



Theoretical Framework for Environmental Accounting

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ABSTRACT

The paper examined the theoretical framework for environmental accounting. It adopted theoretical approach. We looked at the different definitions of environmental accounting. Conceptual framework and terminologies were explained. They include environmental accounting, environmental financial accounting, Ecological accounting, Natural resource accounting etc. Other concepts such as environmental and Natural Assets were explained. We concluded by recommending among others that environmental accounting should be responsible for measuring environmental performance and that environmental bodies and scientists should develop a standard to guide different practices of environmental accounting.

Keywords: Theoretical framework, Environmental Accounting, Conceptual Framework, Natural Resource Accounting.

INTRODUCTION

According to Porwal (2001), no discipline can develop without a strong theoretical base. Practice should be backed by sound theory. Therefore, the study of theoretical framework for environmental accounting cannot be over emphasized.

There is an increasing interest in environmental protection at all levels. This is clear after the issuance of environmental regulations in most of the countries but, as the quest for new solutions to prevent environmental degradation intensifies, it is clear that the process by which regulatory solutions are designed and enforced by public agencies upon different entities is becoming increasingly outdated. So, economics and more specifically accounting can perform an important role in relation to environmental issues.

The inclusion of environmental dimension in the traditional accounting system at all levels (company, sector, governorate, nation-wide) will result in an adjusted economic indicators which will enable different users at all levels to take sound decisions that support sustainable development.

Environmental Accounting, however, has many meanings and uses.

Environmental Accounting can support natural resource accounting at macro level, ecological accounting at local administration level and at micro level related to financial accounting, cost accounting or managerial accounting.

This paper discusses the conceptual framework of Environmental Accounting as well as different associated terminologies.

Objectives of the Study

The objective of this paper is:

- i. to examine the theoretical framework for environmental accounting and
- ii. to proffer some suggestions for the development of environmental accounting.

LITERATURE REVIEW

Meaning of Environmental Accounting

US Environmental Protection Agency (1995) opined that at micro level, environmental accounting means the entire domain of accounting for the environment including financial accounting, reporting and auditing and environmental management accounting.

Srinivasa (2014) defines environmental accounting as counting for any charges and benefits that arise from changes to a firm's goods or methods where the change also involves a change in ecological influences.

Uno and Bartelmus (1998) stated that environmental accounting identifies and measures environment costs, environmental liability and environmental benefits. In other words, environmental accounting means to identify and measure environmental costs, environmental liabilities and environmental benefits.

The Ministry of Environment, Environmental Accounting Guidance (2002), also defined Environmental Accounting as aims at achieving sustainable development, maintaining a favourable relationship with the community and pursuing effective and efficient environment conservation activities.

It went further to say that the accounting procedures allow a company to identify the cost of environmental conservation during normal course of business, identify benefits gained from such activities, provide the best possible means of quantitative measurement (in monetary value or physical units) and support the communication of its results. Environmental conservation is further defined as the prevention, reduction and avoidance of environmental impact, removal of such impact, restoration following the occurrence of disaster and other activities.

Bureau of Meteorology (2013) opined that environmental accounts are strongly structured tables that provide organized information for clearly defined decision making purpose. They are systematic and comparable, and use standard definitions based on accepted measurement and accounting theory.

Accounting and Environmental Concerns:

There is no doubt that different organizations, sectors ...etc. have social and environmental impacts which may carry bigger weight than its economic impacts. Accounting has an instrumental role in disclosing about environmental responsibility for different entities whether industrial, commercial, service or even voluntary and at all levels whether micro, local and macro. Thus, accounting became concerned with achieving new goals such as measuring and evaluating potential or actual environmental impacts of projects and organizations. These new goals are of great importance as they enable many users to take different development decisions which are economically and environmentally sound. US environmental protection agency (1995) stated that the main reasons of accounting's interest in the environment are as follows:

