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A STUDY ON CARBON ACCOUNTING

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ABSTRACT

Carbon Acc*ounting is a process that facilitates measuring the amounts of carbon dioxide emitted by an enterprise. That enterprise could be individual, corporate, state or a nation. It is an emerging field of business economics. Carbon Accounting includes the measurement, calculation, monitoring, reporting and auditing of green house gas emissions at organizational, process, product or supply chain level. Carbon along with other green house gases plays a significant role in regulating earth's temperature. These green house gases are also responsible for rising sea levels, extreme and more variable weather along with changes in the availability of fresh water, changing growing seasons and other agricultural impacts. This paper discusses the greenhouse gas emission accounting and the methods and tools of carbon accounting. It also discusses the steps to be taken by the companies to improve social and environmental performance.*

Keywords: *Carbon Accounting, Industrial Organization, Sustainable Development, Green House.*

Introduction

In recent decades global warming has become one of world's major problems. The impact of global warming and climate change are directly linked to economic and social activities such as transportation, heating and industrial uses, burning of fossil fuels for generating electric power are the main sources of carbon dioxide emissions globally. Industries play an important role in global carbon cycle. They emit 75% of the total greenhouse gas, in which carbon dioxide occupies a large proportion. Industries are the basic units in the low carbon city construction and play a key role in energy consumption and carbon dioxide emission. The construction of low carbon industry and community is an important pathway to realize carbon emissions mitigation in the context of increasing urbanization. Carbon along with other green house gases plays a significant role in regulating the earth's temperature. In 2013, James Hansen and other scientists advocated 350 parts per million as a safe upper level of carbon in the atmosphere that would limit temperature rise to 1 degree Celsius above pre-industrialization levels. Though almost all of the world's nations have party to and have now signed the Paris Agreement of 2015, which attempts to limit temperatures are unknown and increase with rising levels of carbon and other green houses gases.

In order to control carbon and greenhouse gas emissions by the industries, carbon accounting is increasingly required by governments, or by shareholders and investors. Carbon accounting can play a material role in triple bottom line accounting, which has been growing popularity in recent decades, in which industries measure performance in terms of social and environmental impact in addition to traditional business economic indicators.

Objectives

- To study the concepts and stages of carbon accounting.
- To study the methods and tools of carbon accounting.
- To study the steps to be taken by the companies to improve social and environmental performance.
- To study the benefits of incorporating carbon accounting for business houses.

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Review of Literature

In the past many studies have been done on carbon accounting. Some of them are as follows:

Schaltegger and Csutora (2012) differentiate among economic, political and scientific and corporate levels of carbon accounting. According to them, scientific carbon accounting covers the major tendencies in emissions, raises awareness and offers references for how carbon emissions can be managed and reduced to remain within the scope of sustainability.

Stechemesser and Gunther (2012) highlight international, national, industry and corporate levels of carbon accounting, again stressing the potentially different scopes of the field.

Ascui and Lowell (2012) stress the link between the physical and monetary aspects of carbon accounting.

Concepts and Stages of Carbon Accounting

- **Carbon accounting as an example for environmental management accounting**

In the earlier stage (1998) there was little coverage of carbon accounting in social and environmental accounting. Carbon accounting was not studied as a topic but only carbon related costs were mentioned sometimes. In management accounting energy cost was recorded as environmental resource cost and energy savings as environmentally induced benefits.

- **Carbon Accounting studied as a topic**

Around 2000s carbon and greenhouse emissions were studied as a topic- carbon management accounting. In 20th century climate changes were not causing any harm to the earth however increased media coverage resulted in growing public interest in the topic. Regulatory and political pressures, such as the Kyoto protocol, emissions trading in the EU and carbon taxes like those in Australia (Pellegrino-Lodhia 2012), were accompanied by societal and market pressures to control climate change. Business houses and corporate sector were voluntarily taking initiatives and were taking interest in carbon accounting. The measurement and management of green house gas emissions were now on the agendas of the top management of leading companies and advanced business associations. Carbon management and accounting divisions have been set up in major consulting companies and professional accounting organizations are defining their approaches to carbon accounting.

