



## Environmental Costs Accounting as Environmental Information System

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### ملخص

يهدف من خلال هذا المقال إلى تسليط الضوء على أثر أنشطة المؤسسات الاقتصادية على البيئة، عملية دمج التكاليف البيئية في نشاط المؤسسات الاقتصادية وتصنيف الأدوات المختلفة المستخدمة لتحديد هذه التكاليف، من خلال التركيز على محاسبة التكاليف البيئية كإطار لتحديد ومعالجة هذه التكاليف. جاءت نتائج الدراسة لتشير إلى أن المحاسبة البيئية كنظام بيئي، تتكون من توليفة مكونات تعتبر التكاليف البيئية جزءا مهما فيها، باعتبارها المدخلات الرئيسية لنظام المعلومات البيئية.

### الكلمات الدالة:

التكاليف البيئية، محاسبة التكاليف البيئية، المعلومات البيئية، نظام المعلومات البيئية.

### Abstract:

This paper intends to highlight the importance of the impact of economic activities on the environment, the integration of environmental costs in company activity and the classification and different tools used for identifying these costs, by focusing on environmental cost accounting as a framework to identify environmental costs .

The result of the study show that Environmental Accounting as an Environmental Information System, is set of synthesis, where we find environmental costs as an important part in this system, that considering the input of this information system.

### Key words:

Environmental Costs, Environmental Cost Accounting, Environmental Information, Environmental Information System.

## 1. INTRODUCTION

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The environment has become an important issue, since the second half of the twentieth century (20<sup>th</sup>). This concern was reflected in the holding of several international conferences, for studying various industrial companies' activities that effect the environment. **Chastain**, 1973, **Gambling**, 1974, **Ullman**, 1976 and **Dierkes & Preston**, 1977 also discovered the relationship between accounting, organizations and society. (**Soghra Fasihi, Nahid Adedi, 2014**)<sup>1</sup>. In 1990, concerns focused on environmental issues. (**Hamid Ravanpak NOODEZH, Salehe MOGHIMI, 2015, pp.13-18**)<sup>2</sup>

Recently, some efforts have been made to initiate environmental issues, especially since the adoption of the Kyoto Protocol in 1997, (**Protocole de Kyoto, 1998**)<sup>3</sup> that resulted from important decisions, notably the consolidation of the environmental dimension and for changing traditional view of economic companies, which focused only on economic profitability. While it become necessary to establish a balance between their economic efficiency and Social environmental profitability.

An economic company is considered as a consumer of environmental resources, and it produces two kinds of products: One of them with a positive economic value represented by the benefits and the other is a negative economic value which are the outputs of the production process, and what that attendant of negative environmental impacts. (**Andrew Winterbotham, Junior Sophister, p.172**)<sup>4</sup>

There are two main approaches that discuss and evaluate the solutions to externalities which are related to these environmental impacts: public policy means of taxes and subsidies advocated, (**Francis M. Bator, 1958, pp.351-379**)<sup>5</sup> by Marshall- Pigou, and the private resolution approach, as advocated by Coase. (**Arye L. Hillman, 2009**)<sup>6</sup>

The accountants face difficult to determine these costs related to the negative environmental impacts in a monetarily form.

These costs depend on what is called environmental costs, which are treated using a special accounting, which is a part of the social accounting. (**Hasan Şenol, Hakan Özçelik, 2012, p.82**)<sup>7</sup>



As a result of increased sensitiveness about environment, environmental accounting approach appeared as a framework to identify environmental

costs(<https://www.imanet.org.cn/uploads/...11/144706106830702.pdf>, 17/09/2016 11:44:30)<sup>8</sup>, considering that the environmental accounting describes measures, and reports on the allocation of environmental resources, costs, expenditures and risks to various industry groups, to specific firms, or within firms to specific departments, projects, activities or processes based on two pillars: accounting measurement and environmental disclosure. (Gale, Robert J.P. and Peter K. Stokoe, 2001, p.121)<sup>9</sup>

#### - Literature review

There are many studies that focus on environmental accounting and its relation with different characterization of the company. Considering the results of previous studies, the most important findings have been included in this study. Therefore, some of the variables have been determined based on these studies.