- A proper environmental accounting system is a supporting measure for achieving Sustainable Development (SD) in the sense that it is the main tool for measurement, control and decision-making.
- Environmental expenditures whether Capital (CAPEX) or Operating costs (OPEX) increase dramatically day after day.
- Management needs financial data about these expenditures.
- For strategic cost leadership (Driving Cost).
- The need to prioritize these expenditures.
- Environmental costs (and, thus, potential cost savings) may be obscured in overhead accounts or otherwise overlooked.
- There are increasing needs from different stakeholders (government, investors, lenders, banks, non-governmental organizations ... etc) to have financial data on the environmental performance of different organizations.
- If accounting does not provide financial data on the environmental performance of organizations that will help non-complying organizations /entities to pollute environment and spoil resource and yet appear more economic efficient than other which incur costs to protect the environment.
- Many of the environmental activities are of quantitative and accordingly of financial nature and have a major effect on organizations costs, assets and liabilities.

- Naturally any entity have a main outputs and a secondary outputs of which mainly polluters and thus if the entity does not incur costs to mitigate or prevent it a third party in the society have to bear it (the concept of externality).
- Environmental risks may result in huge environmental liabilities and subsequently the organization/entity may be obliged to outlay large payments which may affect seriously the liquidity and the financial position of the organization.
- Many environmental costs can be significantly reduced or eliminated as a result of business decisions, ranging from operational and housekeeping changes, to investment in cleaner production, to redesign of processes/products.
- Managing resources properly in an environmentally friendly way will result in direct returns such as cost savings and reductions and/or indirect returns such better goodwill and image for the organization.
- Many organizations have discovered that environmental costs can be offset by generating revenues through sale of waste by-products for example.
- Environmentally friendly processes, products, and services result in a competitive advantage for such organizations.
- There is a general trend to evaluate the organizations performance according to its social and environmental effectiveness and not only on its economic effectiveness.
- Current practices demonstrate that, no track for environmental costs was available as it was charged randomly. Therefore, there is a need for proper charging and allocation. Distinguishing between environmental costs and other costs will lead to a proper cost allocation of these costs and thus more precise pricing and will help to develop sustainability indicators.
- Accounting for environmental costs and performance can support a organization's development and operation of an overall Environmental Management System (EMS) and ISO 14000 accreditation.

For the above reasons, the researcher believes that accounting should be responsible for measuring and evaluating and disclosure of environmental performance in financial statements or in its attachments. No doubt that measuring environmental performance depends on accounting systems but needs more data, other than the conventional accounting data, such as pollution ratios. Monetizing environmental issues may not be totally accurate but, economists and accountants have to give best estimates according to the current level of knowledge and techniques used (Mohammed, 2002).

Environmental (Green) Accounting: Conceptual framework and terminology

According to Mohammed (2002), the focus of traditional (conventional) accounting practices is on the economic aspects only. Taking into consideration the environmental dimensions, in the accounting system, especially natural resources/assets, depletion ... can be termed as "green accounting".

Abdel Raouf (nd) stated that the term "Greening" has been used a lot in the past forty-five years in relation to different environmental issues. In many cases, the term is also used to name organizations such as Green Belt Movement, operations such as Green Contracting etc. Green Accounting is a general term where it may mean Environmental, Ecological or Natural Resource Accounting. Needless to say that Environmental Accounting is also a general term which may mean the integration of environmental dimension into the macro or micro level despite that it is more applicable to the latter level. However, the four main terms mentioned overlap with each other.

Shell International (nd) also stated that environmental accounting, which calls to introduce a system that supports Sustainable Development (SD) that is gaining more interest especially from multinational energy companies, has many meanings and uses. Environmental Accounting can support national income accounting, ecological accounting at local administration level and at micro level related to financial accounting, cost accounting or internal business managerial accounting. In the following section, the different terms are clarified:

Environmental Accounting

US Environmental Protection Agency (1995) stated that at micro level, environmental accounting means the entire domain of accounting for the environment including: financial accounting, reporting and auditing, and environmental management accounting.

Environmental Financial Accounting aims to the true disclosure in the financial statements in the end of period.

That is, include environmental dimension in the published sheets of operations.

