ENVIRONMENTAL MANAGEMENT ACCOUNTING: PRINCIPLES AND ISSUES

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Environmental management accounting (EMA) is concerned with the accounting information needs of managers in relation to corporate activities that affect the environment as well as environment related impacts on the corporation. The objective of this paper is to define principles and procedures for Environmental Management Accounting (EMA) with a focus on techniques for quantifying environmental expenditures or costs as a basis for the development of national EMA guidelines and frameworks. It is an area of practice and research that has developed rapidly in the last ten years. It concludes with a call for further case based research studies into investment appraisal, costing and performance management aspects of environmental management accounting.

Key Words: Environmental Management Accounting, Environmental Cost, Management Accounting

Introduction:

Environmental management accounting has received considerable attention in the past few years Corporate environmental impacts and incidents are leading to larger monetary consequences for organizations that need to be managed and promoted by international governments and bodies (e.g. Tellus Institute, the United Nations Division for Sustainable Development international experts group on Environmental Management Accounting (UNDSD EMA) and the United Nations Environment Programme (UNEP)) and voluntary acceptance by management of the need to address corporate environmental issues in order to maintain corporate legitimacy. A range of EMA tools are now available for managers and for regular discussion of EMA developments at conferences and workshops is now the norm. A fundamental 'environmental' criticism of conventional management accounting is that it largely ignores separate identification, classification, measurement and reporting of environmental information, especially environmental costs. Given the prior tendency of corporations not to highlight their environmental costs various studies have tried to establish

- what are environmental costs ?
- which environmental costs are potentially important ?

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- are environmental costs significant ?

To help answer the questions environmental costs have been classified in several different ways. Five classifications seem to have received particular attention, based on:

(i) conventional cost accounting – job and process; direct and indirect; historical and standard; fixed and variable; ordinary and extraordinary;

(ii) measurability – conventional, indirect hidden, less tangible, contingent; and societal (externalities); measurability has been the focus of many case studies in environmental management accounting;

(iii) quality – prevention, assessment (appraisal), control (internal failure) and external failure;

(iv) life cycle and activity – life cycle, research and development based, unit batch, product sustaining and facility level costs; and

(v) target audience – internal (managers and employees); external (shareholders, tax agencies, environment agencies, suppliers, creditors, general public, local communities, NGOs, etc.).

Relevance of environmental costs depends on a range of considerations. These include (i) the management function (e.g. decision making requires future environmental costs of different alternatives; control requires a comparison between expected and actual environmental costs; internal accountability is based on visibility of environmental costs); (ii) the specific decision being made (e.g. capital investment, capacity location or closure, product or process design); (iii) the role of the manager in the value chain (e.g. design or production); (iv) the responsibility level of the manager (e.g. top manager or purchasing manager) and (v) the appraisal system (e.g. individual rewards based on use of achieving budgeted environmental cost as a measure of individual performance).

No attempt is made here to provide a comprehensive review of the literature on EMA – for interested parties. A useful starting point is provided by Mathews (1997, 2002) and Bennett and James (1998a), and a wide repository of published information on environmental management accounting is located on the EMARIC web site. Another diverse set of instructive information can be found in the papers of Bennett et al. (2002a) from conferences and workshops of EMAN Europe. Also, there is no detailed discussion of particular environmental management accounting related tools, or environment-related performance indicators.

In this paper, for those concerned with the development or promotion of EMA and the ways these have been addressed, a number of constraints or roadblocks are considered.

What is Environmental Management Accounting?

Environmental Management Accounting (EMA) is the identification, collection, estimation, analysis, internal reporting, and use of materials and energy flow information, environmental cost information, and other cost information for both conventional and environmental decision-making within an organization.

Tellus Institute (Graff et al., 1998, pp. 3–4)

Environmental management accounting is the way that businesses account for the material use and environmental costs of their business. Materials accounting is a means of tracking material flows through a facility in order to characterize inputs and outputs for purposes of evaluating both resource efficiency and environmental improvement opportunities. Environmental cost accounting is how environmental costs are identified and allocated to the material flows or other physical aspects of a firm's operations.

International Federation of Accountants

Environmental management accounting is the management of environmental and economic performance through the development and implementation of appropriate environment-related accounting systems and practices (IFAC, 1998, para. 1). 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.

UNDSD EMA Initiative

Environmental management accounting serves as a mechanism to identify and measure the full spectrum of environmental costs of current production processes and the economic benefits of pollution prevention or cleaner processes and to integrate these costs and benefits into day-to-day business decision-making.

For companies that have the goals of saving money, especially environmental costs and reducing environmental impacts, EMA provides essential information for meeting those goals.

Key points to note are:

- EMA focuses on costs internal to the company; EMA does not include external costs to individuals, society, or the environment for which a company is not legally held responsible.

- EMA places particular emphasis on accounting for environmental costs.

- EMA also encompasses explicit information on physical flows and fates of materials and energy.

- EMA information can be used for most types of management activity or decision-making within an organization, but is particularly useful for proactive environmental management activities.