In (Nicolae Todea, Ionela Cornelia Stanciu, and Ana Maria Joldos, 2010)<sup>10</sup> study, the subject of environmental accounting is discussed as a tool used by the entity to determine environmental costs, starting by scientific accounting research, moving to a stage presentation of knowledge in the field of environmental accounting, the concepts related to environmental expenses and costs, identification of different classification of environmental costs, presentation of specific accounting treatment of environmental expenditure and of environmental costs in Romania for the years 2007 and 2008. The study concludes to:

-There are growing interests on sub-domains such as environmental management accounting and environmental audit; in terms of research in Romania on environmental accounting.

-Romanian accounting technique could not separate coverage of environmental issues in accounting.

The searchers propose to develop in Romania an international standard for environmental accounts entitled "Reporting on



environmental regeneration," such as in Bulgaria, which deals with environmental issues and lines of coordination to be made in application.

In the same way (**BeÑianu Leontina, 2010**)<sup>11</sup>, tried in her study to make an overview of the approaches of environmental cost accounting, by answering the question: which types of costs should be included under Environmental Management Accounting (EMA) ? Starting by the definition and classification of environmental costs, moving to the allocation of environmental costs and finally some examples of environmental cost accounting.

The study concludes that: - Limits of traditional financial and cost accounting methods to reflect efforts of organizations towards sustainability.

-Information on environmental performance of organizations might be available to some extent, but, decision-makers of the company, as well as those in public authorities, are seldom able to link environmental information to economic variables and are crucially lacking environmental cost information.

In another study (**Gale Robert, 2001**)<sup>12</sup>, try to examine the relation between the existence of environmental cost accounting and business strategy, by discussing the expanding base of cost accounting, that defined by two types of costs: internal and external environmental costs, moving to internalizing externalities, and implications for business strategy: total, full cost and life cycle assessment, finally the researcher mentions the link between environmental accounting and business strategy.

In conclusion **Gale Robert** concludes that: -The adoption of Environmental Cost Management (ECM) methods can help put a firm in a stronger competitive position comparing to firms that apply only conventional accounting, and the extent of this advantage will depend on how extensively and creatively the firm makes use of these methods in decision-making.

As well, (**James Boyd, 1998**)<sup>13</sup> try to develop an economic approach to improve the evaluation of environmental accounting's



benefits and derives the value, and determinants, of improved accounting information in several production and capital budgeting contexts. Using concepts from managerial economics, finance, and organizational theory, the analysis identifies the types of environmental accounting improvement that are most likely to yield significant financial and environmental benefits.

He concludes that Environmental Accounting is a necessary complement to improved environmental decision-making.

In 2007(**seetharaman, a; mohamed ismail; saravanan, as, 2007**)<sup>14</sup>, gave a review about the relationship of Environmental Accounting and environmental management system in order to determine the sustainability of organization.

The study discusses the traditional approach of operations management which has been used to evaluate organization's performance, based on cost quality and profit without giving consideration to preservation of the environment. It also identified number of pollution prevention strategies.

The study concludes with an emphasis on the use of environmental accounting for continuous improvement in environmental corporate policies and programs by taking into account regulations, technical developments, scientific developments, and it must be fully integrated into Environmental Management System (EMS) along with other functional area.

What differentiates the study from the previous studies is the fact that we try to demonstrate the relation between Environmental Costs and Environmental Accounting, by answering the following questions: what is the nature of the relationship between environmental costs and environmental accounting? Which types of costs should be included under Environmental Accounting (EA)?

- **Objectives of the research :** The objectives of the research are
- To define environmental costs and to determine its different classifications ;
- To determine the background, status and forms of Environmental Accounting ;



- To expose the Environmental Accounting as an Environmental System.

- **Hypotheses of the research**

H<sub>0</sub>: There is a relationship between Environmental Costs and Environmental Accounting.

H<sub>1</sub>: Environmental Costs is the input of Environmental Accounting System.

## **2. General considerations on The Environmental Costs**

Before starting to define the environmental costs and its different classifications we try to give an overview on the definition of environment and externality, as an essential base of the environmental costs.

According to the geographer Pierre George in 1971 (**George, pierre, 1971**)<sup>15</sup>, the concept of environment refers to “The existence of reciprocal relationships between a reference group and its environment “. (**Erwan HARSCOET, 2007, p.19**)<sup>16</sup>. The concept of externality is as relevant to the field of economics as when Arthur Pigou first postulated the idea in ‘The Economics of Welfare’ (1920) (**Arthur Cecil PIGOU, 1932**)<sup>17</sup>, “Externalities have hugely significant effects on societal welfare”. (**Andrew Winterbotham, Junior Sophister, p.172**)<sup>18</sup>.

