



Methodologies to Calculate Environmental Costs in Colombian Companies

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ABSTRACT

The research "Methodologies to calculate environmental costs in Colombian companies", was developed through a literature review of the bibliography and information found, to establish methodologies to calculate the heat of environmental costs. It was possible to identify that the calculation of environmental costs is a strategy for companies to implement actions to prevent and conserve the environment.

Keywords: Environmental Accounting, Pollution, Environmental Costs, Corporate Social Responsibility, Sustainable Development.

1.Introduction

One issue that has assumed great importance in the world is environmental pollution, so different agreements and standards have been generated in order to conserve and preserve the environment. Therefore, companies have adopted measures such as CSR. In this sense of looking for a sustainable development, environmental costs originate, which is a subject of environmental accounting, which allows valuing natural resources and leads to establish environmentally friendly actions. Therefore, it is important to know about the procedure for calculating environmental costs in Colombian companies.

2.Theoretical Framework

Environmental pollution is a problem that has existed and remains in the world, which is caused mainly by the economic activities carried out by man. Therefore, at the international and national level, actions and strategies have been developed to care for and protect the environment, supported by protocols, policies and standards. Therefore, companies have appropriated these strategies, such as the conceptualization of sustainable development and Social and Corporate Social Responsibility - CSR, which are linked to the 2030 Agenda where the Sustainable Development Goals - SDGs - are established. (Ormaza Andrade y otros, 2020) The implementation of actions that protect natural resources, since all people need this natural protection. (Becerra y otros, 2011)

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In this sense, studies have been conducted where each of the stages involved in the production of units are analyzed, with the objective of identifying the negative impacts generated, in order to establish beneficial and sustainable solutions, which entail that there is a permanent transformation with the implementation of the current environmental regulatory requirements for continuous improvement, which will allow achieving the efficiency and performance indicators that are established either in the medium or short term (Tabares, 2011, as cited in (Álvarez -Silva y otros, 2020). In addition, it is beneficial for companies to have a recognition such as certifications granted by certified entities for carrying out actions that comply with Sustainable Development and CSR. Taking into account that it is a term unknown to many people, there are organizations such as the case of entities dedicated to solidarity located in Ocaña, Norte de Santander department, although they implement actions aimed at social and environmental responsibility, they do not have the benefit of having the certification of B companies, which allows them to have a recognition and to be known as quality, responsible and successful companies for society and the environment. (Pacheco - Sánchez & Rodríguez – Téllez, 2019) Other companies that work to improve product quality and competitiveness in the market through sustainable business practices and actions, which do not have this certification. (Hernández - Cely & Torres - Zamudio, 2021) which do not have this certification of recognition at the national level as well as abroad.

In addition, companies have management methods and tools that help to solve environmental problems that affect the protection and care of nature, which are linked to the functions of the accounting field. Therefore, the accounting and environmental disciplines have been unified to become a solution strategy against environmental pollution, thus originating environmental pollution, which is a way to measure, evidence and report the consequences to the ecosystem as the preventive or corrective measures that are useful and feasible to avoid them; similarly when talking about activities aimed at protecting the environment, those related to investment with a tendency to reforestation, recycling, the use of products after consumption and the use of waste are relevant. (Lemus - Quintero & Carrascal - Delgado, 2018)

Gray et al. (1993) defines this term as the management instrument that relates in general the areas involved with accounting, which can benefit from the reaction of companies dedicated to commerce to these complementary actions that benefit the ecosystem, involving the new concept of eco-accounting. (Becerra y otros, 2011)

Therefore, (Becerra y otros, 2011) conducted a research that is based on finding a procedure that allows finding a solution to the environmental pollution generated by the printing company of Cienfuegos, which is an organization dedicated to the reproduction of printed material, especially for people in Cuba, which is achieved through the use of various techniques, among which the formats environmental checklists and product life cycle, which allow to understand and know about the impacts that happen in each process and product on the environment.

In Ecuador, (Criollo, 2011) to respond to the fact that the relevant operations and procedures are not carried out for the finding of the valuation of environmental wealth in the industrial elements that is in favor of rice, which restricts the choice of the answers indicated for the protection and conservation of the environment, they carry out a research entitled "Procedure for the development of a system of Environmental Costs Management in the Emilio Lastre Rice Industry of benefit", in which they used the following forms: analytical-synthetic, inductive-deductive, hypothetical-precise, memorable-reasonable and experimental as supervision, interviews, forms and brainstorming, etc...; thus allowing to conclude that the Environmental Management accounting, is useful and necessary as a central axis in making decisions that would benefit the political, economic and business orientation of the industry (Criollo, 2011)

On the other hand, in Argentina, (Roque y otros, 2020) in order to efficiently manage the environmental impact caused by productive or service activities in the work areas, the corresponding measurements and management of these impacts were carried out. In this sense, as a primary measurement variable for the environmental impacts generated are the environmental costs, with which it is possible to give an economic valuation to each use or consumption of natural resources used directly or indirectly in the business activity. In this research, a questionnaire was applied in order to identify the level of linkage between environmental costs and investment projects, through the measurement of four variables.

