

ENVIRONMENTAL ACCOUNTING AT THE CORPORATE-LEVEL

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ABSTRACT. The paper focuses on selected problems of environmental accounting at the corporate-level. As a key term, environmental cost is identified. There are many problems connected with determination of environmental costs and evaluation of environmental benefits. Contemporary results of the research in this area in the Czech Republic and abroad are discussed. The role of companies, especially small-medium sized enterprises (SME), in sustainable development and their informational support is mentioned.

Key words: environmental accounting, environmental management system, company, costs, external costs, environmental information

Introduction

Historically first studies of environmental/ecological accounting began with corporate level approaches in 70's years of the last century (Müller-Wenk, Ullmann, later Schaltegger and many others). The development of research activities was encouraged by requirements of newly implemented systems EMS/EMAS (Environmental Management Systems) and in connection with regulation of IPPC (Integrated Prevention and Pollution Control) in the last years.

1. Current Approaches to Environmental Accounting

The concept of sustainable development creates a new space and possibilities for entrepreneurship. New legal measurements from the government regulate activities of companies not to get environment worse and determinate certain framework for long-term prosperity. On the other side, strategy of sustainable development creates important opportunity to increase competitiveness by respecting the environmental protection as one of the strategy aims and enforcing principles of sustainable development to all activities of the company.

The green entrepreneurship develops many tools for management decisions making. [10, p. 120] differentiate these tools according to the types of focus (analytical tools, tools for action, tools for communication) and areas of focus (green entrepreneurship/environment; efficient entrepreneurship/economic and environment; and responsible entrepreneurship/social, environmental and economic).

The term **environmental accounting** has been relatively newly taken in environmental management and there has been broadly used in different contexts. This paper deals with its utilization as an important tool for management decision-making, it deals with environmental management accounting (EMA). EMA can be defined as 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 [8]. The costs related to environment can be

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described as costs within internal management account, or external financial accounts or other public reports.

EMA serves business managers in capital investment decisions, cost calculations, process or product design decisions, performance evaluation and lots of other forward-looking business decisions. [7, p. 39]. EMA was developed due to limitation of conventional management accounting approaches that did not provide management with useful information for management activities and decisions involving significant environmental costs and (or) significant environmental impacts.

The most important tasks of EMA are:

- EMA focuses on accounting of environmental costs, on internal costs of a company;
- information from the system of EMA is important also for other types of management decisions but the most important aim is to support proactive and preventive environmental activities.

It is necessary to note that EMA is a broad set of principles and approaches that provides materials, energy flows and cost data critical to succeed in environmental management activities. A systematic use of EMA principles facilitates finding hidden environmental costs in the general accounting system. If the hidden costs are not identified, the product pricing does not reflect all costs of the product and it can be sold undervalued. Implementing of EMA can also multiply the benefits gained from other environmental tools. EMA requires better understanding of physical environmental impacts of a company and therefore EMA implementation is not the task only for accountants but it requires close cooperation of technicians, environmental engineers and managers in order to properly evaluate economic impacts on environment due to business activity. Burritt et al, 2001 describes a multi-dimensional framework of EMA in the distinctions between dimensions: internal-external, physical-monetary classification, past and future timeframes, short and long-terms, and ad hoc - routine information (Table 1).

Table 1.

Framework of EMA

	Monetary EMA		Physical EMA	
	Short-term focus	Long-term focus	Short-term focus	Long-term focus
Past oriented				
<i>Routinely generated information</i>	Environmental cost accounting (e.g. variable costing, absorption costing, and activity based costing)	Environmentally induced capital expenditure and revenues	Material and energy flow accounting (short term impacts on the environment-product site, division and company levels)	Environmental (or natural) capital impact accounting
<i>Ad hoc information</i>	Ex-post assessment of relevant environmental costing decisions	Environmental lifecycle (and target) costing	Ex-post assessment of short-term environmental impacts (e.g. of site or product)	Lifecycle inventories Post-investment assessment of physical environ. investment appraisal
Future oriented				
<i>Routinely generated information</i>	Monetary environmental operational budgeting (flows) Monetary environ. capital budgeting (stocks)	Environmental long-term financial planning	Physical environmental budgeting (flows and stocks) (e.g. material and energy flow-activity based budgeting)	Long-term physical environmental planning
<i>Ad hoc information</i>				

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	Relevant environmental costing (e.g. special orders, product mix with capacity constraint)	Monetary environ. project investment appraisal Environ. lifecycle budgeting and target pricing	Relevant environmental impacts (e.g. given short run constraints on activities)	Physical environmental investment appraisal Lifecycle analysis of specific project
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(Source Burritt et al 2001)

The key term is **Environmental Cost**. The description of this concept is broadly discussed with various approaches [6, 5, 3, 1, 9.]. There are many difficulties associated with identification and allocation of the environmental costs. Systemization of the environmental cost categories in the companies describes Table 2.