### **2.1. Definition of the Environmental Cost**

There is a big debate in the subject of environmental impact measurment because of the different opinions about the definition of the term environmental costs.

#### **a. The USA Environmental Protection Agency definition**

Environmental Cost depends on : “utilization of information relate to environmental issues in a company, and its can include in :

- conventional costs ;
- potentially hidden costs ;
- contingent costs ;
- image and relationship costs”.(**United Nations Division for Sustainable Development, 2001, pp.14-20**)<sup>19</sup>



According to **USA Environmental Protection Agency** Environmental Cost is considered as an output of the information system in company.

**b. The United Nations for Sustainable Development definition**

Environmental Cost is distinguishes three types of costs, related to all the efforts made by company to : **(BeÑianu Leontina, p.125)<sup>20</sup>**

- reduce the environmental effects of their activities, by using “end-of-pipe” measures and technologies;
- prevent their environmental effects before the end of the production process, by using cleaner technologies, or by establishing environmental management systems;
- The last type is defined on all costs associated to non-product output ; On The United Nations proposition we may notice that : Environmental Costs are defined on both of product output and non-product output related to efforts made by company to analyse and measure environmental impact.

Through all the above mentioned definitions, we may state that an Environmental Cost is : “ Cost that organization incurs to prevent, monitor and report environmental impacts”.**(Karambu Kiende Gatimbu1, Joseph Masinde Wabwire, 2016 ,p.3)<sup>21</sup>**.

**2.2. Categories of Environmental Costs**

Environmental Costs are costs that are incurred because poor environmental quality exists or may exist, and it can be classified as follow ;

**a. International Federation of Accountants (IFAC) classification**

**IFAC** has given the following categories for environmental costs that are given in table1 ;

**Table1. International Federation of Accountants (IFAC) classification of Environmental Costs**

N o	Environmental Costs	
	Cost type	Explanation
1	<b>Material costs of product outputs</b>	It includes the purchase costs of natural Resources such as water and other materials that



		are converted into products and packaging.
2	<b>Material costs of non-product outputs</b>	It includes the purchase (and sometimes processing) costs of energy.
3	<b>Waste and emission control costs</b>	It includes costs for: handling, treatment and disposal of waste and emission, remediation and compensation costs related to environmental damage, and any control related regulatory compliance costs.
4	<b>prevention and other environmental management costs</b>	It includes the costs of preventive environmental management activities such as: cleaner production projects, also includes costs for environmental management activities such as environmental planning and systems, environmental measurement, environmental communication and any relevant activities.
5	<b>Research and development costs</b>	It includes the costs for research and development projects related to environmental issues.
6	<b>Less tangible costs</b>	It includes both internal and external costs related to less tangible issues. Examples include liability, future regulations, productivity, company image, and stakeholder.

Source: (International Federation of Accountants, 2005, pp.15-35)<sup>22</sup>

#### b. The classification of Environmental Costs by Activity

Environmental Costs can be classified by activity in Four (4) categories : Prevention Costs, Detection Costs, Internal failure Costs, External failure Costs, as show table 2 ;

**Table 2.The classification of Environmental Costs by activity**

Environmental Costs	
Cost type	Explanation
<b>Prevention Activities</b>	Evaluating and selecting suppliers and pollution, control equipment; Designing processes and products; Carrying out environmental studies ; Auditing environmental risks Developing environmental management systems; Recycling products ;Obtaining ISO 14001 certification.
<b>Detection Activities</b>	Auditing environmental activities ; Inspecting products and processes ; Developing environmental





	performance Measures; Testing for contamination; Verifying supplier environmental; performance; Measuring contamination levels.
<b>Internal failure Activities</b>	Operating pollution control equipment ; Treating and disposing of toxic waste ; Maintaining pollution equipment ; Licensing facilities for producing ; contaminants ; Recycling scrap.
<b>External failure Costs</b>	Cleaning up a polluted lake ; oil spills and contaminated soil ; Settling personal injury claims(environmentally related) ; Restoring land to natural state ; Losing sales due to poor environmental reputation.

