

ENVIRONMENTAL MANAGEMENT: BETWEEN SUSTAINABLE DEVELOPMENT AND COSTS

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Abstract

Environmental aspects - especially in the financial-accounting field - should be researched with priority, given that the way in which this type of information is collected, processed and reported will have a significant influence on the decision-making process related to this domain. Thus, this research focuses on the analysis of the core of this field, represented in this context by the environmental cost nomenclature. Considering the different types of information collected through environmental costs, it can be appreciated that they summarize the multitude of different reports, analyses, and charts, representing the basis for decision-making. However, to isolate the essence of the costs, it is necessary to investigate the research in the field, the opinions of scientists and also the related norms: what they provide, what they require, what activities they recommend regarding the environment, sustainability, etc. Thus, the author highlighted various costs specific to the environmental management, resulting from the provisions in force and the entities' activity processes.

Keywords: *environmental management; corporate social responsibility; sustainability; environmental accounting.*

JEL Classification: *H21, H26*

I. INTRODUCTION

Aspects of the environment, like the "pollution" and sustainability are more and more often addressed in the research of specialists from various fields, including the economic and accounting research.

At the European Union (EU) level, the Treaty regarding the Functioning of the EU 2012/C 326/01 addresses the environmental aspects as being "determined to promote economic and social progress for the people, taking into account the principle of sustainable development and within the context of the accomplishment of the internal market and reinforced cohesion and environmental protection." At the same time, align. (3), of art. 3 of the treaty mentions that "the Union shall establish an internal market and it shall work for the sustainable development of Europe, based on balanced economic growth and price stability, a highly competitive social market economy, aiming at full employment and social progress, and a high level of protection and improvement of the quality of the environment" ([Treaty the Functioning of the European Union 2012/C 326/01](#)). The EU imposes environmental norms on their member states and in the framework of the external relations that it provides, it seeks to: art. 21 let. "(d) foster the sustainable economic, social and environmental development of developing countries, with the primary aim of eradicating poverty; and (f) help develop international measures to preserve and improve the quality of the environment and the sustainable management of global natural resources, to ensure sustainable development."

During their activity, the European Parliament and the Council of the EU have developed various directives, regulations, and reports regarding the environmental protection. The Directive (DEU) 2019/1937 on the protection of persons who report breaches of Union law, contributes the improvement of the application of the EU law and policies in specific areas, including environmental protection. In the annex of the directive, Part 1, compartment E, art. 2(1), some rules are stated regarding some aspects in the protection of the environment, such as: on the environment and climate; on sustainable development and waste management; on marine, air and noise pollution; on the protection and management of water and soil; on the protection of nature and biodiversity; on chemicals; on organic products ([DEU 2019/1937](#)).

[DEU 2019/1937](#) details each compartment of rules, thus listing all directives, regulations, and other regulatory documents concerning this matter. It is also published as a Proposal for a DEU 2019/1937 on Corporate Sustainability Due Diligence and amending this Directive will set out a horizontal framework to foster the contribution of businesses operating in the single market to the respect of the human rights and environment in their operations and in their value chains, by identifying, preventing, mitigating and accounting for their adverse

environmental impacts, and by having adequate governance, management systems and measures in place to this end.

In this context, the Report on the Biodiversity Strategy for 2030: Bringing nature back into our lives nr. 2020/2273 can be highlighted, which in p. 125, invites the Commission and the Member States to identify which subsidies are harmful to the environment, depending on the activity they are funding. The Organization for Economic Co-operation and Development (OECD) has estimated that globally, the governments spend approximately USD 500 billion per year on the support of activities that are potentially harmful to biodiversity, i.e. five to six times more than total spending on protecting biodiversity ([Report in the Biodiversity Strategy for 2030](#)).

Environmental problems are also on the agenda of the OECD. Thus, the OECD's environmental work helps countries develop and implement effective policies to address environmental issues and to manage natural resources with a sustainable approach. It examines the links between the environment and economic, sectoral or social concerns in different key topics such as: Air pollution; Agriculture and environment; Development and environment; Environment policy tools and evaluation; Green growth and sustainable development; Resource productivity and waste; etc. ([OECD](#)).

