

Integrating the Environmental Accounting on the Information System of the Economic Entities

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Abstract:

Integrating environmental accounting into economic entities is an urgent necessity for sustainable development and for getting long-term benefits. Sustainable development means providing the present needs of mankind without affecting the development of future generations, so we consider it is absolutely necessary to emphasize the importance of rational consumption of non-renewable resources and expanding consumption of renewable resources, increasing investment in green technologies, minimizing pollution, developing research and innovation, using biotechnologies, the increase of recycling of materials, the implementation of environmental management systems, all of these considerations being necessary to be applied in the economic entities to increase their profitability. The purpose of this paper is to present the cost typology used by the environmental accounting and its integration into the information system of the economic entities.

Key words: *environmental accounting, information system, environmental costs, environmental management system, sustainable development*

Jel classification: M41, M64

Introduction

The irrational use of fossil fuels, massive deforestation and land-use change, extensive industrialization based on the consumption of non-renewable resources have contributed to the increase in greenhouse gas emissions, such as carbon dioxide, methane, nitrogen dioxide, etc. The accumulation of these gas emissions has contributed to an increase in the amount of heat coming from the sun and kept in the atmosphere, leading to climate change [5]. The climate change leads to effects, such as [14], [2]: *i) increase in global average temperature; ii) changes in the precipitation level; iii) melting glaciers; iv) increase in ocean temperature, level and acidity; (v) desertification; vi) salinisation and alkalisation of soil, etc.* At the same time, climate change will have effects not only on the environment, but also on socio-economic sectors, including agriculture and food security, human health, water reserves, terrestrial ecosystems, etc. [9]. Thus, the 21st century represents a period of major changes in the business environment, through the universality of competition between industrial branches, increasing performance by integrating management strategies, performance and quality audit, increasing research and innovation, implementing visionary management, [13] and the emergence and the use of environmental accounting, the implementation of environmental management systems in order to extend the activities of economic entities, to achieve sustainable development over time and to achieve superior financial performance within a global context that aims at sustainable development.

Environmental accounting is an instrument that helps identify the impact that economic entities have on the environment. The set of data that can be provided by environmental accounting, consists in the quantification of the effects generated by the use of natural resources for economic development, and the costs of pollution, degradation and restoration of resources. The integration of environmental

accounting into the information system of economic entities can help to identify environmental costs and outline techniques to reduce them. [3]. At the same time, the integration of environmental accounting into the information system of the economic entity contributes to enhancing environmental performance, controlling costs, redirecting investments to green technologies, developing some organic processes along the production and distribution of chain of goods. The purpose of the paper is to present the cost typology used by the environmental accounting and its integration into the information system of the economic entities.

1. Environmental Accounting - Instrument for Sustainable Development of Economic Entities

The production of goods and services uses natural resources and generates effects on the natural environment that lead to the depletion of natural resources and the production of waste that is dumped in the natural environment. Dumping waste in the natural environment causes changes in natural systems with effects on ensuring human well-being and human evolution. Thus, the natural environment is perceived as a stock of natural capital, and its use is perceived by people as services coming from this stock. [16]. The services offered by the environment are: [1],[4]:

Table no. 1. Services offered by the environment

No. crt.	SERVICE	BENEFITS	
1.	PROVISIONING	<i>Nutrition</i>	<ul style="list-style-type: none"> ✓ Crops; ✓ Livestock and dairy products; ✓ Wild plants and animals and their products; ✓ Freshwater plants and animals for food; ✓ Marine algae and animals for food.
		<i>Water</i>	<ul style="list-style-type: none"> ✓ Water for human consumption; ✓ Water for agricultural use; ✓ Water for industrial and energy use.
		<i>Materials</i>	<ul style="list-style-type: none"> ✓ Biotic materials.
		<i>Energy</i>	<ul style="list-style-type: none"> ✓ Biomass based energy.
2.	REGULATION AND MAINTENANCE	<i>Regulation of biophysical environment</i>	<ul style="list-style-type: none"> ✓ Bioremediation; ✓ Dilution, filtration decomposition, remineralisation and recycling.
		<i>Flow regulation</i>	<ul style="list-style-type: none"> ✓ Air flow regulation; ✓ Water flow regulation; ✓ Mass flow regulation.
		<i>Regulation of physico-chemical environment</i>	<ul style="list-style-type: none"> ✓ Atmospheric regulation; ✓ Water quality regulation; ✓ Pedogenesis and soil quality regulation.
		<i>Regulation of biotic environment</i>	<ul style="list-style-type: none"> ✓ Lifecycle maintenance, habitat and gene pool protection; ✓ Pest and disease control.
3.	CULTURAL	<i>Symbolic</i>	<ul style="list-style-type: none"> ✓ Aesthetic, Heritage; ✓ Spiritual
		<i>Intellectual and experiential</i>	<ul style="list-style-type: none"> ✓ Recreation and community activities; ✓ Information and knowledge.