Source: (Hansen and Mowen, p.7)<sup>23</sup>

There are many ways in which environmental costs, losses or benefits may go unrecorded in traditional accounting systems. One broad approach to calculating full environmental costs is to distinguish between internal costs and external costs, that are demonstrated in table 3 (Gale, Robert J.P. and Peter K. Stokoe, 2001, p.122)<sup>24</sup>

**Table 3. Internal and External Environmental Costs**

<b>Environmental Costs</b>	
<b>Internal Costs</b>	<b>External Costs</b>
Include the costs for the remake and restoration of the zone, wastes management or other costs for the environmental quality.	Reflect the impact of the company's



Direct costs those determined by the activity specific to the zone, kind of pollution or programme of prevention of pollution adopted for the wastes.	Indirect costs formation of personnel, research developmen t	Eventual costs	activity on the society and environment, at present and in future soil and air pollution, water contamination
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Source :( Ileana – Sorina RAKOS , Andreea ANTOHE, 2014,p.171 )<sup>25</sup>

As shown in table 3, we conclud that full environmental costs = (internal + external costs) Where :

- Internal costs = (direct + indirect + eventual costs).

-External costs = the costs of external environmental and health damage.

By analyzing different classifications of the environmental costs, made by experts in the environment field, we define Environmental Costs as the proposition of the Recommendation of CE, 453/2001, that defines environmental costs as “Those costs to prevent, reduce or recover damages that the entity has caused or is likely to cause on the environment as a result of its activities. These include prevention, elimination or reduction of waste and wastewater, air emissions, treatment of contaminated soil, groundwater, noise and vibration levels, the landscape changes, research and innovations of products and cleaner production processes, control of environmental quality”( Emmanuel Amaps Loveday Ibanichuka, Oyadonghan Kereotu James, 2014, p.44 )<sup>26</sup>

### 2.3. Use of Environmental Costing for Internal decision making

Management Accounting consider the accounting data for decision making, but the sustainability of the management accounting can be attained only by considering Environmental Costing in



decision making based on that the environmental cost is define as the process of collection and analysis of information related to environmental cost for internal decision making.

The internal decisions making of the firm that considers the environmental activities are: **(International Federation of Accountants, 2005)<sup>27</sup>**

- Product/process related Decision Making ;
- Investment Projects and Decision Making.

### **3. Environmental Accounting**

Environmental Accounting has recently represented the subject of several scientific research works, some of which question the techniques used for the integration of the environmental information in the financial-accounting system.

Taking into consideration the global necessity of sustainable development, environmental accounting may be regarded as an extension of the updated traditional accounting, which takes into account the interactions between economy and environment, by the relations: win-win, exchange-exchange, profit-compensation, damage incurred to the environment.

There are some factors that have contributed to the appearance and development of environmental accounting such as **(Ileana-Sorina Rakos, Andreea ANTOHE, 2014, p.173)<sup>28</sup>**

- Favorable legislative framework ;
- Pressure from the groups concerned.
- Cost evolution – necessity to create environment-specific accounts.

All these factors lead to the necessity of integrating the environment in the decisional and financial process of the productive economic entity.

#### **3.1. Background of Environmental Accounting**

Environmental issues have found a reflection in the accounts only in the last part of the twentieth century. The chronology's important developments in environmental accounting and Environmental issues reflected in the accounts we found at Ienciu



(2009) which presents the following rhythms are given in table 4(Nicolae Todea, Ionela Cornelia Stanciu, and Ana Maria Joldoș, 2010, pp.208-209)<sup>29</sup>

**Table 4. Background of Environmental Accounting**

N°	Period	Features of the period
1	1971-1987	<ul style="list-style-type: none"> <li>- Represented the beginning of the first environmental accounting research due to the increasing importance of this area. The first period takes into account the literature in this field through studies treating social and environmental accounting in the same way.</li> <li>- Since the early 80s, surveys suggest that the separation of environmental accounting and social accounting is starting, due to increased interest in environmental reporting compared to social.</li> <li>- Also in this period accounting books dealing with aspects of social and environmental accounting began to appear.</li> </ul>
2	1988-1994	<ul style="list-style-type: none"> <li>-The problem of environmental accounting became an area of interest. In this period of increased interest of researchers for this area, managers and even accountants began to pay attention to the problem of environmental accounting.</li> <li>- This period was also characterized by an increasing research on environmental accounting over social accounting. Also, the concepts of sustainability and environmental audit begin to interest the users.</li> </ul>
3	1995-2001	<ul style="list-style-type: none"> <li>- Environmental Accounting in both theoretical and practical level started to address on a large scale especially in developed countries.</li> <li>-The number of studies in this period began to grow; this period can be called "the cornerstone" of</li> </ul>



		accounting environment.
4	2002-present	There is a widening in this area of research in numerous developing countries including Romania. At the international level are issued guidelines on reporting Environmental Information and regulations appearing in the accounting environment.

