

Environmental Management Accounting – Priorities to the Reporting Company Systems

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Abstract: Environmental management accounting serves as a mechanism for identifying and measuring 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 the last decade, corporate environmental accounting has gained increased importance in practice, of which cost accounting receives most attention. Limits of traditional financial and cost accounting methods to reflect efforts of organizations towards sustainability and to provide management with information needed to make sustainable business decisions have been broadly recognized. Information on environmental performance of organizations might be available to some extent, but, decision-makers of internal company, as well as those in public authorities, are seldom able to link environmental information to economic variables and are crucially lacking environmental cost information. As a consequence, decision makers fail to recognize the economic value of natural resources as assets, and the business and financial value of good environmental performance. Beyond “goodwill” initiatives, a few market-based incentives exist to integrate environmental concerns in decision-making. This paper gives an overview of the approaches of environmental management accounting and we analyze environmental cost in condition by current economic context.

Keywords: environmental management accounting, environmental cost, environmental performance, corporate reporting, environmental financial statements

1 Introduction

Traditional tools used for planning economic and development policies cannot identify environmental costs. The concept of lastingness actually involves restrictions on the exploitation of natural resources and the modification of the lifestyle, in sourcing the maintenance costs of the natural heritage and the preservation of the natural balance. In order to reach this objective, all the decision making processes must be improved for the purposes of increasing responsibility and accountability in relation to environmental issues at all the hierarchical levels. The identification and acknowledgement of the environmental costs associated with a product, process or system are important for making good managerial decisions. The achievement of the objectives related to the reduction of environmental expenses, the expansion of the recovery processes and the improvement of the environmental performances involve paying special attention to current and potential environmental costs. This led to the development of *Environmental Management Accounting - EMA* over the past decades¹.

2 What is environmental management accounting?

Environmental management accounting has received special attention lately².

¹ Bennett, M., Rikhardsson, P., Schaltegger, S., *Adopting Environmental Management Accounting: EMA as a Value-adding Activity*, 2013, Dordrecht, Kluwer Academic Publishers. pp. 1-14

² Green, I.M., *Monetary Green Accounting and Ecosystem Services*, Working Paper No. 86, July 2013, Published by the National Institute of Economic Research Stockholm

The analysis of specialized literature and of the related practices indicates the fact that a series of different concepts were developed with regard to environmental management accounting and that a tendency towards their standardization has been registered lately, thus:

The International Federation of Accountants defines environmental management accounting as³: *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.*

The United Nations Division for Sustainable Development – UNDSO provides a slightly different definition of EMA. Its definition emphasizes that environmental management accounting systems generate information for internal decision making, where such information can be either physical or monetary in focus. As the UNDSO states⁴: *the general use of EMA information is for internal organizational calculations and decision making. Environmental management accounting procedures for internal decision making include both physical procedures for material and energy consumption, flows and final disposal, and monetarized procedures for costs, savings and revenues related to activities with a potential environmental impact.*

The Environmental Agency of Australia⁵ defines EMA as *the identification, collection, analysis, internal reporting and use of the information concerning the flow of materials and energy, environmental costs, as well as other costs necessary for decision making within an entity.* This definition of EMA is similar to that of traditional management accounting, registering at the same time a series of essential differences, such as:

- it puts special emphasis on environmental costs;
- it incorporates information about the costs, as well as information related to the physical flows and to the consumption of raw materials and energy;
- the information provided by EMA can be used for any type of decisional process within an entity, but it is generally useful for activities with significant consequences on the environment.

Until now, a consensus with regard to the EMA field, contents or procedures has not been reached, and it would probably be of no use to try to reach a consensus or to promote standardization. EMA must be adjusted to the managerial needs and priorities of each particular company and to their own reporting systems⁶.

