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ROLE OF ECO-INDICATORS IN ENVIRONMENTAL MANAGEMENT ACCOUNTING

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Abstract

All aspects of business are affected environmental pressures, including accounting. It requires changes in accounting system, especially widely use environmental accounting.

The aim of this research is to evaluate possibility of implementation of eco indicators in environmental management accounting in Latvia.

To reach this objective it is necessary to develop the following tasks:

- to study what is environmental management accounting (EMA) in substance and it's significant elements;
- compare and analyse main tips of costs included in guidance of EMA with structure of eco-indicators established in Latvia;
- to describe both contributing and obstructing factors of implementation of EMA;
- to draft proposals for improvements in normative act's of enterprises to stimulate use of environmental management accounting.

This research has used the approach of economic analysis and comparative methods in studying the legislation and practices of international accounting system and environmental management accounting in different countries. In the article the monographs of the authors, publications in periodicals and other sources of literature in area of environmental management accounting and linking to Latvian situation are also analysed.

The main conclusion shows on differences of environmental indicators of Latvia in comparison with classification of costs recommended in EMA and suggestions for enhancement of EMA implementation setting are given.

1. Theoretical background of “Environmental Management Accounting”

The integration of environmental problem into the corporate accounting can be substantiated by several important reasons one of them shows that enterprise accounts should reflect attitude of the companies towards the environment and the impact of environmental expenditures, risks and liabilities upon the financial position of an enterprise (UNCTAD, 2002)



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Despite the significance of environmental information in preparing financial statements, as well as in operational decision making process, prior studies (Epstein, M. J., 1995) have found that majority of enterprises are not aware and do not evaluate their environmental costs.

This suggests that thereby the causes of these costs are unknown. Lack of understanding of the impact of environment on the produced goods and the provided services is the reason for not including environmental costs during the calculation of a product costs; liabilities related to the environmental changes in their turn are not reflected in the financial reports.

The above mentioned problem can be partly prevented by means of environmental management accounting. Although this concept is not new, and active research in this field dates back to late 20th century, however, the Latvian economic environment in the current period misses information on the substance of environmental accounting and its application possibilities. Consequently, the research on this issue becomes even more topical nowadays.

The concept ‘environmental accounting’ on the basis of guidelines, developed by international organizations, as well as on the basis of studies performed by scientists from different countries, is differently defined and interpreted. Professor K. V. Bhanu Murthy (India) – environmental accounting divides into three level activities where Corporate Environmental Accounting (CEA) is about making environment related costs more transparent within corporate accounting systems and reports (K. V. Bhanu Murthy, 2007).

Having studied available publications, we can come to a conclusion that Environmental Management Accounting (EMA) is an element of Corporate Environmental Accounting (K. V. Bhanu Murthy, 2007; EPA, 1995). Essentially EMA involves refining a management accounting system so that it more tightly and rigorously accounts for environment related costs.

Besides the above mentioned environmental accounting contexts, there had been two more types identified in the recommendations of IFAC – Full cost accounting that enables to evaluate the external environmental costs and influence, as well as Natural resource accounting for the determination of stocks and their flow in physical and monetary terms.

In order to continue the studies of the specificity and application aspects of environmental management accounting, it is necessary to specify its definition. One of the first publications in this sphere is a document, prepared by Environment Protection Agency (US) in 1995, where the environmental management accounting is described as “the process of identifying, collecting and analyzing information about environmental costs and performance to help an organization’s decision-making” (EPA, 1995). In its turn, IFAC’s guideline defines EMA broader as the identification, collection, analysis and the use of two types of information for internal decision-making:

1. physical information on the use, flows, and fates of energy, water, and materials (including waste);
2. monetary information on environment-related costs, earnings and savings. (IFAC, 2005).

This position is very important for more complete evaluation of the influence of a company’s performance on environment. The studies have proved that many companies disclose the quantitative indicators of utilized natural resources and caused waste, but in the



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monetary terms these indicators are not being aggregated. When the changes of environmental factors are being evaluated in the terms of money, people pay more attention to them. In order to perform such evaluation, it is necessary to integrate the conventional environmental reports into the system of environmental management accounting. The disclosure of the influence of environmental problems in the company's information is determined by restrictions of different level:

- Different restrictions (for example, emission limit in conformity with Kyoto Protocol);
- Environmental taxes of different countries (carbon taxes; energy use taxes; landfill fees etc.);
- Regular control, provided by the EU requirements (for example, RoHS Directive);
- Conditions of Investing Ratings System (Dow Jones Sustainability Index);
- Standards of Environmental Management System (EMS) that shall be observed by suppliers as provided by the International Standardization Organization;
- Companies' voluntary or according to the owners' requirements prepared environmental reports together with annual financial statements (IFAC, 2005).