EMA is not merely one environmental management tool among many - rather, EMA is a broad set of principles and approaches that provides the materials/energy flow and cost data critical to the success of many environmental management activities. Terms or tools such as full cost accounting, total cost assessment, cost accounting, materials accounting, life cycle assessment, life cycle costing, and activity based costing are associated with EMA.

Reasons for Change

EMA researchers and proponents recognize the limitations of conventional management accounting approaches for management activities and decisions involving significant environmental costs and/or significant environmental consequences/impacts. For example, the following "conventional" management accounting practices might contribute to the inadequate consideration of environmental costs in internal decision-making:

- The unintentional "hiding" of many environmental costs in overhead accounts;

- Inaccurate allocation of environmental costs from overhead accounts back to processes, products, and process lines;

- Inaccurate characterization of environmental costs as "fixed" when they may actually be variable (or vice-versa);

- Inaccurate accounting for volumes (and thus costs) of wasted raw materials, and;

- The actual lack of inclusion of relevant and significant environmental costs in the accounting records at all.

Implementing EMA

EMA provides two types of data to assist companies in making decisions about capital investment, product/process costing, strategic planning, or other business opportunities. One type is cost information; the other type is physical flow information (e.g., raw materials use and waste generation rates).

Companies may approach the data collection in different ways. For example, some companies may simply conduct a more careful examination of existing cost data and combine it with existing materials flow knowledge to make more informed decisions. Other companies may do actual mass balances on their processes to better understand previously hidden losses.

Some examples of physical flow information include: quantity of chemical brought on-site, quantity of chemical produced on-site, quantity of chemical consumed in the manufacturing process, quantity of chemical in the product, quantity of chemical in the waste, water use, wastewater generation, and energy use.

In order to make the most informed decisions, cost information should include both the initial investment costs (and savings) and the annual operating costs (and savings). Developed by the Tellus Institute, following is a list of the broad categories included in both types of costs (and savings).

Initial Investment Costs

Planning/Engineering	Utility Systems & Connections
Permitting	Start-up/Training
Site Preparation	Contingency
Purchased Equipment	Salvage Value

Annual Operating Costs & Savings

Operating Inputs	Waste Management*	Less Tangibles
Operating Input Materials	Waste Management Materials	Productivity
Operating Input Energy	Waste Management Energy	Future Regulation
Operating Input Labour	Waste Management Labour	Potential Liability
Operating Floor Space	Waste Management Floor Space	Insurance
Operating Taxes & Depreciation	Waste Management Fees Waste Management Taxes & Depreciation	Company Image
Operating Cost of Capital	Waste Management Cost of Capital	Revenues

*Waste Management includes
waste handling, recycling, treatment,
disposal, and regulatory compliance

Some of these costs may be less tangible, or even intangible, but should at least be noted if they apply. Many tools are available to assist in the data gathering task. (See the list of links associated with this section.)

Once collected, the data must be conveyed to the decision makers in a concise and straightforward fashion. This can be achieved in whatever fashion is accepted by the company for presenting potential projects. Its crucial to stress the environmental costs that were found using EMA methods that inform the decision making in ways that conventional project analysis would have overlooked.

Uses and Benefits of Environmental Management Accounting:

An organization's decision-makers can use the physical flow information and cost information provided by EMA to make decisions that impact both the environmental and financial performance of the organization. It is important to note that, while EMA supports

internal decision-making, the implementation of EMA does not guarantee any particular level of environmental or financial performance. However, for organizations and programs that have the goals of minimizing costs, especially environmental costs, and minimizing environmental impacts, EMA provides an essential set of information for meeting those goals.

EMA data are particularly valuable for management initiatives with a specific environmental focus. EMA provides not only the cost data necessary for assessing the financial impact of these management activities, but also the physical flow information (e.g., raw materials use and waste generation rates) that help characterize environmental impacts. Examples of the many environmental initiatives that benefit from EMA include

- Pollution Prevention
- Design for Environment
- Environmental Life Cycle Assessment/Costing/Design
- Environmental Supply Chain Management
- Environmentally Preferable Purchasing
- Extended Producer/Product Responsibility
- Environmental Management Systems
- Environmental Performance Evaluation & Benchmarking
- Environmental Performance Reporting

Thus, EMA is not merely one environmental management tool among many - rather, EMA is a broad set of principles and approaches that provides the materials/energy flow and cost data critical to the success of many other environmental management activities.

Increasingly, the range of decisions affected by environmental costs of one type or another is generally on the rise. Thus, EMA is becoming increasingly important not only for environmental management decisions, but for all types of routine management activities, such as:

- Product & process design
- Cost control & allocation
- Capital budgeting

- Purchasing
- Supply chain management
- Product pricing
- Performance evaluation

Benefits of Environmental Accounting to Industry:

EMA brings many potential benefits to industry:

- The ability to more accurately track and manage the use and flows of energy and materials, including pollution/waste volumes and types
- The ability to more accurately identify, estimate, allocate, and manage/reduce costs, particularly environmental types of costs
- More accurate and comprehensive information to support the establishment of and participation in voluntary, cost-effective programs to improve environmental performance
- More accurate and comprehensive information for the measurement and reporting of environmental performance, thus improving company image with stakeholders such as customers, local communities, employees, government, and finance providers

Benefits of Environmental Accounting to Government

The implementation of EMA by industry also can benefit government in a variety of ways:

- The more that industry is able to justify environmental programs on the basis of financial self-interest, the lower the financial, political, and other burdens of environmental protection on government.
- Implementation of EMA by industry should strengthen the effectiveness of existing government policies/regulations by revealing to companies the true environmental costs and benefits resulting from those policies/regulations
- Government can use industry EMA data to estimate and report financial and environmental performance metrics for government stakeholders such as regulated industries or the industry partners in voluntary programs.