3 Environmental cost

Discussion of environmental accounting and environmental management accounting generates reference to environmental costs - a term that can take on a variety of meanings⁷. Environmental costs have traditionally been thought of as being the 'end-of-pipe' costs, such as the costs associated with cleaning up sites after production, or waste-water treatment costs. Environmental management policies that focus on these end-of-pipe costs and technologies can generate short run returns, but such a focus will be costly in the long run as it will ignore the consumption of resources within the organization. A broader interpretation, and one that is consistent with the definitions applied, would see the term environmental cost also encompass material and energy used to produce goods and services (particularly from non-renewable sources), the input costs associated with wastes being generated (including the capital costs, labor costs, materials and energy costs used to produce the waste) plus any associated disposal costs, storage costs for particular materials, insurance for

³ International Federation of Accountants, *International Guidelines on Environmental Management Accounting (EMA)*, 2014, <http://www.institutopharos.org/home/ema.pdf>

⁴ United Nations Division for Sustainable Development, *Environmental Management Accounting. Procedures and Principles*, United Nations, New York, 2011, <http://www.un.org/esa/sustdev/sdissues/technology/estema1.htm>

⁵ Environment Protection Authority of Victoria, Chartered Accountants, *Environmental Management Accounting. An introduction and case studies for Australia*, Published by Institute of Chartered Accountants in Australia, http://www.epa.vic.gov.au/bus/accounting/docs/final_report.pdf, 2013

⁶ Department of Economic and Social Affairs Commission on Sustainable Development, *Promoting Environmental Management Accounting Through Government Policies and Advancing Information for Decision-Making Through Electronic Networking And Corporate Reporting*, New York, 2010, p.3

⁷ Burritt, R., Hahn, T., Schaltegger, S., *Towards a Comprehensive Framework for Environmental Management Accounting – Links Between Business Actors and EMA Tools*, *Australian Accounting Review*, no.12 (2), 2012, pp.39-50

environmental liabilities, and environmental regulatory costs including compliance costs and licensing fees, inclusive of any fines⁸.

The achievement of the objectives of reducing environmental expenses, expanding recovery processes and improving environment performances requires a shift of attention in the direction of current and potential environmental costs⁹. The identification and acknowledgement of the environment costs associated with a product, process or system are important for making good managerial decisions. The costs for the reduction of pollution, waste management, supervision, regulatory reporting, legal fees, etc., increased at a fast pace in the past 20 years, especially due to the increasingly stricter environmental norms¹⁰. Traditional management accounting systems include many of these environmental costs in the category of overhead expenses, which means that production managers do not have any stimuli to reduce costs, and the executive management is not aware of the dimension of the environmental costs¹¹.

By clarifying the structure of the environmental costs for a process or a product, EMA will enable the management to accurately understand the aspects that must be stressed in order to render costs more efficient. Financial implications usually play an important role in the decisions of the entities concerning environmental aspects¹².

In this approach, internal environmental costs to the firm are composed of direct costs, indirect costs, and contingent costs. These typically include such things as remediation or restoration costs, waste management costs or other compliance and environmental management costs. Internal costs can usually be estimated and allocated using the standard costing models that are available to the firm.

Direct costs can be traced to a particular product, site, and type of pollution or pollution prevention program (e.g., waste management or remediation costs at a particular site). Indirect costs such as environmental training, R&D, record keeping and reporting are allocated to cost centers such as products and departments or activities¹³.

External costs are the costs of environmental damage external to the firm. These costs can be “monetized” (i.e., their monetary equivalent values can be assessed) by economic methods that determine the maximum amount that people would be willing to pay to avoid the damage, or the minimum amount of compensation, that they would accept to incur it.

The impact of environmental issues on production costs is often underestimated. They are like an iceberg. EMA helps to identify and analyze these hidden costs¹⁴. For example, minimizing the amount of waste not only reduces incineration and waste disposal costs but also total purchasing costs of materials (as fewer materials are needed if there is less waste), operating costs (fewer materials need to be processed), labor and administration costs of handling materials and waste, etc.

Hidden costs are, most of the times, part of overhead expenses, since they are not known.

A well-substantiated environmental management accounting system manages to identify as direct many costs which were initially included in overhead expenses. Under these circumstances, when an entity analyses a new manufacturing procedure it must, among other things, also identify the following aspects:

- emissions in the environment, elimination modalities and associated costs;
- elimination or reduction of the harmful or oxidizing compounds in the products;
- the sources, quantity and cost of the used energy;
- the costs generated by the compliance with the legal regulations and provisions in force;
- the costs of potential compensations etc.