At the same time, European Parliament and Council Directive no. 94/62/EC of 20 December 1994 on packaging and packaging waste, states in art. 7 (1) that Member States shall take the necessary measures to ensure that systems are set up to provide for: (a) the return and/or collection of used packaging and/or packaging waste from the consumer, another final user, or from the waste stream to channel it to the most appropriate waste management alternatives; and (b) the reuse or recovery including recycling of the packaging and/or packaging waste collected. Therefore, the measures referred to in paragraph 1 shall form part of a policy covering all packaging and packaging waste and shall take into account: the requirements regarding the protection of environmental and consumer health, safety and hygiene; the protection of the quality, the authenticity and the technical characteristics of the packed goods and materials used; and the protection of industrial and commercial property rights ([Directive 94/62/EC](#)).

Therefore, entities in the EU are required to register in various monitoring systems, respectively they must keep track of the packaging. This record is kept either in the same system as the accounting record or in separate systems, intended only for the packaging management that does not intersect with the accounting system. But even though it is sometime intersected with the accounting system, the waste management system represents a fairly detailed record on types of waste (primary, secondary, retail, etc., or waste made of paper, plastic, cardboard, glass, etc.). Therefore, we cannot deny the fact that in practice, the entities do not keep track of certain environmental costs, like the packaging that is managed through systems imposed by the legislator.

Therefore the art. 8 from [Directive 94/62/CE](#) provided the marking and identification system and al. (2) provided that to facilitate collection, reuse and recovery, including recycling, the packaging shall indicate the used material(s), for purposes of its identification and classification by the industry concerned in this matter.

In this context, the rules of the European Union, as well as the rules of other international organizations such as OECD, UN (United Nations) etc., provided both for the union and for its external relations, regional rules, and rules for various jurisdictions, that lead entities to administer, manage and keep track of all environmental "aspects" such as: packaging, wastewater, waste, air emissions, etc., in other words of all elements or effects on the environment, leading to a record, management, administration optimum environmental costs.

The OECD has published an impressive list of works concerning the environment, including aspects related to environmental costs. For example, the paper [Costs of Inaction on Key Environmental Challenges](#) states that "the costs of inaction in relation to industrial accidents and natural disasters related to the environment are an increasingly important issue with economic impact for OECD and non-OECD countries. Inaction can result in various costs, including emergency response costs, remediation costs, property damage, loss of human health, and ecosystem damage. In many cases, the costs of prevention and preparation can be much lower than the costs of remediation and recovery. Although it is not economically efficient (or even feasible in most cases) to reduce the risk of these 'events' to zero, governments can introduce policies to encourage investment in measures that reduce hazard rates and vulnerability" ([Costs of Inaction on Key Environmental Challenges](#)).

In his paper, Roy (2014) notes that "the current under-taxation of cars used in the company is likely to result in a disproportionately large increase in the total distance driven, made up of both the increase in the number of cars in use and the increase in the distance travelled per car. This is likely to result in disproportionately large impacts on the most relevant environmental and related social costs. A favorable tax treatment of transport expenses in general and of employer-paid parking, could impact the chosen mode of transport in favor of public transport and non-motorized vehicles, rather than the private car."

In 1998, the US Environmental Protection Agency argued that the definition of environmental costs depended on how a company intends to use the related information, for example, in capital budgeting or product design. They made a distinction between four types of costs:

- Conventional costs are those raw material and energy costs that have environmental relevance.
- Potentially hidden costs captured by accounting systems but which then lose their identity in 'overheads'.
- Contingent costs that can be incurred at a future date – for example, costs for cleaning up. They are also referred to as contingent liabilities.
- Image and relationship costs that are intangible and include, for example, the costs of producing environmental reports (ACCA, <https://www.accaglobal.com/>).

United Nations Department of Economic and Social Affairs (UNDESA), Sustainable Development, published in 2001 the work *Environmental Management Accounting (EMA): Procedures and Principles*, in which environmental costs were analyzed in detail and management accounting techniques were established. These are useful for identifying and allocating environmental costs as: input/output analysis, flow cost accounting, activity-based costing, and life-cycle costing (EMARIC, 2003).