Taking into consideration these and other requirements, "EMA serves business managers in making capital investment decisions, costing determinations, process/product design decisions, performance evaluation and a host of other forward-looking business decisions" (UNSDS, 2000). It means that EMA focuses on the management of a company's internal functions, however, at the same time it enables to become an instrument in order to provide external information users with reports on environmental costs. However, there are no strict requirements in EMA sphere, as it is in financial accounting, therefore each company can adjust the general recommendations to its special business conditions, and thus a necessity emerges to have a particular methodological base for the foundation.

2. Approaches of EMA Costs Classification

The approaches and methods that the companies may apply in EMA practical aspect had been differently analyzed in several scientific and applied studies (EPA, 1995; Epstein, M. J., 1995; UNDSN, 2001.; ICAWAI, 2008.; IFAC, 2005). One of the most widely interpreted materials has been presented in the document of IFAC international guidelines; therefore it was used as a basis for the evaluation of Latvia's situation.

According to EMA definition, both physical and monetary information on the company's activities influencing environment shall be accounted and processed in the sphere of environmental management. The application of natural units of measurement is especially necessary for the accounting of material costs (use of energy, water, different materials, emission of waste), but they mainly characterize the influence of company's activities on environment. It means that the company shall track down all "inputs" and "outputs" of physical resources in order to ensure that no significant quantity of energy, water or materials is left without accounting. Such type of accounting is called "material balance" or "eco-balance" (IFAC, 2005).

The distinctive feature is that some outcomes or "outputs" in the material balance shall not be considered as a finished product. For example, at transport companies that utilize energy



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and materials, but do not make new physical finished products, all energy, water and other used materials shall be considered as non-product output.

Taking into consideration the diversity of EMA methodology and methods applied in different countries, the classifications of environment-related costs differ; however, there are six categories of costs identified in EMA recommendations:

- **Material costs of product outputs** – they comprise the purchase costs of natural resources, for example, water and other materials that are included into the manufactured product, by-product and packaging;
- **Material costs of non-product outputs** – they comprise the purchase costs of energy, water and other materials and sometimes also the process costs, if they turn into waste and emission;
- **Waste and emission control costs** – processing of waste and emission, enrichment and removal, compensation costs for the harm to the environment and other costs related to the control regulatory requirements;
- **Prevention and other environmental management costs** – this group covers costs that are related to the environment protection management activities, for example, a project on the development of a cleaner product, but it comprises also costs related to environmental planning, measuring and communication, as well as other relevant costs;
- **Research and development costs** – costs that are related to the studies envisaged for dealing with environmental problems and developmental projects;
- **Less tangible costs** – internal and external costs with less tangible nature, for example, liabilities for the fulfillment of future regulation, the company's image, partnership, etc. (IFAC, 2005)

The classification of the above mentioned costs was used in order to evaluate, whether the requirements of the laws and regulations of Latvia form the basis for the accounting of companies' costs at such structure and detailed elaboration degree that provides as complete as possible information on the influence of companies' economic performance on environment and on the measures taken regarding the preservation and renewal of natural resources.

3. Comparative Analysis of Latvia's EPI and EMA Costs

In 2009 the Cabinet of Ministers of the Republic of Latvia adopted the *Regulations on National Environmental Indicators* that had been developed in conformity with the provisions of Environmental Protection Law. They are envisaged for the evaluation of the efficiency of environmental policy implementation and for the determination of the correspondence of environmental situation to the policy aims, but such an approach to the environmental issues may be also applied by entrepreneurs. Having studied 435 different environmental indicators summarized during the studies performed by European Environment Agency and ten groups of indicators chosen for the description of environment-related sustainable development processes in the EU documents, it is possible to find that Latvian environmental indicators cover 7 groups:

1. Waste management – 4 indicators
2. Biodiversity – 17 indicators



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3. Air pollution and depletion of ozone layer – 5 indicators
4. Climate change – 10 indicators
5. Water management – 16 indicators
6. Land use – 4 indicators
7. Use of natural resources – 5 indicators (LR MK, 2009)

Each group of indicators comprises those indicators that precisely describe the parameters existing in the environment that are accounted during measuring and studied. For example, the indicator “waste management” comprises several specifying concepts of environmental indicators – generated quantity of hazardous waste (in thousands of tons per year), quantity of waste generated in households (in kilograms per capita a year), total volume of recycled waste generated in households (proportion of the quantity generated per year) and total volume of recycled hazardous waste (proportion of the quantity generated per year).