**Source : ( By researchers based on Nicolae Todea, Ionela Cornelia Stanciu, and Ana Maria Joldoș, 2010, pp.208-209)<sup>30</sup>**

Through the table 4 we conclude that research in environmental accounting have come to the forefront of accounting research, outpacing other chapters, such as social accounting, given the importance of environmental issues on the community. Environmental reports remain an area of interest for researchers, As in all cases, environmental management accounting is a tool to inform managers about the environmental costs, to qualify the environmental effects of the entity. It appeared as a result of increasing pressure on the entity's management to reduce costs and minimize environmental impact activities.( **Emmanuel Amaps Loveday Ibanichuka, Oyadonghan Kereotu James, 2014, p.45)**<sup>31</sup>

### **3.2. Definition of Environmental Accounting**

The importance of environmental accounting is growing up because of increasing environmental problems, economic, social and technological developments.

Environmental Accounting (EA) is defined as : “The process of environment based categorization of Business activities, collecting, analyzing and then monitoring these environment-related activities, and then put all these information into a business balance sheet to help an organization's decision maker”. (**Hasan Şenol, Hakan Özçelik, 2012, p.83)**<sup>32</sup>

### **3.3. Functions and Roles of Environmental Accounting**

There are four (4) forms of Environmental Accounting, which are; Environmental Financial Accounting (EFA), Environmental Cost



Accounting (ECA), Environmental Management Accounting (EMA), and Environmental Nation Accounting (ENA). EFA, ECA, and EMA are related to corporate (business) accounting. **(Hamid Ravanpak NOODEZH, Salehe MOGHIMI, 2014, p.14)<sup>33</sup>** and their functions in company are divided into internal and external functions, as follow : **(Environmental Accounting Guidelines, 2002, p.3)<sup>34</sup>**

#### a. Internal Functions

Environmental Accounting within the company is considered as an Environmental Information System, makes it possible to manage and analyze the Environmental Costs versus the benefit obtained, and promotes effective and efficient environmental conservation activities through suitable decision-making.

#### b. External Functions

The role of external Environmental Accounting is demonstrated by disclosing the quantitatively measured results of its environmental conservation activities, external functions allow a company to influence the decision-making of stakeholders, such as consumers, investors, and local residents.

The definition of **Environmental Information** is wide and includes written, electronic, visual or audio information held by Bristol Water about :

- The state of the elements of the environment ;
- Factors affecting the environment ;
- Measures (including administrative measures) and activities affecting or designed to protect the environment ;
- Reports on the implementation of environmental legislation;
- Cost-benefit and other economic analyses and assumptions used within the framework of environmental measures and activities.

([https://ico.org.uk/.../eir\\_what\\_is\\_environmental\\_information.pdf](https://ico.org.uk/.../eir_what_is_environmental_information.pdf), 18/09/2018 12:19:56)<sup>35</sup>

We define **Environmental Disclosure** as : “The set of information items

that relate to Company’s past, current and future Environmental



management activities and performance“(Sylvie Berthelot, Deniis Cormier, Michel Magnan, 2003, p.2)<sup>36</sup>

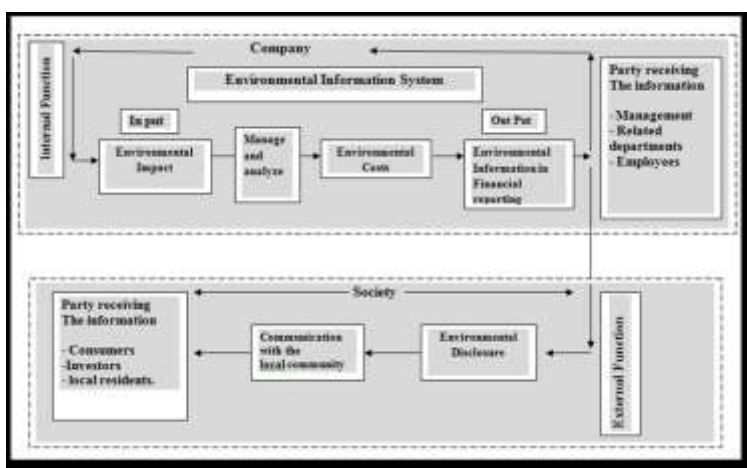
The factors considered in Environmental Accounting Reporting are (Hamid Ravanpak NOODEZH, Salehe MOGHIMI, 2014, p.14)<sup>37</sup>