Environmental Management Accounting means the management of environmental and economic performance through the development and implementation of appropriate environment related accounting systems and practices. While this may include reporting and auditing in some companies, environmental management accounting **typically** involves life-cycle costing, benefits assessment, and strategic planning for environmental management.

Environmental Cost Accounting deals with environmental costs in order to reach the full cost accounting. i.e. the identification, evaluation, and allocation of conventional costs, environmental costs, and social costs to processes, products, activities, or budgets.

According to the polluter pays principle (PPP) propounded by Pearce (1994) each polluter has to pay for the costs for dealing with the pollution resulting from his operation. Failure to bear these costs by the polluter will mean that some other party (a third party) will have to shoulder them - external environmental costs.

The term environmental cost has at least two major dimensions:

- (1) It can refer solely to costs that directly impact "private costs";
- (2) It also can include the costs to individuals, society, and the environment for which a company is not accountable "social costs".

Ecological Accounting

In many cases, the term Ecological Accounting is used to refer to the preparation of accounts according to physical data only. In addition, Ecological accounting is the type of Environmental Accounting (a dedicated type for Natural Resource Accounting at local administration level).

Osborn (nd) opined that in this respect, Ecological Accounting is mainly used to prepare an asset management plans at local administration level. Such plans provide a tool to evaluate the condition and life cycle of any particular physical asset.

According to Zhifangi: Jing and Shihui (2016), Ecological Accounting is not a new concept. It developed slowly over nearly ten years. However, it is a new field and discipline. Social accounting and social responsibility accounting, resource accounting and environmental accounting have an inherent relationship with ecological accounting. However, ecological accounting is more open. It is not limited to environmental pollution. It considers the collective relationship among resources, environment and economic performance.

Natural Resource Accounting

United Nations (1994) stated that the term natural resource accounting is called after inclusion of environmental aspects into the system of national accounts. Leads Eco (1997) also stated that where emphasis is given to natural assets, deterioration in its quality... in order to get an environmentally adjusted economic indicators such as environmental gross national Income.