In Colombia, (Urrego & Gonzales, 2020) they carry out a research work to the Colombian organizations, with the purpose of making an analysis to the values and find those benefits of environmental accounting with respect to the management of solid waste, with respect to the management of these, by means of the identification of new mechanisms that help the development of the financial and environmental field. In this research, the method used is analytical type with a descriptive methodology, in addition to collecting information through an interview, which consisted of a questionnaire. Therefore, in the results obtained, it was analyzed that the companies, when implementing environmental accounting, gave as a solution that solid waste became costs and opportunities for the generation of new income or the reuse of the same.

In Valle del Cauca, (Gomez & Valencia, 2020) conducted a research that identified the lack of knowledge, education and experience in environmental causes with respect to the accounting system in companies engaged in the production of bricks in Cartago in the department of Valle del Cauca. In addition, these factories present an inadequate physical infrastructure, such as inefficiency in the stages of elaboration of the brick and other products, generating an affectation to the environment, despite being aware of the environmental damage they cause, there are not many actions taken to mitigate the environmental pollution generated.

According to the research conducted by (Burgos, 2021) environmental accounting is important as a solution to environmental problems generated by the incorrect use and management of natural heritage in organizations, as is the situation in Córdoba. In spite of the existence of actions aimed at the prevention and conservation of the environment, there is still a decline in the application of the term environmental accounting in Colombian companies. Therefore, in search of alternatives or actions to mitigate environmental deterioration, environmental costs is a strategy that complies with the protection and conservation of goods and services provided by an ecosystem, and sustainability, taking into account that this situation occurs due to the eco-systemic impacts that generate increased unsustainable use of natural resources, these actions generate water pollution, soil (erosion, soil compaction), loss of flora and fauna (Fonseca- Carreño, 2019).

In summary, the term sustainability is a commitment of all, both of individuals and of highly conformed and recognized companies; therefore, an appropriate project management should be oriented to improve the life of the current society and that of the new and future generations or descendants. (Manzano - Durán y otros, 2021)

3. Methodology

The methodology used in this research is of a descriptive qualitative type, in which a bibliographic study of scientific articles, research work, and books and texts based on the subject of environmental costs is carried out. Then, research works that were in university repositories and scientific articles that should be related to the implementation of environmental costs in organizations and with more recent date of completion were chosen, in order to identify the methodologies used and unify them into one in this work that leads to establish stages for the quantification of environmental costs (Morales, 2015). In this sense, it is inductive because it consists of studying and observing the facts or particular experiences that allow giving conclusions that induce to support an idea or theory; and it is also deductive because the evaluation of the general principles of a subject is carried out, by checking and verifying that it is valid the particular contexts are explained (Bernal, 2006).

4. Results

For the execution of this research, a bibliographic review of scientific articles and other documents related to the central theme of environmental costs was carried out. After collecting information and making a comparative analysis through inclusion and deduction of the methodologies applied in the research works shown in Table 1.

Table 1 - Research work

Year	Title	Author
2021	Research plan in Córdoba applied to current standards on environmental accounting (Burgos, 2011).	Luis Burgos
2014	Environmental costs in the feasibility of companies. Suggested for accounting valuation (Becerra and Hincapié, 2014).	Wilmar Becerra and David Hincapié
2011	How to quantify environmental costs? Case: Compañía gráfica de Cienfuegos (Becerra et al, 2011).	Becerra Keitel, Gomez Elizabeth, Perez Grisel and Reyes Reynier

Taking as a reference the research work carried out by (Becerra y otros, 2011) a methodology for the quantification of environmental costs is established:

Initial diagnosis of the company: This stage consists of a review of the economic activity of the company, the processes involved in the production processes and the review of accounting documents.

Product life cycle: This stage determines the significance of the life cycle, where a balance of the elements used in other words, a study of the stages of production per unit, whether physical or monetary, of a single finished product, prioritizing those that cause environmental impact. This is followed by the classification of the environmental impacts in the activities according to the inputs and outputs of the process. According to the information, the fixed and variable costs for the product must be classified. (Becerra y otros, 2011).