- Incoming harms to environment;
- Responsibilities of companies towards these harms;
- Revision of the relationship between industries and environment and the use of natural sources;
- Evaluation of environmental impacts harms;
- Necessity of reporting environmental costs.

We can demonstrate the role and functions of Environmental Accounting into internal and external site of the company on the Figure 1 as follow ;

**Fig. 1. The internal and external role of Environmental Accounting**

Source: (By researchers based on Environmental Accounting Guidelines, 2002, p.3)<sup>38</sup>



Through the Fig.1 we conclude that Environmental Accounting is a link between company and society by it internal function where is considered as Environmental Information System, and it external role

by disclosing the Environmental Information in Financial Reporting according to Environmental Accounting.

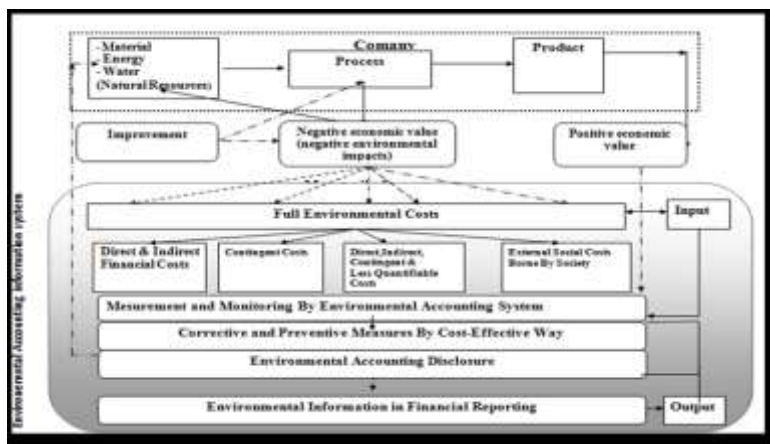
#### 4. The Relation between Environmental Accounting and Environmental Costs

As we found before that Environmental Accounting is considered as an Environmental Information System when it makes their internal company's, where Environmental Information System (EIS) can be defined as computer systems that use a variety of tools and technologies to facilitate the management and use of environmentally related data and information, in order to manage and analyze environmental costs as an input of this information system.(Muki Haklay, 1999, p.14)<sup>39</sup>

We can show the relation between Environmental Accounting and Environmental Costs in the Fig.2, as follow ;

**Fig.2. Environmental Information System**

Source: (By researchers based on, Seetharaman, a; Mohamed Ismail; Saravanan, as, 2007, P.142)<sup>40</sup>



From the Fig.2 that shown the relation between Environmental Accounting (EA) and Environmental Costs, where (EA) appears as an Information System which consist of a set of synthesis starting by the full environmental costs as an input of this information system as a





monetary measurement form of negative Environmental Impacts. Using the Environmental Accounting as a tool of determining these environmental costs, and discloses it in financial reporting as Environmental Information, and Output of the Environmental Accounting System. (Seetharaman, a; Mohamed Ismail; Saravanan, as, 2007, P.142)<sup>41</sup>

## 5. CONCLUSION

Through our treatment of the subject, and from the above analyzing we get several findings as follows :

- Negative economic value is a result of company process.
- Environmental costs are considered as a measurement and monitor of negative environmental impacts, determined by Environmental Accounting.
- Environmental Accounting is used to assess full environmental costs associated with activities and products.
- Environmental Accounting as an Environmental Information System, is set of synthesis, where we find environmental costs as an important part in this system, that considering the input of this information system.
- The relationship between Environmental Costs and Environmental Accounting is indicated by the fact that environmental accounting is a framework for environmental costs disclosure.
- We confirms the validity of the hypothesis set which says that there is a relationship between Environmental Costs and Environmental Accounting.

## 6. Appendices

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