Table 2.

Environmental Costs

Environmental Cost/Expenditure Categories				
Waste and Emission Treatment	Prevention and Environmental Management	Material Purchase Value of Non-Product Output	Processing Costs of Non-Product Output	Environmental Revenues
Depreciation for related equipment	External services for environmental management	Raw materials	Labour costs	Subsidies, Awards
Maintenance and operating materials and services	Personnel for environmental management activities	Packaging	Energy costs	Other earnings
Related Personnel	Research and Development	Auxiliary materials		
Fees, Taxes, Charges	Extra expenditure for cleaner technologies	Operating materials		
Fines and penalties	Other environmental management costs	Energy		
Insurance for environmental liabilities		Water		
Provisions for clean-up costs, remediation				

Source: [Schaltegger et.al., p.19]

According to US EPA [6,11], the definition of environmental cost depends on utilization of information in a company and the environmental costs can include conventional costs (raw materials and energy costs with the environmental relevance), potentially hidden costs (costs which are captured by accounting system but then lose their identity in overheads), contingent costs (costs in a future time - contingent liabilities), and image and relationship costs. For exact accounting, it is necessary to explain these terms in detail. For the environment cost tracking key drivers, have to be identified: toxicity of emission and waste treatment, volume of emissions and waste, environmental impact added to volume of treated emissions, the relative costs of treating different kind of emissions [5, p.136].

Many other systems or techniques describing environmental costs are published [3, 7, 8, 9 and others]. **Total Cost Assessment (TCA)** is a tool for the valuation of cases like: project selection among numerous alternatives, project final analysis, supplemental environmental projects, budgeting for alternatives. **Life Cycle Assessment** was also adopted for

the logistic chains in companies. Another system is, for example, **Full Cost Accounting**. A technique based on the **input/output analysis (mass balance)** was described for the companies' environmental costs. Process flow charts can help to trace inputs and outputs of the process, in particular, waste, and can bring together technical and cost accounting information. Flow cost accounting can make material flows transparent using different information. For the environmental accounting process, it is necessary to use different kinds of information (for example, physical unit information from primary measurements, conversion factors etc.). Environmental **Activity Based Costing (ABC)** allocates all internal costs to the cost centres and cost drivers based on the activities causing the costs [8]. Overview of current methods of environmental costs is shown in Table 3.

Table 3.

Current methods of addressing of environmental costs

	Costs of environmental protection		Costs of material and energy flow	
	Past and present costs	Future (potential) costs	Past and present costs	Future (potential) costs
Separate calculations	Emission reduction costs	Environmental budgeting		
Full-cost accounting	Full-cost of environmental reduction	Consideration of the costs of environ. risks	Costs of remaining material	
Direct costing	Environ. oriented direct costing, multistage direct costing	Costing of future environmental costs		
Process costing	Activity based costing	Activity based costing	Costing oriented towards material and energy flow; Activity based costing oriented towards material flow	Activity based budgeting oriented towards material and energy flow

2. Current Situation in EMS and EMA Acceptation in the Czech Republic

In the recent years, the Czech Republic has seen increased attempts of companies to reduce the negative impact of their activities on the environment by introducing environmentally friendly technologies. Preventive approaches are being preferred (wastes formation prevention) to end-of-pipe technologies (wastes disposal). The point of the environment protection has become an integral part of decision-making. A wide range of voluntary initiatives and activities has been operating in the domain of environment protection, the environmental management systems implementation, in particular. The number of organizations operating with ISO 14001 and EMAS certification/validation (990) in the Czech Republic indicates an important need of information data for decisions about environmental costs and benefits.

For the purpose of environmental management and for the search for an environmentally friendly solution, which would comply with the economic objectives of the company as well as with sustainability principles, it is necessary, as we said before, to stress the importance to the identification of costs related to protection of and damage to the environment. According to survey of environmental management in the Czech companies [9,14,15], the enquired companies largely identified the environmental costs as follows:

- costs of wastes disposal,
- costs of wastes transportation,

- fees for the environmental protection,
- fines and penalties related to the environment damaging,
- payment to external organizations for services related to EMS implementation, certification and re-certification,
- operating costs of end-of-pipe technologies i.e. waste water treatment plants, incinerators, etc.