⁸ Jasch, C., Staskiene, Y., *From Environmental Management Accounting to Sustainability Management Accounting*, in *Environmental research, engineering and management*, 2015, No.4(34), pp.77-88

⁹ Herbohn, K., *A full cost environmental accounting experiment*, *Accounting, Organizations and Society*, vol. 30, issue 6, 2015, pp. 519-536

¹⁰ Green, I.M., *Monetary Green Accounting and Ecosystem Services*, Working Paper No. 86, July 2013, Published by the National Institute of Economic Research Stockholm

¹¹ Gray, R., *Of Messiness, Systems and Sustainability: Towards a More Social and Environmental Finance and Accounting*, *The British Accounting Review*, vol. 34, issue 4, 2012, pp. 357-386

¹² Environment Agency Japan, *Developing an Environmental Accounting System*, Tokyo, 2010, <http://www.env.go.jp>

¹³ United Nations Division for Sustainable Development, *Environmental Management Accounting Policies and Linkages*, United Nations, New York, 2012

¹⁴ EMA-SEA, *Environmental Management Accounting for South-East Asia*, http://www.gc21.de/ibt/en/ilt/ibt/programme/EMAportal/downloads/ema_sea.pdf

The traditional accounting system does not allow the distinct identification or evaluation of the data regarding the environment, data about the management of residual waste, the prevention of pollution, recycling, compliance with legal provisions, health and work safety¹⁵. Therefore, the identification and quantification of environmental costs and benefits are necessary for the calculation of the profitability of the environment-related projects. Without this information, managers can reach a false and expensive conclusion.

In order to integrate the environment in accounting, an information management system, similar to that in the annual financial reports, must be established. At the end of each accounting exercise the entity can present an environmental report which will comprise the expenses made for the protection of the environment; the recapitulative evaluation of the environment incidences and performances of its activities. The environmental data provided by the environmental management accounting are considered one of the key elements in an environmental report and enable the users to understand the perspective of the entity as concerns environmental protection and the way the environmental problems are dealt with. It is worth mentioning the fact that some companies, such as Baxter - USA, Carillion, Wessex Water – Great Britain, Canon – Japan, etc., publish environmental financial statements in which they present their environmental costs and the benefits obtained following these expenses.

For example, the *Baxter* group (the United States of America) has been presenting an *environmental financial statement* in its environmental report ever since 2012, in which it publishes information about environmental costs and the benefits obtained due to environment protection actions. The presentation modality and the published data were modified in time. When the determination modality of a certain index was changed, corrections of the data in the previous exercises were performed so that the presented information could be compared. In the annual report for 2013 information concerning environmental taxes for electronic products was added, and sometimes it is necessary to perform some corrections for the data presented in the previous report. Thus, in the report for 2018, the information regarding the reduction of waste, the elimination of non-harmful waste, the income from recycling, was updated. The estimation of the costs, incomes and savings realized in the field of environment by the Baxter group in 2013- 2018 is presented in Table 1¹⁶.

Table 1. Baxter - Financial Statement - Environmental Costs (dollars in millions)

	2018	2017	2016	2015	2014	2013
Environmental Costs						
Basic Program						
Corporate Environmental – General and Shared Business Unit Costs	1.9	1.6	1.4	1.5	1.3	1.2
Auditor and Attorney Fees	0.3	0.4	0.4	0.4	0.4	0.3
Energy Professionals and Energy Reduction Programs	1.2	1.1	1.1	1.0	1.0	0.9
Corporate Environmental – Information Technology	0.4	0.3	0.3	0.3	0.3	0.5
Business Unit/Regional/Facility Environmental Professionals and Programs	7.8	7.7	7.4	7.0	6.5	5.4
Packaging Professionals and Packaging Reduction Programs	-	-	1.3	1.2	1.0	1.0

Pollution Controls – Operation and Maintenance	3.0	3.1	3.2	2.8	3.2	2.8
Pollution Controls – Depreciation	2.4	0.9	0.8	0.7	0.8	0.8
Basic Program Total	16.9	15.1	14.6	13.6	13.5	12.9

¹⁵ Gale, R., *Environmental costs at a Canadian paper mill: a case study of Environmental Management Accounting (EMA)*, *Journal of Cleaner Production*, vol. 14, 2016, pp. 1237-1251