In every company the environmental indicators to be individually applied shall be clear, easy to measure, they should clearly reflect the changes in the environmental situation. The environmental specialists recommend accounting in a separate register those indicators that are regularly determined (measured, calculated) at the company. It provides the managers with an opportunity to observe the development of environmental issues at the company for many years. Thus the progress in every sphere that the company measures and controls by means of environmental indicators becomes an important acknowledgement of environmental protection activities carried out by the company. However, the performance of such activities shall be aligned with the common EMA conception providing that physical data shall be turned into monetary ones, consequently – they shall be evaluated in terms of particular costs.

In order to determine, whether it is possible to obtain the most important values of EMA costs, while applying EPI adopted in Latvia, there was a matrix of environmental costs and environmental indicators developed during the empirical research (see Table 1).

Only 33 times it was possible to find certain correspondence between the environmental indicators adopted in Latvia and those 6 costs groups identified in EMA guidelines, besides the number of indicators presented in the table constitutes approximately 50% of all indicators (in total – 61 indicators). For example, in Group 1 “Waste management” indicator 1.1. *Generated quantity of hazardous waste (thousands t/year)* and indicator 1.2. *Quantity of waste generated in households (kg/capita/year)* are related to both use of raw and auxiliary materials for the manufacturing of production – EMA costs group 1, and to the result of such economic activities that do not directly become a realization object and also to the processing costs – EMA costs group 2. In its turn, indicator 1.4. *Total volume of recycled hazardous waste (% of quantity generated)* mainly shall be attributed to EMA costs group 4 – Preventive and other environmental management costs. Similarly other indicators also can be used for the identification of different EMA costs.



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Table 1

Environment-Related Costs and Latvian EPI (LR MK, 2009; IFAC, 2005)

Categories of environmental costs	Waste management	Biodiversity	Air pollution	Climate change	Water management	Land use	Use of natural resources
1. Material costs of product outputs							
Raw and auxiliary materials	1.1.-1.2.		3.1.-3.3.	4.1.-4.2.			7.1.-7.2.
Packaging materials	1.1.-1.2.		3.1.-3.3.	4.1.-4.2.			7.1.-7.2.
Water					5.2.1.		7.3.
2. Material costs of non-product outputs							
Raw and auxiliary materials	1.1.-1.2.		3.1.-3.3.	4.1.-4.2.			7.1.-7.2.
Packaging materials	1.1.-1.2.			4.1.-4.2.			7.1.-7.2.
Operating materials				4.1.-4.2.			7.1.-7.2.
Water					5.2.1.		7.1.-7.2.
Energy				4.6.-4.10.			
Processing costs	1.1.-1.2.						
3. Waste and emission control costs							
Equipment depreciation							
Operating materials	1.1.-1.2.						7.1.-7.2.
Water and energy				4.6.-4.10.	5.2.1.		7.3.
Internal personnel							
External services							
Fees, taxes and permits							
Fines							
Insurance							
Remediation and compensation	1.4.						
4. Preventive and other environmental management costs							
Equipment depreciation							
Operating materials, water, energy	1.4.	2.5.-2.10.		4.1.-4.2.		6.1.-6.4.	
Internal personnel							
External services							
Other		2.1.-2.4.					
5. Research and development costs							
6. Less tangible costs							
						6.1.-6.4.	

The performed analysis enabled to determine that conceptually EPI system may be a part of the evaluation of EMA costs however, it has several drawbacks:

- the structure of national environmental indicators in Latvia at their present developmental stage is oriented towards the evaluation of environmental situation at the state level, at the companies' level;



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- several environmental indicators shall be attracted to each EMA costs item;
- one and the same indicator may be used for the identification of different costs;
- it is impossible to identify all types of costs by means of environmental indicators – it is proved by the data presented in Table 2 (11 types of costs and costs group 5 *Research and development costs* have no corresponding environmental indicator).
- there might emerge difficulties regarding the evaluation of the natural units of measurement of environmental indicators in terms of money.

The fact that the environmental indicators are not used to characterize such important costs as costs of equipment depreciation, internal personnel, external services, taxes, fines, insurance and research and development (See highlighted rows in Table 1), which shall be considered as very important in this sphere, indicates the necessity to supplement EPI system significantly for more complete disclosure of EMA costs.

Thus we can draw a conclusion that it is necessary to develop more detailed and to a certain extent different system of indicators at the level of a company for EMA needs; for example, groups of indicators – *Biodiversity* and *Climate change* shall be only indirectly related to the influence of a particular company's economic activities on environment and they shall rather be attributed to EMA costs group *Less tangible costs*.