(Source: processed by: EEA., 2012b.)

Having presented the services provided by the environment, it is possible to establish the directions of protection and management of the environmental resources, which are necessary and can be adopted at the level of the economic entities [15]: *i) environmental and climate protection; ii) waste water management; iii) waste management; iv) protection of biodiversity and landscape; v) protection of soil and groundwater; vi) protection against radiation; vii) reduction of noise and vibration, etc.*

Within economical entities, environmental costs are the result of impact reduction activities and the conservation of the environment. Costs can therefore be classified according to different criteria, such as: [10]: *i) prevention of pollution; ii) environmental conservation; iii) recycling of resources; iv) administration; v) research, development and innovation; vi) social responsibility; vii) environmental remediation.* Thus, a detailed typology of environmental costs can be identified and presented, which can be reflected at the level of the economic entities (Table no.2).

Table no. 2 Typology of environmental costs

No. crt.	Classification criteria	Typology of environmental costs
1.	POLLUTION PREVENTION	<ul style="list-style-type: none"> ✓ costs to prevent air pollution; ✓ costs to prevent soil pollution; ✓ costs to prevent water pollution; ✓ costs to prevent noise pollution; ✓ costs to prevent thermal pollution; ✓ costs to prevent radioactive pollution; ✓ costs to prevent olfactory pollution; ✓ costs to prevent light pollution; ✓ costs to prevent visual pollution; ✓ other pollution prevention costs..
2.	ENVIRONMENT CONSERVATION	<ul style="list-style-type: none"> ✓ costs to prevent global warming; ✓ costs for energy conservation; ✓ costs to prevent ozone depletion; ✓ costs for the conservation of water resources; ✓ other costs for global environmental activities.
3.	RECYCLING RESOURCES	<ul style="list-style-type: none"> ✓ costs for efficient use of resources; ✓ costs for waste recycling; ✓ costs for neutralization of waste; ✓ the cost of contributing to the movement of resources ✓ other costs related to waste management, recycling and neutralization.
4.	ADMINISTRATION	<ul style="list-style-type: none"> ✓ costs for the implementation of an environmental management system; ✓ costs for the maintenance of the environmental management system; ✓ costs for environmental impact monitoring; ✓ costs for the professional qualification of employees in the field of the environment; ✓ costs for the authorization and advertising of organic products; ✓ costs for activities aimed at improving the environment (greening, landscape preservation, etc.).
5.	RESEARCH, DEVELOPMENT AND INNOVATION	<ul style="list-style-type: none"> ✓ costs of research for the development of innovative products that contribute to the preservation of the environment;

		<ul style="list-style-type: none"> ✓ <i>research and development costs to reduce the environmental impact along the product value chain: manufacturing - distribution - marketing - recycling.</i>
6.	SOCIAL RESPONSIBILITY	<ul style="list-style-type: none"> ✓ <i>costs for environmental and landscape conservation activities, planting of trees, etc. carried out in places different from the ones where the economic activities are carried out;</i> ✓ <i>costs related to donating or providing financial support to environmental groups or various social activities related to environmental conservation that support local communities.</i>
7.	ENVIRONMENTAL REMEDIATION	<ul style="list-style-type: none"> ✓ <i>costs for the restoration of the natural environment and bringing it to the initial state;</i> ✓ <i>insurance costs to cover environmental degradation;</i> ✓ <i>other environmental costs.</i>

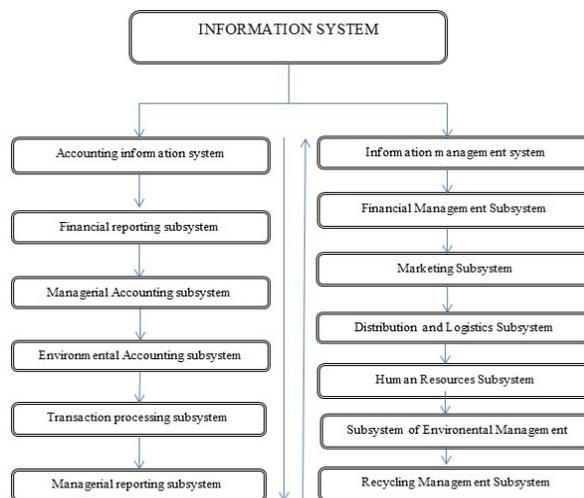
(Source: processed by: Ministry of the Environment JAPAN, (2005), *Environmental Accounting Guidelines*, available at: <https://www.env.go.jp/en/policy/ssee/eag05.pdf>)