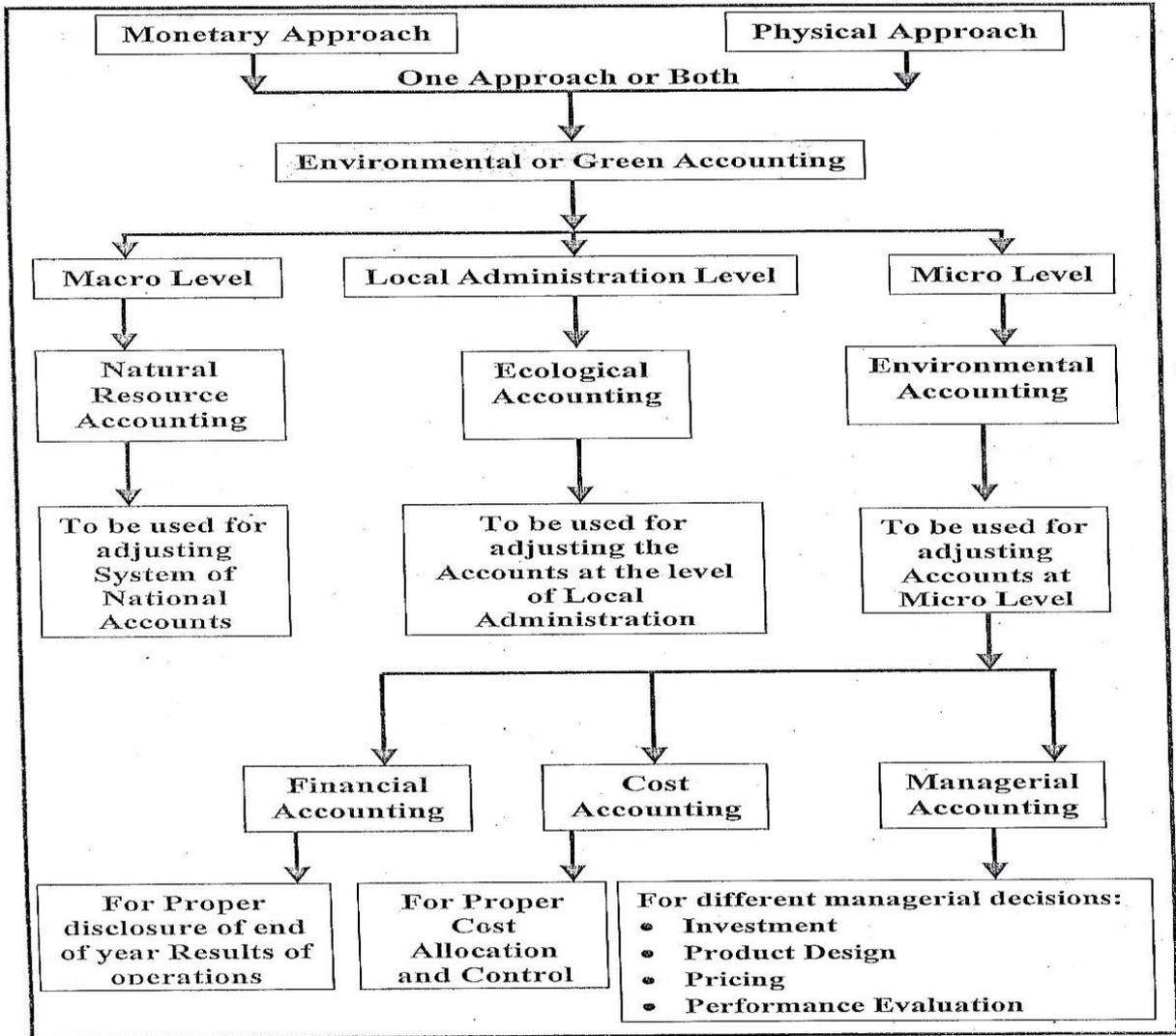
Physical Approach vs. Monetary Approach

It is worth mentioning that two approaches are adopted in Environmental Accounting. Firstly, the Physical Approach was suggested by the United Nations where a complete guide to be prepared indicating the available resources within a country classified according to it state and uses (for instance, agriculture, desert land...etc).

Depending on this approach the environmental operations are presented in a physical terms, the current balance of the resource and the additions and deductions from that resource. No monetary value is assigned according to this approach. According to Farghally (1997) the monetary approach emerged due to the fact that the Physical Approach does not fulfill the requirements of the Environmental Accounting. Nevertheless, the physical approach is very important to get physical information about the resources which enables one to prepare the environmental statistics and is considered the first step in the Monetary Approach. Despite the difficulties associated with the

monetary approach, it gained a lot of interest as such data will enable one to know the profit and loss associated with environmental operations and to get an environmentally adjusted economic indicator. The following figure shows the different approaches and classifications of environmental accounting at all levels.

Figure #1 Approaches and Classification of Environmental Accounting



Source: Mohamed (2002)

Concepts Associated with Environmental Accounting:

Environmental and Natural Assets:

Traditional accountings introduce terms like fixed, current, Depleteable, normal and even lucky assets. But due to environmental sciences it produces the natural and environmental assets.

In the traditional balance sheet one can realize that the majority of assets are man-made assets and, in some cases, intangible assets like goodwill and patents. Although, many organizations possess environmental assets such as (petroleum, trees ... etc) despite the full control over such assets.

For instance, a hotel overlooking a bay or a river will have a competitive advantage and thus more revenues compared to other hotels downtown in a crowded area. The researcher believes that a separate item for environmental assets should be in the financial statements especially for these organizations who are dependant on environment and natural environmental stock in generating its revenues. In addition, nowadays in many countries it is familiar to see a pollution bond (environmental asset) possessed by an organization that may not be in need for it any longer as a

result of complying with environmental regulations so it sells the bond to other organization that need it. According to the previous argument the researcher suggests to distinguish between natural assets and environmental assets as follows:

Natural Assets:

Natural assets are one type of environmental assets which represents a natural capital stock of organizations, governerates, sectors, nationwide. It may represent a renewable asset such as soil or nonrenewable asset such as petroleum. Natural assets may be defined as “natural resources that are discovered and developed through periods by an entity which have control over such resources after extracted and should be shown in financial statements of these entities”. Needless to say that some of natural resources provide man with many services such as recreation.