At the same time there should be changes made regarding the present accounting practice, because the necessity to apply EMA indicates the most significant problems to be dealt with:

- inadequate links between accounting and other departments;
- unintentional hiding of environment-related cost information in overhead accounts;
- inadequate tracking of information on material use, flows and costs;
- lack of some environment-related information in the accounting records;
- investment's decisions made on the basis of incomplete environment-related information (IFAC, 2005).

Having searched for the solutions of above mentioned problems and analyzed Latvia's situation regarding the accounting of environment-related information and evaluation of companies' performance, we admit that the provisions of Natural Resources Tax Law of the Republic of Latvia have certain significance in dealing with the problem (NRTL, Section 4).

A company as a tax-payer is responsible for ensuring the accounting of the volume of natural resources and pollution. However, the provisions of the law are not specified in relation to the type and form how this accounting shall be carried out. Thus, when making changes in the system of environmental indicators, it is very important to elaborate them in details in conformity with six categories of environmental costs necessary at the company's level (See Table 1). The legal basis for such changes would be the amendments made to Regulation No.175 *Regulations on National Environmental Indicators* adopted by the Cabinet of Ministers of the Republic of Latvia. It is necessary to supplement the system of environmental indicators elaborated in details with the amendments of provisions of those laws and regulations regulating accounting and laws on taxes that shall be applied to the natural resources to be extracted.

In the sphere of accounting it is necessary to make amendments to "Annual Accounts Law" of the Republic of Latvia by including there as the obligatory provisions for the disclosure of environment-related information in the annex of an annual account, and at the same time specifying the structure of information to be prepared, supplementing Regulation No.585



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“Regulation Regarding the Conduct and Organization of Accounting” adopted by the Cabinet of Ministers of the Republic of Latvia. The implementation of such provisions would make the companies responsible for the development of such classification of costs that would enable not only to disclose for users of accounts the information related to the influence on environment, but also would enable the management to track down the flows of natural resources and other materials used for economic activities and the level of pollution caused to nature as a result of such flows, to find out and control the hidden costs, to make adequate decisions for the implementation of environment protection measures.

Conclusions and Solutions

1. *Environmental management accounting* is one of *environmental accounting* forms, and studies performed in this sphere within about 20 years show its historical development, the increase of social understanding and distribution, which is proved by the guidelines developed by several international organizations (UNCTAD; IFAC). On the basis of these recommendations, in many countries there had been developed national policy on environmental accounting, and the companies are motivated to implement it into practice, however, in Latvia at present there has no complex approach developed regarding the application of environmental accounting.
2. Out of the definitions analyzed within the research, IFAC guidelines provide the most detailed nature of EMA. As the most essential it is necessary to point out the registration of environment-related costs both in natural units for the flows of physical resources and aggregating the monetary data that provide basis for the improvement of decision-making quality at the company and also for the informing of the external users of annual accounts on the influence of the company’s economic activities on environment.
3. The classification of environment-related costs into six groups was used as a methodological basis for the performed analysis; two groups have non-conventional division concerning the utilization of raw materials and materials in relation to the substance of product to be manufactured and waste, and emissions, in their turn the rest three groups are related to the costs of waste management, research projects on nature protection and other less tangible costs.
4. When evaluating the normative basis for the formation of environmental costs at the companies in Latvia in comparison to EMA groups of costs, the environmental performance indicators (EPI) adopted by the Cabinet of Ministers of the Republic of Latvia were used as natural indicators of environment; these indicators are arranged in seven groups. It was found out during the analysis that only about 50% of all (61) indicators can be related to the types of EMA costs, besides several significant groups of costs are not represented all with the environmental indicators (costs of equipment depreciation, internal personnel, external services, taxes, fines) thus proving that EPI system cannot be used as a basis for the introduction of EMA, if it is not significantly supplemented.
5. For dealing with the identified problems, related to EPI system as the basis for the implementation of EMA, it is necessary to make amendments to Regulation No.175 *Regulations on National Environmental Indicators* adopted by the Cabinet of Ministers of



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the Republic of Latvia, elaborating in details the system of indicators at the level of companies in conformity with six EMA categories of costs.

6. It is necessary to supplement the system of environmental indicators elaborated in details with the amendments of provisions of those laws and regulations regulating accounting - it is necessary to make amendments to "*Annual Accounts Law*" of the Republic of Latvia by including there as the obligatory provisions for the disclosure of environment-related information in the annex of an annual account, and at the same time specifying the structure of information to be prepared, supplementing Regulation No. 585 "*Regulation Regarding the Conduct and Organization of Accounting*" adopted by the Cabinet of Ministers of the Republic of Latvia.

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