We mention that in the case of the activity-based costing technique, the economists Bennett & James, (2000) state that it is necessary to determine the specific environmental inducers, for example, the volume of discharge of pollutants, the toxicity coefficient, the coefficient of aggressiveness on the environment etc. The study of Christ & Burritt (2013) argues that EMA incorporates several techniques and tools designed to help organizations recognize and manage their environmental impacts. These tools include, but are not limited to: environmental cost accounting, total cost accounting, life cycle costing, environmental life cycle budgeting, environmental capital investment assessment, total quality environmental management, and material and energy flow accounting. Burritt & Tingey-Holyoak (2012) note that accountants need to measure efficiency gains, reduced sustainability risk, and market opportunities and communicate them to internal and external stakeholders for transition toward a cleaner production. The accountants in academia, known as 'knowledge generators' have been vociferous in their calls for accountants in practice to use their professional strengths as appliers of managerial instruments to manage the impact of businesses on the environment.

Avylin & Mohd (2020) hope that future research could consider all these perspectives and develop an index of business performance that includes both the economic and environmental performance of a firm and test them so that we can have empirical proof on the consequences of EMA implementation. In the same time, Bostan et al. (2013) define environmental costs as the ones generated by activities whose main direct or indirect purpose is to prevent, reduce or remove any form of harmful action on the environment. Companies operating in the new globalization context must regularly conduct periodic monitoring of their environmental impact, thus enabling the planning and substantiation of decisions related to the production and sale of their output, depending also on the current or future internal and external environmental costs.

Jinga et al. (2014) conducted a study in which they presented the impact of a company on the environment during the entire life cycle of the products. "For instance, transportation is necessary during all the cycles (the most important being the transportation of the raw materials, which are all imported). From the environmental point of view, transportation is associated with the depletion of natural resources (as fossil fuels are mostly used) and with global warming." The researchers came to the conclusion that "the most important impact is given by the waste, thus the companies have to reduce the scrap resulted in the production process, maintaining the product quality at the same time, and to minimize the consumption of energy."

Therefore, as UNDESA mentioned in the work *Environmental Management Accounting: Procedures and Principles* from the year 2001, "the main problem of environmental management accounting is that we lack a standard definition of environmental costs. Depending on various interests, they include various costs, e.g., disposal or investment costs and, sometimes, external costs (i.e., costs incurred outside the company, mostly to the general public). Of course, this is also true for the profits of corporate environmental activities (environmental cost savings). In addition, most of these costs are usually not traced systematically and attributed to the responsible processes and products but simply summed up in general overhead" (EMARIC, 2003).

In recent sources, environmental accounting has been and is continuously addressed. Thus, IFAC published an article entitled *Putting the Focus on Environmental Management Accounting* (Burritt et al., 2021; Lusmanschi et al., 2023). In this context, the structure, nomenclature, and typology of environmental costs require a separate analysis, especially when in the literature, they are approached through the lens of environmental accounting and management and associated with "green accounting", "environmental costs", "sustainability", "ecological accounting", "environmental accounting" etc., without their clear classification and delimitation. Thus, we will emphasize the scientific problem, by identifying the nomenclature of costs, their characteristics and the way of application and use.

II. MATERIALS AND METHODS

In order to achieve the purpose of the research, the literature was analysed and investigated, along with the norms in force (laws, EU Directives, Treaties, Regulations, etc.), Management Standards (published as: ISO 14001, ISO 14051, ISO 14053, etc.), as well as the Management standards under development, having the scope to analyse the perspective and future directions of this matter. The following research methods and tools were used: the normative documentary method, the induction and deduction method (emphasis on the main ideas and conclusions related to environmental cost accounting, environmental management, etc.), the analytical method, the comparison method (namely by examining the structure of environmental costs), the method of synthesis (identification of the main aspects regarding green accounting, types of environmental costs and the process of recognition of environmental costs). Various national and international web sources related to the environmental accounting were studied, as well as the regulatory framework in the field.

III. RESULTS AND DISCUSSIONS

This section presents the generalization of the approaches, conceptions and notions of environmental accounting, of environmental costs is presented (table 1). From the analyzed concepts, an exhaustiveness of the types of environmental costs can be observed.