The natural assets are of great importance as they represent future goods and thus should be depreciated like man-made assets in order to be replaced. i.e. to be protected, resorted and maintained for its productivity.

Environmental Assets:

They represent the environmental assets possessed by an organization as a result of environmental protection, regulations and/or according to environmentally voluntary activities. In fact, such assets are part of man-made assets such as environmental protection equipment, pollution bonds...etc. it is worth mentioning that they might be fixed assets or current assets. Even that the same asset may be considered fixed in one organization while current in the other.

According to the previous discussion, the researcher may set the following rule “*all natural assets are environmental assets but not vice versa*”. In most of the Accounting and Economics literature, they are mostly referred to as environmental assets.

The Importance of distinguishing between Environmental and Natural Assets:

Showing natural assets in a separate category is important as those assets represent the real wealth in some organizations, governorates, sectors, countries. Beside that, they are the wealth of the next generations. Showing environmental assets in a separate item gives an idea for all concerned parties about the value of environmental assets and environmental capital for environmental protection at any level (company, sector, governorate, nation-wide). Knowing the deterioration and/or improving the quality in the volumes and value of environmental assets across different accounting periods.

Thus, Accounting should distinguish between environmental and natural assets and also seek to answer questions like what is the value of the environmental assets? What is its return? Does it value increase or decrease? And so forth.

Environmental Liability

Accounting institutions define liability as a Probable future sacrifice of economic benefits arising from present obligations to transfer assets or provide services in the future as a result of past transactions or events." More simply, a liability is a present obligation to make an expenditure or to provide a product or service in the future.

Liability has an important legal dimension as well. A liability is a legally enforceable obligation, whether it is voluntarily entered into as a contractual obligation, or is imposed unilaterally, such as the liability to pay taxes. The law both establishes liabilities and determines who is responsible for discharging them (Mohammed, 2002).

Types of Environmental Liabilities

US Environmental protection Agency (EPA) stated that it is somehow difficult to classify environmental liabilities into different categories. However, one can realize the following types of environmental liabilities:

Compliance Obligations

As regulations are enacted that apply to the manufacture, use, or release of regulated substances, organizations find themselves facing future compliance costs. An organization may discover that it is not in compliance with existing regulations. The costs of compliance can range from modest outlays required to conform to administrative requirements (e.g., record keeping, reporting, labeling, training and all that) to more substantial outlays, including capex expenditures (e.g., to pre-treat wastes prior to land disposal or release to surface waters, to contain spills, to treat air emissions). Regulations also impose "exit costs" (e.g., to properly close waste disposal sites and provide for post-closure care (EPA, 1995).

Remediation Obligations are sometimes subsumed under "compliance" because some property cleanup requirements have been enacted as part of regulatory programs applicable to operating facilities. Also, it is easy to distinguish between the compliance obligation of routine closure of facilities at the end of their useful lives and the remediation obligation for cleaning up pollution posing a risk to human health and the environment. And meeting current compliance obligations may help minimize future remediation obligations. Remediation tends to be expensive and can include excavation, drilling, construction, pumping, soil and water treatment, and monitoring, and can include the response costs incurred by regulatory authorities. Remediation costs also can include the provision of alternate drinking water supplies for affected community residents, and, in some circumstances, purchase of properties and relocation expenses. Technical studies and the expenditure of management, professional, and legal resources add to the cost of remediation.

The remediation obligation is distinctive because an organization may face remediation obligations due to contamination at inactive sites that are otherwise unregulated; at property formerly but not currently owned or used; at property it never owned or used, but to which its wastes were sent; and, at property it acquired but did not contaminate. As large expenditures will be needed in the short-term to remediate existing environmental contamination, particularly at inactive and abandoned sites, these liabilities often dominate and can distort a firm's assessment of its environmental liabilities. Therefore, it is helpful to distinguish between remediation obligations for existing contamination and potential remediation obligations for future contamination because managers can have more impact on ongoing and future activities and releases - whether accidental or not - that may trigger future remediation obligations.

