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IMPLEMENTATION OF ENVIRONMENTAL MANAGEMENT ACCOUNTING SYSTEMS IN ROMANIAN COMPANIES – METHODOLOGY AND CASE STUDIES

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Abstract. Among the means used within the sustainable development strategy of companies, the environmental management accounting (EMA) constitutes an analytical high-rank tool helping the organisation both in managerial decision-making process and simultaneously improvement of its economic, environmental and social performance on the way toward the achievement of strategic organisational objectives. The paper presents the ECOIND experience in adaptation and integration of environmental management accounting within the strategic management system of enterprises. For the implementation of an EMA system, the following main steps are performed: identification of environmental costs, development of material and associated monetary flows, allocation of environmental costs to cost carriers taking into account the environmental principles, quantification of environmental and non-product costs in the final structure of the cost carrier, use of EMA results for decision-making processes and innovation promotion. An information collection system has to be implemented in order to collect environmental and non-product cost related information. Case studies illustrating the implementation and results obtained at two Romanian economic units from chemical industry are also presented.

Keywords: sustainable development, environmental management accounting, environmental costs.

AIMS AND BACKGROUND

This paper is presenting the ECOIND experience on EMA system implementation within the sustainable development strategy of companies. In order to illustrate this approach, results obtained in 2 case studies from chemical industry are also presented.

Environmental management accounting (EMA) is a relatively new developed analytical tool used in the aim to increase the materials use efficiency. It consists of an integrated approach that uses data generated both from financial and cost accounting in order to reduce the environmental risk/impact and environmental protection related costs[1]. The internal informational system of companies is usually hiding the information related to environmental performance costs and benefits. Companies and their managers generally consider environmental costs as

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negligible for company operation and often do not realise that some production costs have an important environmental related component[2]. On the one hand, the potentially 'pollutant' products appears to be more profitable, due to the fact that some of their production costs are 'hidden', therefore there is a possibility to be sold with an underestimated price, on the other, the 'green' products can be cost carriers for the 'pollutant' products (via the overhead costs)[3,4]. The systematic use of EMA help and support managers to identify company 'hidden' environmental costs and, on this basis, to improve decision-making process and simultaneously to assess company economic, environmental and social performance on the way towards achievement of company organisational objectives.

DISCUSSION

For the implementation of an EMA system within the companies, the following main steps were performed.

Environmental costs were identified and traced (fines, penalties, wasted raw materials, environment related labour, non-products costs). The company environmental costs consist of all expenses related to environmental protection measures such as pollution prevention, reduction, control and documentation of environmental aspects, environmental impact as well as expenses incurred for waste streams discharge, treatment, land rehabilitation and sanitation measures. The amount of money spent by the company for environmental protection is not directly linked to the overall environmental performance of the company. The environmental costs were aggregated in 4 main groups: treatment, prevention and EMS, non-product output related costs and external costs. For the case studies developed within ECOIND projects, only the first 3 groups of costs were identified and highlighted in the final cost structure of the cost carriers (Fig. 1).

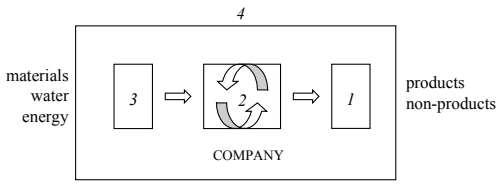

Fig. 1 Environmental costs groups
1 – treatment and discharge/storage waste steams; *2* – prevention and environmental management system; *3* – non-product output related costs; *4* – external costs

Material and associated monetary flows were subsequently developed. Using this information, the waste and emissions treatment/prevention and environmental management costs were allocated to cost carriers – products. Allocation methods take into account environmental principles (i.e. Water Treatment – allocation is made based on the pollutant concentration in effluents).

A special remark should be mentioned related to the non-product output costs. There are 3 ways to calculate them: versus technological norms, versus BAT (best available techniques as defined by Integrated Pollution Prevention and Control Directive) and versus theoretical norms. In order to improve their operation, companies are interested in the difference between the present costs and costs according to the technological norms. This approach offers the opportunity to reduce costs through a better operation of existing present technology. In this particular case the cost calculus has to be done on a monthly basis in order to allow a quick response from the company managers. The difference between the present costs and those according to BAT is important in the case of technological changes, being an important data for the determination of the time period needed to recover the investment. A good practice will be to calculate them at the end of the fiscal year in order to be included in the annual report and to facilitate the shareholders decisions upon the making of new investments. The non-product output costs are higher when calculated versus theoretical norms. The use of this approach could lead to little incentive of company in implementing EMA, but on the other hand, could be a strong motivation for better use of resources and for stimulating innovation.

An information gathering system was implemented in order to collect environmental and non-product cost related information. This is, probably, the most difficult part of the job, since it involves experts from almost all of the company plants and departments.