Environmental activities can be managed in terms of quantity, so economic entities can accurately identify and quantify investments and costs associated with environmental conservation activities. Having an ample perspective on the potential benefits generated by such investments, the economic entity can increase the efficiency of its activities, and the integration of environmental accounting into the information system provides support for a rational decision-making process. [10].

2. Integrating Environmental Accounting in the Information System of the Economic Entity

The competitive economic entity is made on a primordial base represented by a well-defined and functional information system, because information has become an important resource, together with raw materials, capital and labor but at the same time an essential tool for adaptation, evolution , maximizing the results of the organization and its sustainable development in accordance with the natural environment. [8]. At the same time, the information system leads to increased productivity and to achieving medium and long-term strategic plans to prevent rapid developments in demand and supply of goods and services. The information system is the set of data and information, circuits and information flows, procedures, means of handling information used to establish and achieve the sustainable objectives of the economic entity[12].

Figure 1. The information system within economic entities integrating environmental accounting



(Source: processed by the author)

On the one hand, the information system ensures a permanent record of the economic processes with a significant impact on the development and efficiency of the activities carried out by the economic entities, and on the other hand, through the integration of the environmental accounting and the environmental management system, it provides evidence of the impact that the economic activities which have been carried out generate on the environment. It also contributes to the identification of the main techniques and ways to minimize this impact. Through the information system one can ensure the necessary information for decision making and one can provide the necessary data to highlight the achievement of the strategic objectives which are also sustainable [11].

Each economic entity must adapt its informational system to the needs of its users, in accordance with the fundamental objectives of all systems, respectively [6]: *i) it supports the management function: the information system provides the support and resources that are necessary to profitably manage the entity's resources; ii) support in decision making: the information system provides managers with the information they need to fulfill their responsibilities and for making optimal decisions; iii) it supports the day-to-day operations of the economic entity: the information system provides the necessary support to the operational staff in order to efficiently fulfill their daily tasks; iv) it supports the environmental management.* The information system consists of the accounting informational system and management informational system. Accounting is a key component of the economic informational system because, by using the specific means and procedures, it provides information, such as [7]: *i) building the past and present economic entity; ii) orientation of future economic strategy and decisions; iii) market-oriented analysis; iv) narrowing the random field in decision-making; v) solutions and motivations of adopted decisions.* The integration of environmental accounting into the informational system of the economic entity provides information on [10]: *(i) the cost of environmental preservation expressed in monetary units; (ii) the benefit for the preservation of the environment expressed in physical units; (iii) the economic benefit of environmental conservation activities expressed in monetary units.* The set of data provided by environmental accounting as descriptive data and figures outline a structure of financial performance of these records, since it identifies, quantifies and systematically communicates the costs and the benefits resulting from conservation activities in monetary value. At the same time, environmental accounting identifies, quantifies and communicates the benefits of environmental conservation in physical units, which determines the actual and concrete environmental performance.

Environmental accounting, as an integrated part of the informational system, has double function [10]: *at internal level* - it ensures the efficient management of environmental conservation costs, analyzing cost - benefit activities of environmental conservation, promotes efficient activities of environmental conservation, identifies investment needs to reduce the impact of economic activities on the environment, supports research and innovation within the company; *at external level* - through the quantitative results of environmental conservation activities, the economic entity can influence the behavior and decisions of its external partners such as investors, consumers, business partners, state institutions, etc., thus increasing the social and the environment responsibility.

Conclusions

Economic entities operating in an unstable economic environment and characterized by numerous transitions to the circular economy, bioeconomy through which one plans the sustainable development of humanity, generate at their level, major structural changes, which imply the development of efficient information systems and the integration through them, of some of environmental accounting and environmental management systems. This opens up a new optics of the way an economic entity develops, which, by not modifying its primary premise, namely maximizing profit, that should be achieved by making the economic entity responsible of the impact that its economic

activities having been carried out may generate on the environment. At the same time, the new optics for sustainable development of economic entities means minimizing the consumption of non-renewable natural resources, expanding the use of renewable resources, monitoring environmental impact, optimizing activities and investments for environmental conservation, waste management and increasing recycling.

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