Fines and Penalties

Organizations that are not in compliance with applicable requirements may be subject to civil or criminal fines or penalties for non-compliance and/or expenses for projects agreed to as part of a settlement for non-compliance.

Such payments fulfill punitive and deterrent functions and are in addition to the costs of coming into compliance. Fines and penalties (and related outlays for supplemental environmental projects) can range from modest amounts to a few million dollars per violation. Generally, a civil penalty is assessed that is at least equal to the costs a company saved through non-compliance, thus removing any financial incentive to ignore a law. Other factors may add to or reduce the penalty amount assessed for a violation.

Compensation Obligations

Under common law and some state and federal statutes, companies may be obligated to pay for compensation of "damages" suffered by individuals, their property, and businesses due to use or release of toxic substances or other pollutants. These liabilities may occur even if a company is in compliance with all applicable environmental standards.

Distinct subcategories of compensation liability include personal injury (e.g., "wrongful death," bodily injury, medical monitoring, pain and suffering), property damage (e.g., diminished value of real estate, buildings, or automobiles; loss of crops), and economic loss (e.g., lost profits, cost of renting substitute premises or equipment). Compensation costs can be fairly minor or quite substantial, depending on the number of claimants and the nature of their claims. Oftentimes, legal defense costs (potentially including technical, scientific, economic, and medical studies) can be substantial in handling such claims, even when the claims are ultimately determined to be without merit. Moreover, responding to compensation claims can consume management time and require expenditures in order to control damage to corporate image. Compensation liabilities may involve costs for remediation of contaminated property as well as provision of alternate water supplies, thus somewhat overlapping the remediation category.

Because of workers' compensation and employer liability laws, payments to compensate employees for occupational exposure and injury from hazardous or toxic substances are not generally determined through litigation against the employer or considered environmental liabilities. However, occupational claims sometimes may be brought against another party who is not the employer; for example, workers responding to a train wreck have sued the shipper of hazardous wastes released at the scene of the wreck; for the shipper, these claims can be viewed as environmental liabilities. Managers will want to understand the potential costs of occupational exposure and injuries, because actions taken to prevent or reduce environmental liabilities may also eliminate or reduce occupational liabilities.

Punitive Damages

To supplement compensatory payments to those harmed by the actions of others, the law allows the imposition of what are called "punitive damages" to punish and deter conduct viewed as showing a callous disregard for others.

Unlike compensatory liability, the measure of punitive damages is not directly tied to the actual injuries sustained. Punitive damages are often many times larger than the costs of compensation. Punitive damages tend to be more common in product liability than environmental liability cases.

Natural Resource Damages

A relatively new category of environmental liability is best termed "natural resource damages." Established in the United States according to number of Regulatory such as the Clean Water Act, the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA or "Superfund"), and the Oil Pollution Act (OPA), this liability generally relates to injury, destruction, loss, or loss of use of natural resources that do not constitute private property.

Rather, the resources must belong to or be controlled by federal, state, local, foreign, or tribal governments. Such resources include flora, fauna, land, air, and water resources. The liability can arise from accidental releases (e.g., during transport) as well as lawful releases to air, water, and soil. To date, most natural resource damage payments have been relatively small. As a result, there are a wide range of environmental expenditures such as abatement costs, elimination costs, Handling of Wastes Costs ...etc. As well as, environmental capital expenditures as a result of buying a new asset and/or new cleaner technology.

The perception, identifying the environmental costs associated with a product, process, system or an organization is very important for the sound decision making. Goals such as environmental costs optimization, better environmental performance, identifying the true (full) costs and identifying the social costs ...etc all require knowing the different current and potential costs.

However, knowing the environmental costs depends upon the organizational purpose for using such data like (cost allocation, capital budgeting, product designing and all that managerial decisions). It is worth mentioning that the domain and scope of applying the costs if sometimes to be vague whether this costs is environmental costs or not.

Discussing the topic (environmental accounting framework) further, Josiah (2017), opined that environmental accounting deals with conventional and ecological accounting.