Table 1. Approaches and concepts related to accounting and environmental costs

Authors	Types of costs, approaches, etc.
<i>Christ & Burritt (2013)</i>	<ul style="list-style-type: none"> • environmental cost accounting • full cost accounting • the cyclical cost of living • environmental life cycle budgeting; • assessment of environmental capital investments; • quality environmental management; • material and energy flow accounting.
<i>UNDESA (2003)</i>	<ul style="list-style-type: none"> • input/output analysis; • cost flow accounting; • activity-based costing (ABC); • life cycle cost.
<i>USA Environmental Protection Agency in 1968</i>	<ul style="list-style-type: none"> • conventional costs (raw materials and energy that have environmental relevance); • potentially hidden costs (accounting systems capture them, but then they lose their identity as "overheads"); • contingent costs that may be incurred at a future date – for example, cleaning costs; • image and relationship costs (include, for example, environmental reporting costs).
<i>Bostan et al. (2013)</i>	<ul style="list-style-type: none"> • current or future; • internal and external; • whose purpose is to prevent, reduce or remove any form of harmful action on the environment.
<i>Jinga et al. (2014)</i>	<ul style="list-style-type: none"> • electricity; • wasted raw materials; • raw materials in product; • life cycle cost.

Source: Authors' processing according to the studied literature

In this context, it is necessary to analyze the norms and recommendations which are applied in practice. Therefore, in practice, entities face such costs in their continuous activity. In order to correctly identify and timely manage, as well as to be "friendly" with the environment and avoid risks related to its image, some companies have implemented the system of environmental management through ISO certification, namely those from the "14000 family".

The group of ISO 14000 standards ([ISO 14000](#)) are developed by ISO Technical Committee and its various subcommittees. These standards focus on specific approaches such as audits, communications, labelling, accounting, recordkeeping and life cycle analysis, as well as on environmental challenges such as climate change.

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The group of ISO standards related to the environmental field are presented in table 2.

Table 2. Environmental Management Standards

Subcommittee Title	Published standards	Standards under development
Environmental management systems	12	5
Environmental auditing and related environmental investigations	3	2
Environmental labelling	8	0
Environmental performance evaluation	9	1
Life cycle assessment	16	5
Greenhouse gas and climate change management and related activities	16	4

Source: Authors' processing according to iso.org data

Thus, the ISO 14000 group has 64 published standards and 17 under development, which have provisions for both direct and indirect recommendations on the organization and management of environmental "effects", as well as on related costs. The Subgroup of SC1 *Environmental management systems* includes 12 published standards and 5 under development. We note that direct accounting approaches can be found in ISO 14051 *Environmental management — Material flow cost accounting — General framework* and ISO 14053 *Environmental management — Material flow cost accounting — Guidance for phased implementation in organizations*.

The mentioned standards contain the following: terms and definitions; objectives, principles, and fundamental elements; implementation steps, cost calculation methods, form recommendations, sheets, sketches, etc.

For example, [ISO 14051:2011](#) provides a general framework for accounting for material flow costs. The standard provides for tracking and recordkeeping in physical units (mass, volume) and associated costs. The standard defines the following notions:

- cost monetary value of resources consumed to perform activities.
- cost allocation - indirect attribution of a cost between different objects, such as a product or process, by using an appropriate apportionment basis.
- cost assignment - direct attribution of a cost to a specific object, such as a product or process.
- environmental management accounting (EMA) - identification, collection, analysis and use of two types of information for internal decision making: a) physical information on the use, flows and destinies of energy, water and materials (including wastes) and b) monetary information on environment-related costs, earnings and savings.
- material cost for a substance that enters and/or leaves a quantity center; it can be calculated in various ways, e.g. standard cost, average cost, and purchase cost, the choice between these methods being at the discretion of the organization.
- material loss - all material outputs generated in a quantity center, except for intended products. Material losses include air emissions, wastewater and solid waste, even if these material outputs can be reworked, recycled or reused internally, or have a market value. By-products can be considered as either material losses or products, at the discretion of the organization.
- waste management cost of handling material losses generated in a quantity center (e.g. management of air emissions, wastewater, and solid waste), includes the following: a) the costs for onsite activities, e.g. reworking of rejected products, recycling, waste tracking, storage, treatment, and disposal; b) the costs for outsourced activities, e.g. waste storage, transport, recycling, treatment, and disposal.