4.1. Recording of the calculation of environmental costs:

Environmental costs can be grouped into 4 groups:

- Prevention costs: Refers to the cost of those actions that are carried out with the objective of avoiding the generation of pollutants and/or waste that cause negative impacts to ecosystems.
- Detection cost: These are the costs involved in establishing whether the goods and productive actions are in accordance with the environmental standards established by law.
- Cost due to internal failures: these occur in the development of actions that generate polluting waste, taking into account that these have not been disposed of in the ecosystem.
- Costs due to external failures: These are formed, but then removed from the organization. Which in turn can be subclassified into events.

4.1.2. Budget of environmental costs: this is done taking into account the amount of processing to be valued and this amount known as the balance of elements used the near values of waste, wastewater and waste that are given in unit of the finished good, estimating a price of the number to be discarded, so the process of point 2 is performed again, specifically with the sharing of costs.

4.1.3. Control of the environmental costs: It is inspected on the value of the actual substantiated obtained from the waste and residual water, distributing the discrepancies, even if they are beneficial or not beneficial with respect to what was planned.

4.1.4. Decision making: At this stage we begin to define the decisions, which will determine the progress of the stages of product development, use of other products generated from another product, determine the amount of waste among others, contextualize in the constant improvement of the stages in a cycle, constantly improving, from here starts the process for the necessary changes in the conduct of operations.

In addition, in the research conducted by (Becerra & Hincapie, 2014) establishes other methods for calculating the value that natural resources have, among these:

4.2. Valuation based on market prices: This is the economic quantity that is calculated for natural products and services in relation to what is offered and the quantity of the goods purchased and sold at the commercial level. This type of valuation is used to measure transformations in price or quality of a good or service. The apparent value indicates the acceptance for cancelling environmental goods and services. Consequently, negative consequences are obtained in the alteration in the balance of ecosystems, especially in those resources that cannot be renewed, which is evident in the variations shown in the productive process or in people's welfare. Among the types of changes are:

- Modifications in production.
- Price of human health and well-being.
- Opportunity cost.

Valuation based on actual and/or potential costs: In these methodologies, trade prices are handled, which are based on the indication that the maintenance cost of an environmental good belongs to the moderate appreciation of its price. In addition, it is taken that the costs to prevent damages or the environmental transformation and the eco-systemic services that these provide, supply viable appreciations to the price, having as base to the supposition, in which there are people who incur in investing in the prevention of the damages to the environment, or to exchange the services of the ecosystems, in this sense the price of these services must be smaller than that of the people who pay to substitute. These techniques are presented below:

-Cost-effectiveness review

-Replacement costs

-Shadow projects

Valuation under price replacement in the market: In the case of environmental products and services that have a scarce trade value, its price can be calculated by means of the value that cancels for another product that is in the trade, which has a direct and indirect utility of the environmental product or service. It becomes profitable link that can be given with the environmental quality and a good or service of the trade that has its use. The value of

apparent base difference, this is reached only once other unknowns, in exception the environmental characteristic, have been managed to control, shows a value price for the buyer for the special environmental characteristics. This is what these techniques are characterized by:

- Mobility costs
- Wells as substitutes for the environment

4.3. Contingent valuation: this requires the calculation of the economic value of the product, based on the transformations in the economic stability and health of the people, as a result of the supposed transformations to an environmental product or service, using direct questions related to their willingness to pay for the environmental products or services.

4.4. Hedonic valuation: In this it is assumed that the value of the products is related to the quantity of each of its characteristics, one of these characteristics is the environmental quality.

The characteristics of the products are different, which is evidenced in value, the variation in value is a result of the presence of an environmental characteristic.

- property value perspective
- Wage divergence

In relation to these techniques or methodology, it is evident that there is knowledge about the calculation of environmental products and services.

4. Conclusions

A strategy for companies to implement actions to mitigate the impacts generated by production processes through the application of new technologies and machinery is through the valuation of environmental costs, such as the organization and proper maintenance of the physical substructures of the company, and thus are committing themselves to the protection and conservation of the environment.

With the bibliographic and document review, it became evident that there is a lack in the implementation of environmental cost calculation, which would lead to establish the necessary actions to mitigate the environmental impact generated to the environment and to use these impacts as costs that would be of income.

Another alternative that seems possible according to what has been investigated is the suitability of the personnel in the organizations, where there are employees with leadership characteristics, who guide their workers, since these are an incorporated and fundamental pillar that provide, guide and propose the achievement of goals. (González - Castro y otros, 2021).

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