- Industry EMA data can be used to inform government program/policy design.
- Government can use industry EMA data to develop metrics for reporting the financial and environmental benefits of voluntary partnership programs with industry, innovative approaches to environmental protection, and other government programs and policies.
- Industry EMA data can be used for regional or national-level accounting purposes.

In addition, government organizations can implement EMA themselves, with the following benefits:

- Government EMA data can be used for environmental and other decisions within government operations, e.g., purchasing, capital budgeting, and federal facility environmental management systems.
- Government EMA data can be used to estimate and report financial and environmental performance metrics for government operations.

Benefits of Environmental Accounting to Society

- Enable the more efficient and cost-effective use of natural resources, including energy and water
- Enable the cost-effective reduction of pollutant emissions
- Reduce the external societal costs related to industry pollution, such as the costs of Environmental monitoring and control as well as public health costs
- Provide improved information for improved public policy decision-making
- Provide industrial environmental performance information that can be used in the broader context of evaluations of environmental performance and conditions in economies and geographic regions

As more organizations come to recognize that many management decisions have potential environmental impacts and costs of various kinds, recognition of the value of EMA will grow. In the end, the distinction between conventional management accounting and EMA may blur, as the two approaches merge into a single broad management accounting approach that can better inform all decisions, environmental and otherwise.

Conclusion

Debate is likely to continue about these issues, like which environmental costs are relevant to business and which should be recognized and measured; the process by which externalities might be included in environmental management accounting systems; and inequalities brought about through EMA.

Some other issues for case studies involving costing, investment appraisal and performance evaluation include the following.

• **Investment appraisal.** The importance of constraints on extending the duration of investments, environmental impacts and costs needs to be addressed. For example, can environmental management accounting be used to demonstrate the need for developing countries to address environmental obsolescence of plant and equipment, even in the face of economic viability? Political considerations may influence the last word here as intangibles such as, for example, opportunity costs of forgone environmental protection opportunities (Schaltegger and Burritt, 2002), cannot be exploited in some political settings, whereas a clean production facility leaves a positive tangible reminder to voters and may be easier to exploit. Cleaner manufacturing technology clearer understanding of the role of environmental management accounting in the process of integration of organizational participants and areas is needed (e.g. to move from conventional supply push of new engineering systems, leading to adverse environmental impacts) to demand pull systems based on customer demand (reduces inventory levels and associated use of space, employees trained to improve environmental quality, closer cooperation with suppliers, design of cleaner products, elimination of non-value adding activities etc.).

• **Costing.** Study of the impact of costing systems on dematerialization. For example, standard costs are useful in engineered cost situations (where input–output relationships are well known). Standard costing is affected by regular improvement of engineered relationships. Inflexible use of standard costs in practice may act as a barrier to material reduction (e.g. the mix of material and labour may not be approached in a flexible way when use of higher quality labour can lead to less waste in material use, leading to a positive environmental effect and a competitive advantage). Also, although conventional cost classifications have been used as a way of organizing information about the environment, not all conventional notions have been stressed as much as they might. For example management issues associated with the difference between engineered and discretionary costs play a role in the overall success of dematerialization issues where engineered costs are converted into discretionary costs, but can lead to a larger proportion of manipulable discretionary costs. Likewise, reducing rework, spoiled output, scrap and waste are desirable environmental and economic goals. All three, rework, scrap and

waste, lead to wasted resources but there are multiple causes related to the quality of materials used, duration and quality of machinery and manufacturing methods used, inadequate training of the worker, etc. Tracking of costs, such as material flows, may help identify scope for reduced material use, but only an understanding of the multiple causes (technical and behavioural) will help improve control and actions that lead to reduced environmental impacts and better performance.

• **Performance management.** Benchmarking is increasing in importance as a way of comparing performance against competition. Benchmarking passes ownership of any changes in environmental best practice over to the managers that undertake the benchmarking exercise and it sets difficult to obtain, but achievable targets that motivatebetter environmental and economic performance. The 'vibe of the thing' is towards development of easier to quantify monetary environmental performance measures as the main bottom line of concern to managers, with a focus on buying as cheaply as possible (economy), as few inputs as possible (efficiency – see Stone, 1995) and minimal concern for desired environmental outputs and outcomes (effectiveness). The balanced scorecard holds up promise here, for increasing stakeholder value, placing environmental interests within it based on acceptable sets of environmental indicators and at the same time beginning to focus on the inevitable conflicts with other stakeholders.

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