It is obvious what type of cost is usually traced - namely costs related to the treatment of wastes, of wastewaters and to emissions into the air, fees for environmental protection, sanctions for the environment destruction and costs for external services related to environmental management systems. 76% of the examined enterprises answered that they do track environmental costs. Environmental costs are tracked out of the accounting system more frequently.

The result of the research reflected unambiguously that the larger the enterprise is the higher number of companies track environmental costs. This is closely related to the fact that the size of enterprises requires correspondingly complex accounting system (the number of accounting transactions grows, the transparency deteriorates). To support decision-making processes in large companies, it is useful to track and evaluate important cost items. Undoubtedly, environmental costs belong to important cost items.

Over 85% of respondents declared that information about environmental costs was useful for the company management. The survey showed that the importance of information was increasing with the size of enterprises. Most of large enterprises with regarded information about environmental costs as useful for the company management. Therefore, it is obvious that environmental costs in large companies should be considered as important cost items, which need to be tracked and controlled.

According to our experiences, we can say that systems of environment accounting if they exist in companies have usually been developed by enterprises themselves without any significant support from external parties and that the concept of environmental cost has not been explicitly defined. Special, analytical accounts can be encounter within companies monitoring environmental costs. The problem lies in a proper posting of original accounting documents which are conducted the employees of the accounting department but accountant usually are not the experts in the field of environmental management. Another problem is connected, for example, with environmental investments that are not always declared as environmental, which results in situation that their depreciation is not included in the operational environmental costs.

3. Selected Further Research Problems

There are many approaches how to create EMA system. SME need special help for creating this tool - it has been tailored for selected companies and industry branches but not as a general system. A formal framework for the environmental management system is represented by ISO family 14 00X and EMAS, but the companies, especially SME do not accept broadly this concept. Some studies point out on the causes of low number of certifications/valuations in these companies. If EMA should support environmental management, it is necessary to analyse why the number of companies with such system is still so low. (Fig.:1).

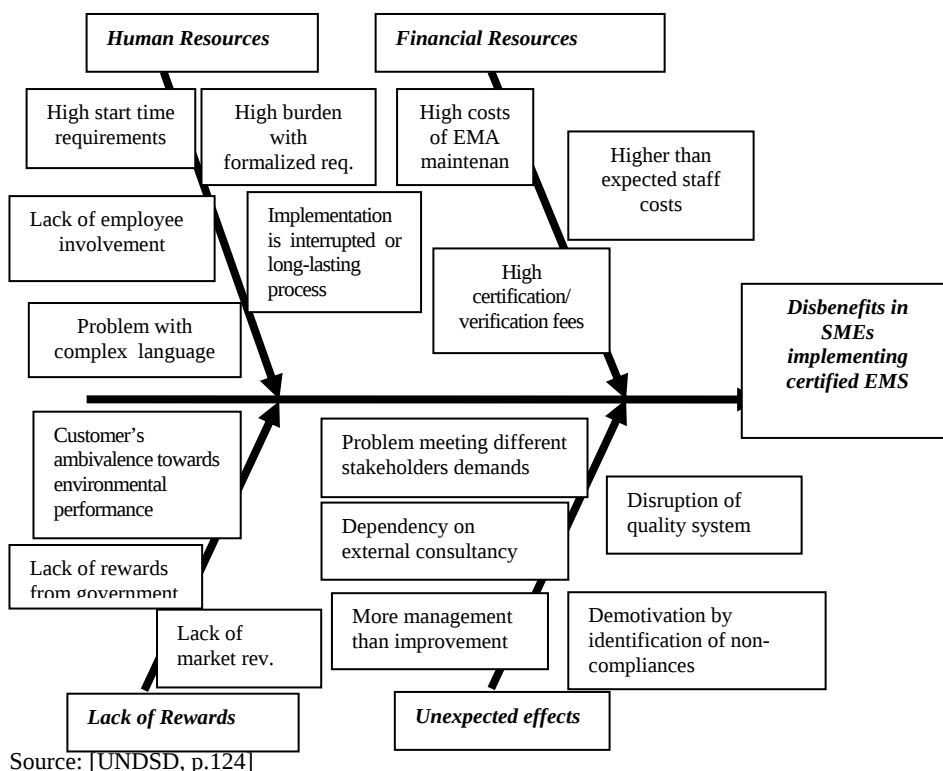


Figure 1. Drawbacks of EMS Implementation in SME

In the case of small and middle-sized enterprises, the **missing data compensations** are very important. There are some approaches available to obtain data and to make easier decisions in practice. Kennedy [3, p.39] refers to the following methods:

- Estimation based on similar processes within the facility (for example similar use of material in the chemical processes);
- Estimation based on end-product composition (potential to derive data using basic chemistry principles);
- Conduct a survey or benchmarking;
- Take an educated guess;
- Leave it blank (either to minimize the amount of time spent on the accounting or to limit inaccuracies in the calculation).