¹⁶ www.baxter.com

Remediation. Waste and Other Response (proactive environmental action will minimize these costs)						
Attorney Fees for Cleanup Claims and Notices of Violation	0.1	0.1	0.1	0.1	0.1	0.7
Settlements of Government Claims	0.0	0.0	0.0	0.0	0.0	0.0
Waste Disposal	7.6	8.2	6.5	6.3	5.9	6.9
Carbon offsets	0.2	0.1	0.0	0.0	0.0	0.0
Environmental Fees for Packaging	0.9	0.9	0.9	1.1	1.0	1.0
Environmental Fees for Electronic Goods and Batteries	0.1	0.1	0.1	0.0	0.0	0.0
Remediation/Cleanup – On-site	0.2	0.5	0.1	0.1	0.1	0.4
Remediation/Cleanup – Off-site	0.1	0.0	0.3	0.0	0.2	0.1
Remediation. Waste and Other Response Total	9.1	9.9	8.0	7.6	7.3	9.1
Total Environmental Costs	26.0	25.0	22.6	21.2	20.8	22.0
Environmental Income. Savings and Cost Avoidance						
From Initiatives in Stated Year						
Regulated Waste Disposal	-0.1	-0.7	0.1	0.1	0.7	0.4
Regulated Materials	-1.3	-2.8	0.5	0.5	2.1	1.6
Non-hazardous Waste Disposal	0.7	0.0	-0.1	0.2	7.0	0.4
Non-hazardous Materials ⁵	1.7	1.5	-2.0	5.0	4.8	6.7
Recycling (income)	5.1	4.3	4.3	3.9	3.0	2.9
Energy Conservation	5.1	4.2	2.3	7.3	12.0	4.2
Packaging	-	-	0.0	3.5	2.9	1.7
Water Conservation	0.7	0.6	0.5	0.0	1.1	0.5
From Initiatives in Stated Year Total	11.9	7.1	5.6	17.0	30.7	18.4
As a Percentage of Basic Program Costs	70%	47%	38%	125%	227%	143%
Cost Avoidance from Initiatives Started in the Six Years Prior to and Realized in Stated Year	80	76.4	82.1	75.6	62.2	32.7
Total Environmental Income. Savings and Cost Avoidance in Stated Year	91.9	83.5	87.7	92.6	92.9	51.1

Source: Sustainability Report Baxter 2016, 2017, 2018, p.19, sustainability.baxter.com/EHS

The analysed information shows that the group presents information about the *costs that were avoided* due to their efforts, and that have big values (80 billion dollars in 2016).

We can also notice that, in this six years period, the highest value of the total environmental costs was registered in 2016 (26 billion dollars). The avoided costs and the obtained savings grew from 51.1 billion dollars in 2013 to 92 billion dollars in 2018. With the help of its environment protection actions, the group manages to obtain significant advantages; thus, in 2019 they spent 26 billion dollars and they saved three times as much, that is 80 billion dollars.

The environmental report for 2018 present some group objectives regarding the environment for the period to come, giving special attention to environment protection actions. Thus, by 2019, the group plans to:

- Reduce total waste generation 30% indexed to revenue from 2013 baseline.
- Reduce energy usage 30% indexed to revenue from 2014 baseline.
- Eliminate 5 million kilograms (5,000 metric tons) of packaging material from products sent to customers from 2015 baseline.
- Reduce water usage 35% indexed to revenue from 2016 baseline. To help achieve this, by 2017 evaluate potentially vulnerable watersheds associated with Baxter facilities and establish aggressive water conservation goals for high-risk areas.
- Implement two projects to help protect vulnerable watersheds and/or provide communities with enhanced access to clean water.

The Canon Japanese group presents, in its environmental report, the information related to environmental costs in a slightly different manner, rendering them in physical units as well as in financial ones (Table 2) ¹⁷.