In addition to these definitions, the [ISO 14053:2021](#) defines the following notions:

- system cost incurred in the course of in-house handling of the material flows, except for material cost, energy cost and waste management cost, showing as an example labor cost; cost of depreciation and maintenance; cost of transport.
- material flow cost accounting (MFCA) spreadsheet that reflects the MFCA information for a production process that is treated as a single process.

Therefore, within the framework of environmental accounting based on ISO, we could delimit the costs, in:

- *system costs (personnel costs, depreciation and maintenance, transportation and other service costs);*
- *materials costs;*
- *energy costs;*
- *waste management costs;*

Following the analysis of the information and the conclusions made including and according to ISO provisions, namely related to the application of the "14000 family", we could generalize that the environmental costs include the ones with:

- materials;
- energy;
- waste management;
- indirect (depreciation and maintenance of purification equipment, wastewater treatment, air filtration, etc., taxes, fees, payment for pollution, etc.).

Another aspects related to the production cycle and product life that imply environmental costs can be:

- preventive measures for the production process (purchase of materials, construction of "pollution" maintenance facilities, prevention costs and preparations to avoid pollution costs, etc.)
- current measures, related to the moment of product manufacturing (current materials, energy consumption, water, gas, etc., or related to the current service and maintenance of purification, filtration, etc. installations);
- deferred (life cycle) measures, throughout the life of the product, i.e. after the manufacturing process.
- "post-life cycle" measures (packaging waste after consuming the product, smoke from waste incineration, etc.)

Depending on the activity type, the item of costs, the size of the entity, the way of organization, management policy, etc., the environmental costs can be recognized in:

- cost of making assets (inventories, e.g. payment for import packaging; fixed assets, environmental taxes on cars, etc.);
- distribution costs (e.g. air emissions for distribution activities);
- administrative expenses (for example, discharges into wastewater, air emissions, etc., related to the administration activities of the entity);
- production costs, such as indirect or auxiliary; for example, if the entity builds a wastewater pretreatment facility, install a smoke filter, etc.; related to the production activity or related to the services of the primary production activity.

At the same time, environmental costs can also be addressed through activities and analytics such as:

- direct costs (raw materials and materials, energy resources, salaries, taxes and fees, maintenance, operation, wear and tear (depreciation) of fixed assets intended for environmental protection);
- management costs of ecological services, such as storage, scrapping, processing, destruction, etc., of ecological waste;
- costs for investments in fixed assets (creation, reconstruction, modernization, improvement of fixed means related to environmental protection, such as installations for the treatment/pretreatment of wastewater; buildings for capturing and neutralizing harmful substances, smoke filters, machines with lower consumption electricity, gas, etc., photovoltaic systems, etc.).
- costs of remediation, restoration, environmental improvement, etc.

Therefore, managing ecological (environmental) costs by their type, will improve the quality of information related to them. Thus, the analysis of the types of costs is necessary, in order to keep track of various nomenclatures; If possible, it is desirable to exclude the accumulation of these "in a basket" costs such as: indirect costs, or directing costs, or auxiliary costs, etc.

IV. CONCLUSIONS

Therefore, the nomenclature, classification, and types of environmental costs is quite exhaustive because depending on the size of the entity, its activity (such as production entity, the entity that provides wastewater purification and treatment services, or entity that provides services of waste burning/incineration, etc.), its "view on the environment" (for example it has a well-established concept regarding the prevention, reduction, etc., of pollution, or it is quite sensitive to its reputation, taking care of its image, etc.), and the jurisdiction in which it operates (with or without strict environmental regulations), the effort put into an efficient and optimal management of the harmful effects on the environment can differ.

Thus, the method of collection, recording, recognition, and evaluation of environmental costs in general aspects is no different than the reflection of other expenses and/or costs that were and are borne by the entity, but the existent legal obligations on their delimitation and distinct reflection, leads the way of presentation of the environmental information. Some particularities can be found when there are some specific local rules (in the case of the Republic of Moldova Accounting and Financial Reporting Law no. 287/2017 ([Law no. 287/2017](#))) or international ones ([Directive 2013/34/EU](#); [Directive 2006/43/EC](#); [Directives 78/660/EEC & 83/349/EEC](#)) that

require different reports from the management (administrator), which contain specific information on environmental costs and issues.w

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