Conventional accounting is further divided into three accounting systems: Management accounting, financial accounting and other accounting.

Management Accounting

Management accounting (also called managerial accounting or cost accounting) is central tool and basis for most internal management decision and it is not usually directly available to external stakeholders. They deal with how environmental costs are treated and traced, how environmental accountants are responsible.

Financial Accounting

Financial accounting is typically designed to satisfy the information requirements of external stakeholders of firms with respect to financial impacts.

They deal with how environmentally induced outlays are capitalized or expensed. How the standards and guidelines exist concerning disclosure of environmental liabilities and assets are treated. Also, how the environmental assets are measured.

Other Accounting

Other accounting is tax accounting and bank regulatory accounting. Tax accounting is mandatory for all businesses as government tax agencies require tax report. Bank regulatory agencies for example have special accounting and reporting requirement. Each of those accounting systems considers different aspects of how environmental issues influence organizations.

They deal with how the effect of subsidies on pollution abatement devices, possibilities and impacts. How the cost for remediation of landfills can be deducted from taxes.

The effect of accelerated depreciation and cleaner production technologies and the consequences of various environmental taxes.

Ecological Accounting

This measure the ecological impact a company has on the environment. Its measures are in physical terms (kilograms). Ecological accounting can be divided into three systems:

1. **Internal Ecological Accounting:** This is designed to collect information expressed in terms of physical units, about ecological system for internal used by management. Methods of measuring the impacts of a company's product and process on the natural environment are necessary foundation for good management decision. Various ways of examining pollution discharge and damage to ecological capital have been developed over the past decade. Whether sophisticated or not, internal ecological accounting is necessary for any environmental input system.
2. **External Ecological Accounting:** Here the data for external stakeholders interested in environmental funds, non-governmental organizations (NGO) and pressure groups are collected and disclosed. Over the past ten years, hundreds of firms have public stock-taking of their environmental impacts. Many of these reports are produced annually and contain extensive data on discharge of pollution.
3. **Other Accounting:** Other ecological accounting systems which also measure data in physical unit provide a means for regulators to control compliance with regulations. Also, these accounting system are necessary for computation of environmental taxes such as CO₂, emission tax, discharge tax. Without information about discharge levels, environmental tax rates cannot be multiplied by the volume of release of pollution to derive a future for total tax drive.

Apart from tax agencies and environmental agencies which are primarily interested in a specific information on discharge of specific pollutants, an increase number of stakeholders such as Banks and Insurance companies require reliable information on the ecological impact of companies as part of the risk assessment process.

CONCLUSION

There is no doubt that some of the current development practices are described as unsustainable activities despite that all development efforts seek higher standards of living. In attempting to achieve that, however, such development activities had damaging affect on the environment. It is irrational to use part of our resources in the development process while the other part contributes negatively by polluting and depleting the rest!

In order to achieve sustainable development there are number of policies to be followed. These policies entail the adoption of the precautionary policies such as environmental impact assessment, natural reserve areas, environmental awareness, environmental researches and environmental accounting and corrective policies such as pollution control, reallocating, monitoring.

It is the researcher view that precautionary policies are of more importance as it helps to avoid negative impacts from materializing and environmental accounting is one of the most important tool to measure, guide and control the sustainable development at all levels.

Nevertheless, environmental accounting is still facing a number of problems such as lack of supporting information and skilled staff as well as the absence of a standard accounting principles.

RECOMMENDATIONS

We therefore recommend that;

1. Environmental Accounting should be responsible for measuring environmental performance and its reporting especially in published financial statements.
2. Environmental bodies and scientists should develop a standard to guide different practices of environmental accounting.
3. Research and studies in the field of Environmental Accounting should be encouraged to develop at all levels.
4. Environmental Accounting and Statistics units should be established in different organizations with clear mandates.
5. Introducing Environmental Accounting should be encouraged by management and official authorities at all levels.

6. A separate account should be opened for environmental expenditures. This will enable measuring and reporting of environmental expenditures and environmental performance of each company as well as the whole sector.

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