefficiencies which
helped managers to find rooms for improvement. Future oriented EMA tools give information on expected wastes, emissions, energy and materials. With the combination of past and future oriented EMA tools, managers can make proper decision on investment project appraisals and long term financial planning.

### 3.3 Environmental Costs

As explain earlier, managers and accountants need to manage the firm’s environmental performance and their first step is usually concentrating on managing the environmental costs. But what actually makes up the environmental costs?

Ideally, environmental costs include all costs in relation to organizational activities have environment impacts. However, it is impractical to do so (Schaltegger & Burritt, 2000). Many environmental related costs are dispersed across business functions and these costs surface after management decisions are made and their scales are underestimated.

In general, two types of environmental costs exist – private or internal costs and externalities or societal costs (Deegan, 2003; Schaltegger & Burritt, 2000; UNDSD, 2001). Private or internal costs are “costs that directly impact a company’s bottom line” (USEPA, 1995), whereas externalities or societal costs “encompass the costs to individuals, society, and the environment for which a company is not accountable” (USEPA, 1995). Externalities are costs borne by the society as a whole rather than those who cause the costs and enjoy the benefits (Schaltegger & Burritt, 2000). Such costs are usually not reflected in a company’s account.

Environmental costs can further be classified into explicit costs and implicit costs (Atkinson et al., 2004). Explicit costs are the direct costs of modifying technology and processes, costs of cleanup and disposal, costs of permits to operate a facility, fines levied by government agencies, and litigation fees. Implicit costs are closely related to the monitoring of environmental issue such as administration costs and legal fees, employee education and awareness, and the loss of goodwill if environmental disasters occur.

Epstein (1996) reported that many organizations underestimated product costs because they did not have systems for accurately accumulating environmental costs. Gale (2006a) found that environmental costs under EMA could be at least twice as much as would normally be reported. Gale (2006b) further suggested that polluting companies pay three times for non-product output (i.e., wastes and emissions) that represents inefficient service delivery and operations. Environmental costs are usually managed at a low priority until end-of-pipe costs or economic benefits of managing them become evident (Graff et al., 1998). Chinander (2001) explained the cause of such treatment
was due to environmental impacts were hard to see, had lagged effects with long latency periods, and less visible.

Many companies in developed countries like US, Japan analyze their environmental costs by materials flow cost accounting (MFCA). The analysis of monetary depends on the information available on the resource flows. MFCA is a conventional process costing exercise based on mapping of material flows and energy flows within an organization. The costs of wasted materials and energy are identified and reported separately at all stages of the production. In Japan, Nitto Denko, a major manufacturer of chemical, electronic and health care products used material flow cost accounting to improve its positive product ratio by 10% in three years time (Kokubu et al., 2009).

### 3.4 EMA and Environmental Management

There is tight linkage between EMA and environmental management. Gray and Bebbington (2001) defined environmental management as ‘the range of responses by companies to environmental issues in reviewing their environmental position, developing and implementing policies and strategies to improve that position and in changing management systems to ensure ongoing improvement and effective management.’ With environmental management, stakeholders can assess the performance of the companies in reducing or minimizing their environmental impacts. International standards are developed for environmental management like ISO14000 series of certification from the International Organisation for Standardisation (ISO), BS7750 from the British Standards Institute. These international standards provided a framework on how to manage an organization’s environmental performance and created the need of EMA in key management decision making processes (Gray & Bebbington, 2001).

### 4. Benefits of EMA

There are many benefits associated with EMA applications. These include cost reductions, improved product pricing, attraction of human resources, and reputational improvements.

Albelda Perez, Correa Ruiz, & Carrasco Fenech (2007) found that management accounting practices was a facilitator for continuous improvement of environmental performance, compliance with environmental legislation, communication with interested parties, and employee involvement. With EMA, environmental costs which were previously grouped under overheads were now separately identified, classified and allocated, allowing for advanced cost analysis and possible cost reductions to occur. For example, Baxter International and Interface Inc. saved approximately $14 million
and $12 million per year, respectively from the use of EMA (Hansen & Mowen, 2005). EMA enabled firms to develop more efficient processes and also lead to process innovation (Ferreira et al., 2010).

5. Determinants of EMA Adoption

Ferreira et al. (2010) found that the key driver of EMA use was industry. In Malaysia, Jalaludin, Sulaiman, & Ahmad (2011) found that training and accounting body membership affects the adoption of EMA. Wei, Burritt, & Monroe (2011) found that social structural influences and organizational contextual influences motivated the development of EMA for waste management in local governments in Australia.

The initial pressure for companies to account for their environment would come from external stakeholders like pressure groups, media or internal stakeholders who were managers who perceived the importance of good environmental and sustainability performance for short-term risk management or longer term strategic objectives (Bennett et al. 2011). They further suggested that companies would use a flexible EMA system if they needed to satisfy the information need of external stakeholders. Managers would choose some indicators from a set of generic sustainability indicators (e.g. GRI G3.1) and EMA would be developed to suit the particular information needs of the external stakeholders. On the other hand, if sustainability initiatives are caused by managers’ own decisions, then managers needed key performance indicators from EMA to monitor their performance. EMA would be more likely to be a continuous information management system that supported internal reporting purpose.

6. Barriers of EMA Adoption

EMA is not likely to success if promotion is inadequate. A survey on Japanese companies discovered that the practice of linking eco-efficiency measurement with EMA information was incomplete and eco-efficiency information was underutilized due to inadequate public promotion (Burritt & Saka, 2006).

EMA requires collaboration and actions by different functions, such as financial management and environmental management but no logical relationship had been established between them (Bartolomeo et al., 1999). In the study of the EMA adoption in the pulp and paper industry in Thailand, Setthasakko (2010) found that accountants in Thailand did not have sufficient environmental knowledge and experience. This restricted the integration of environmental issues to existing accounting practices. Accountants in Thailand did not consider themselves as leaders in creating EMA in organizations. This correlates with the discussion other studies (see Wilmshurst & Frost,
2001; Adams, 2002; Lodhia, 2003).

Many managers believed that implementation of EMA was costly and they also incorrectly believed that customers were more focused on quality and lower prices than environmental responsibility. In 1990, the US Clean Air Act amendments and a corporate commitment to reduce the emissions of volatile air pollutants presented Dow Chemical with a choice of investing $3m in the necessary pollution control technology or to shut down the operation (Baker, 1996). Environmental cost information from environmental management accountants indicated that making the investment would ensure supply but at a higher price. Dow’s management representatives persuaded industrial customers it was investing in the product’s long-term viability by remaining ahead of impending legislation and as a result they accepted an environmental price premium.

The application of IFAC/ UNDSD EMA guidelines was voluntary and companies use their own definitions of environmental costs. In the study of EMA applications in Thailand’s pulp and paper industry, Setthasakko (2010) found that companies had their own definitions of environmental costs which made firms found collecting, identifying and evaluating environmental cost data difficult.

Finally, managers were unwilling to adopt EMA as they were not willing to be held responsible for significant environmental costs. Gale (2006a) reported that after looking at the “true environmental costs”, the managers of a paper mill in Canada who participated in the research project questioned the validity of EMA methodology and the managers decided not use EMA.

7. Conclusion

The discussions above show that current financial accounting practices cannot truly support in managing environmental issues of sustainability development because many environmental costs are not considered under the highly regulated financial reporting standards. On the other hand, management accounting practices are more flexible and managers can use environmental management accounting techniques to better manage the firms’ environmental costs and to improve the firms’ production processes, environmental performance and ultimately to achieve sustainable development.
References