There are available the methods developed to evaluate and prioritize liabilities, for example, Pareto analysis, risk matrix, analytical hierarchy process and other qualitative methods. As an integral part of management system rating criteria must be identified and used for costs valuations.

Contemporary management techniques use point of view that is more pragmatic in the continual improving. As a special case for decision-making, a calculation of efficiency of investment project can be used. There are many standard indicators for the calculation as net

present value, payback period, internal rates of return and others. Conventional accounting system cannot offer the sufficient information for the **valuation of risks**. Such costs should be taken into account - hidden, contingent and image costs (non-product material costs, reporting or training costs, compensations and penalties, good-will benefits and costs, external costs etc.).

Broadly discussed is the circumstance that EMA does not include external costs to individuals, society, or the environment for which company is not legally held responsible. In the case of **externalities**, the company will internalize the costs by regulation, charges or taxes, but it cannot include monetary non-valuable items. The most difficult problem is also to calculate the environmental benefit. In such cases, it is recommended to use multicriteria analysis for the valuation of non-market benefits and preferring of the environmental friendly investments [4]. For the further extension of the EMA, it is necessary to consider the environmental revenues/benefits – not the internal only but the benefits from the averted damage.

Conclusion:

The evaluation of impacts related to company activities is expensive and therefore the efficiency criteria (the added value of a new IS have to be higher than its costs) should be considered in creation of an environmental information system for the management decisions. The critical valuation of meta-analytical studies will help for additional information about contemporary conditions to support EMA and to create typology of possible transfer of results.

The environmental accounting can be a very important support for the companies with connection to environmental management systems and can realize win-win solutions based on eco-efficiency procedures.

REFERENCES

1. Burritt L.; Hahn T.; Schaltegger S.: Current Developments in Environmental Management Accounting-Towards a Comprehensive Framework for EMA. Universität Lüneburg 2001 (http://www.uni/lueneburg.de/eman/pdf_dateien/Burritt/Hahn.pdf)
2. Farský M.; Ritschelová I.; Vomáčkova H.: Životní prostředí z pohledu účetnictví. Univerzita J.E. Purkyně v Ústí n.Lab. Ústí n. Lab. 2001
3. Kennedy M.L.: Total Cost Assessment for Environmental Engineers and Managers. J.Wiley and Sons, Inc., New York 1998
4. Obršálová I.: Environmental Investments Appraisal – Some Problems of Efficiency Calculations. E+M Ekonomie a Management, Special Issue, 2002
5. Schaltegger S.; Burritt R.: Contemporary Environmental Accounting. Greenleaf Publishing, Sheffield 2000
6. UNDSO: Improving Government's Role in the Promotion of Environmental Managerial Accounting, United Nations, New York 2000
7. www.emaweb.org 5.11.2004
8. www.acca.org.uk 5.11.2004
9. Kožená M.: Konkurenceschopnost podniku při respektování strategie udržitelného rozvoje. Diplomová práce, VUT FP, Brno 2002
10. Bleischwitz, R.; Henricke P.: Eco-Efficiency, Regulation and Sustainable Business. Edward Elgar, Cheltenham 2004

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11. UNDSO: Environmental Management Accounting, Procedures and Principles, UN, New York 2001
12. Schaltegger et al.: Innovatives Management staatlicher Umweltpolitik. Birkhäuser, Basel 1996
13. Souček E.; Obršálová I.; Ježdík V.: Peněžní indikátory ochrany životního prostředí v České republice. Univerzita Pardubice, Pardubice 2003
14. Ritschelová I.; Obršálová I.; Tošovská E.; Ščasný M.: Application of Environmental Accounting. VaV 1C 4/17/04 Ministry of the Environment of the Czech Republic, Prague 2004
15. Fedorová, A. et al.: Environmental Costs Information for Environmental Management, Research Report on Project of Grant Agency of the Czech Republic (no. 402/02/0092), Brno 2002