In order to illustrate this approach, some results for 2 case studies from chemical industry, developed during the 2006–2008 period are presented. The main objective of the EMA system implementation was to identify company environmental costs and to accurately allocate them to cost centres and/or products. The initial data consisted of cost structures used by the company, from which non-product output-related costs were firstly identified (through benchmarking). The baseline for one company was considered the BAT norms (company 1) and for the 2nd one the theoretical norms (company 2) (Fig. 2).

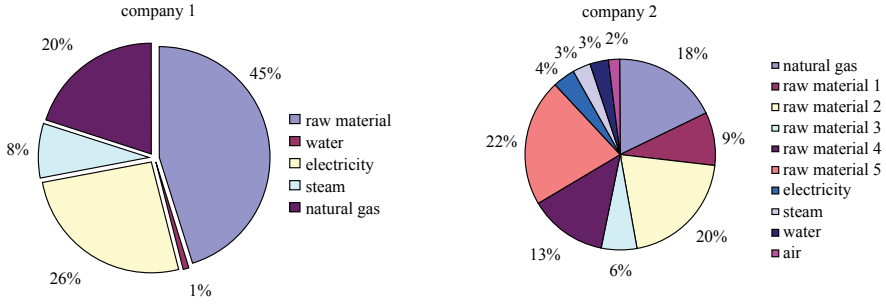

Fig. 2. Structure of non-product output costs

The non-product output-associated labour costs (processing non-product output costs) were derived based on the material non-product output cost ratio within the total material cost.

A comparison of the 2 presented case studies with other case studies from chemical industry is presented in Table 1.

Table 1. Structure of non-product output related costs (%)

Structure	Company 1	Company 2	Case study Romania	Case study Slovakia
Material non-product output costs	90.15	91.35	90	60
Processing non-product output costs	9.85	8.65	10	40

The next main step in EMA implementation was the development of material/energy flows and associated monetary flows. This step is needed for a suitable allocation of 'hidden' costs within the overhead environmental costs elements to the cost carriers (cost centres and/or products). In other words, the allocation key used is based on the monetary flows associated to the process material/energy flows.

As an example, the allocation scheme for company 1 is presented in Fig. 3.

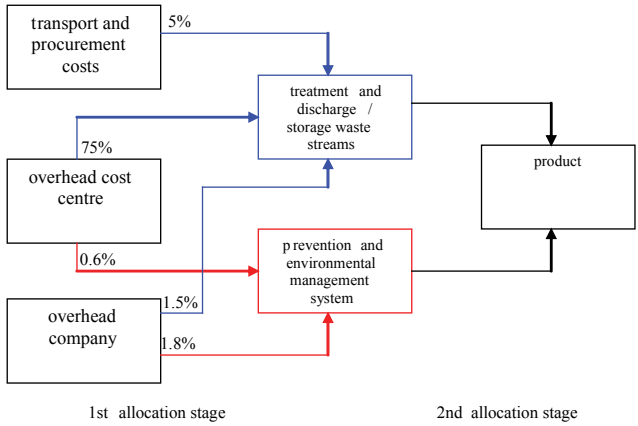

Fig. 3. Allocation scheme for company 1

After setting up the proper allocation key, this is used for allocation of hidden environmental costs on cost carriers. The resulted structures of environmental cost groups for the 2 case studies are presented in Table 2.

Table 2. Structures of environmental costs (%)

	Company 1 Product 1	Company 2 Product 1	Company 2 Product 2	Company 2 Product 3	Case study Romania	Case study Hungary	Case study Slovakia
Treatment and discharge / storage waste streams	23	4	15	22	26	35	48
Prevention and environmental management system	0	1	4	6	3	not considered	6
Material non-product output costs	69	88	75	68	63	65	28
Processing non-product output costs	8	7	6	4	8	not considered	18

CONCLUSIONS

As a general conclusion, EMA could be regarded as a new approach to costs calculations (part of flow management concept). By contrast to the old approach of materials flows (which is focusing only on processes monitoring), EMA takes into account also the losses accompanying equipment operation (material flows being monitored at the level of cost centres or along the production lines). The objective is not to calculate the environmental costs but to offer valuable data related to the allocation of production costs (structure of production costs). The improvements, to the classic costs system, have 2 main components:

- economic – identification of material costs, their value and their causes. The material non-product output costs are representing the main share of environmental costs, for the processing industries;
- environmental – reduction of materials/energy-related costs that is leading to positive environmental effects concretised in reduction of waste streams flows.

The most important effects of EMA system introduction are:

- development/design of new 'green' products,
- reduction of material losses and waste generated.

Environmental management accounting became a new way of thinking in the companies once it revealed hidden costs and, which is the most important result, encouraged different people (engineers, technicians, accountants, managers) to communicate, to work together, as a team, toward a common, shared objective. Moreover, environmental management accounting can be integrated within the strategic model of the organisation in a way that contributes to rapid achievement of

organisation objectives. Due to its proactive component they represent an important value-added to the model for the sustainable development of the organisation.

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