Table 2. Canon - Environmental Costs

Cost Items		Environmental preservation cost (thousand yen)		Economic effect (thousand yen)	Effect of environmental preservation (amount)	Effect of environmental preservation (reference)	
		Investment amount	Cost	Actual amount of reduction effect		Reduction amount	Reduction amount of CO ₂
Pollution protection cost		4,820	0	-	-	-	-
Global environment preservation cost	Reduction of electrical consumption	35,099	0	2,066	-164,000 kwh	-69 t-CO ₂	10.6 ha
	Reduction of copy paper	24	0	1,064	-7,600 kg	-25 t-CO ₂	3.8 ha
Resource circulation cost	Reduction of waste	0	0	6,955	-465,543 kg	-143 t-CO ₂	22.1 ha
Upstream and downstream cost	Reduction of packaging materials	0	0	-6,758	43,600 kg	122 t-CO ₂	-18.9 ha
Management activity cost		0	540	-	-	-	-
Research and development cost		0	0	-	-	-	-
Social activity cost		0	0	-	-	-	-
Environmental damage cost		0	0	-	-	-	-
Total of environmental preservation cost		39,943	540	3,327	-	-115 t-CO ₂	17.6 ha
		Total:40,483					

Source: http://www.canon.co.jp/web/english/web/frame/kankyou_f.htm

Other companies present environment-related information in their annual financial report. This information is, most of the times, less detailed.

In 2017, Stora Enso's environmental investments amounted to 40 million euro (33 mil. euro), environmental costs total 184 million euro in 2017 (178 mil euro in 2016), including taxes, fees, refunds, and permit-related costs, repair and maintenance, chemicals and materials, but excluding interest and depreciation and environmental liabilities total of 81 million euro (68 mil. euro in 2016). The quantitative information: 8.58 million tonnes of fossil CO₂ equivalents in 2013, 9.91 in 2016 and 10.44 in 2015; electricity consumption are 17.9 terawatt hour in 2012, 19.5 terawatt hour in 2014 and 19.8 terawatt hour in 2015; hazardous waste 3 626 tonnes in 2016, down from 3 982 tonnes in 2017 etc.¹⁸

The data offered by EMA are used for making decisions within, and sometimes outside a company, depending on whether this information is published or not.

4 Conclusions

The challenge of environmental management accounting is to develop new practices for the identification of the production and control alternatives of pollution, the selection of raw materials that make

¹⁷ www.canon.co.jp/web/english/web/frame/kankyou_f.htm

¹⁸ www.storaenso.com

cost reduction and environmental protection possible, the monitoring of pollution, the identification of alternative processes, etc. The estimate of the cost of environmental degradations is an ambitious goal. An accurate evaluation is ideal for the identification of the various emissions that cause the degradation of the environment and for the establishment of a policy for setting the priorities. The difficulties are generated by the lack of knowledge concerning the nature and dimension of the caused damages, as well as by the fact that the destruction of the environment does not often have a market price, being difficult to assess.

It is common knowledge that most expenses are indirect, and, in order to accurately determine the costs, it is necessary to identify a pertinent repartition base. It is also very important to appropriately select the calculation method. A well-substantiated environmental management accounting system succeeds in identifying as direct many costs that were initially included in the overhead expenses.

The information provided by the environmental management accounting, just like in the case of traditional management accounting, is used within the entity for decision making. Nevertheless, sometimes a part of this information is made public in the environmental reports (Baxter, Canon, etc.). The environmental data offered by environmental management accounting are considered one of the key elements of an environmental report and enable the users to understand the perspective of the entity on environmental protection and the way environmental issues are dealt with. Also, apart from the information presented in currency units, they also offer information expressed in physical units.

The analysed data helped us reach the conclusion that the adoption of environmental management accounting:

- ensures the accurate determination of the production costs by taking into consideration environment-related aspects;
- contributes to a better repartition of the overhead expenses related to the environment, and thus the managers have access to information that help them make decisions;
- enables the persons who make decisions to identify the cost reduction modalities and to preserve or launch only those products that are profitable from the perspective of the environment;
- encourages the adoption of processes related to clean technologies.
- offers competitive advantages.

EMA provides a complete array of tools and methods that help companies reduce their expenses and improve decision making. In the context of the current economic crisis, it is estimated that the level of the environmental costs will decrease, primarily due to the restriction of activities, but, for the long-term, most companies prevision the increase of investments in actions for the protection.

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