- **Carbon Accounting became an International Issue**

Till 2010, policies and rules regarding carbon and green house gas emissions were limited to business houses and corporate sector. After that the dominant and most widely used framework and international standard for carbon accounting is the Greenhouse Gas (GHD) Protocol, developed by the world business council for Sustainable Development and the World Resources Institute (WBCSD-WRI 2004.2011). This protocol goes to great lengths to help organizations include their indirect carbon emissions. According to the GHG protocol, carbon emissions are usually grouped into different 'scopes'. The three scopes suggested by GHG Protocol are the following:

  - **Scope 1:** Direct GHG emissions, including sources that are owned or controlled by the company (e.g., emissions from own boilers, vehicles etc.)
  - **Scope 2:** Electricity indirect GHG emissions from the generation of purchased electricity consumed by the company (the protocol onsides solely electricity, but other purchased energy-heat or steam-should also be considered here.
  - **Scope 3:** Other indirect GHG emissions based on activities such as external transportation or the use of sold products. Scope 3 is an optional accounting category that allows for the inclusion of all other indirect emissions. The Scope 3 standard of the GHG Protocol (WBCSD-WRI 2011) provides detailed guidance for organizations on how to include their carbon impacts embedded alone the value chain. Beyond upstream emissions, Lenzen and Murray (2010) stress the importance of including downstream impacts in organizational carbon footprint accounts as well.

- **From Carbon accounting to climate change accounting**

The concept of 'climate change accounting' widens the term carbon accounting, as it includes not only emission costs but also climate change mitigation and adaptation costs. Climate adaptation impacts corporate accounts as climate change increase the energy consumption costs. Carbon accounting refers to a larger set of greenhouse gas groups, which are covered by the Kyoto Protocol: nitrous oxide, methane, hydro fluorocarbons, per fluorocarbons and sulfur hexafluoride. But this is misleading because in green house gas emissions non-carbon based gases are also released. So in

future, the terms GHG accounting or global warming accounting may be considered more appropriate. Focus has already been placed on GHG-accounting in a broader sense, but climate change accounting may also come into the spotlight in the future, as climate change becomes an essential element of organizational cost accounting.

Methods and Tools of Carbon Accounting

Matthews classified the variety scopes of carbon footprint into 3 tiers, including direct emissions, emissions from purchased energy, and supply chain emissions. There are three main pathways for assessing business-related carbon emissions.

- **Bottom-up Approach**

It is also named as material-flow-based or process-based life cycle assessment (LCA). In this approach, methods are available to estimate the embodied carbon dioxide in the consumption of goods, which provides a framework for analysis of the potential environmental impacts embodied throughout the lifetime of goods. This approach can deliver accurate emissions results; however, the complexity of some activities that entail several thousand processes can be extremely difficult to measure. A significant portion of the emissions can be disregarded due to lack of data.

- **Top-down Approach**

It is also named as input-output model developed in the 1930s to categorize upstream emission sources. Economic IO models were first developed by Leontief in 1936 to aid manufacturing planning. Compared to the process-based LCA, EIO-LCA greatly expands the system scope to include the entire economy of a region, which can assess the energy consumption and environmental impacts of goods from a nationwide perspective based on economic input-output metric. This model can be extended by physical units of environmental data and, thus, can appropriate for carbon accounting purposes as well, as many applications. It can also be used for covering carbon emissions along with long supply chains; however, system boundaries are not properly defined.

- **Hybrid Approach**

Hybrid approach is combination of first two approaches. It was designed to remove the shortcomings of first two approaches. It was combination of physical and monetary units and also combination of process-based and input-output based data. There are many applications of the hybrid approach to carbon accounting. Lenzen (2002) applied it to different Australian industry sector, while Ozawa-Media (2013) used it to study the carbon footprint of a British university by including carbon emissions. The bottom-up approach is more accurate, and the system boundaries are better defined, while top-down approach can deliver data even if there is lack of process-based data and at a lower cost. With the hybrid approach, the benefits of the two can be merged.

Steps Taken by Companies to Improve Social and Environmental Performance

Following steps should be taken by the companies to reduce carbon dioxide emissions and combat climate change.

- **Measuring carbon footprint**.

Identify the parts of business that needs to be tracked for the emissions. By assessing how much pollution an organization's actions generate, you can begin to see how minor policy changes can significantly reduce a company's overall carbon footprint. A carbon footprint can be measured by undertaking a greenhouse gas emissions assessment. By identifying the activities that release greenhouse gas emissions, it would be ideal to differentiate activities between core and auxiliary activities. Some sample auxiliary activities that cause GHG emissions could include utilities, waste disposal/recycling and travel.

- **Carbon Capping**

A government entity sets a "cap" on the emissions that can be produced in its jurisdiction, and companies are given carbon allowances. These allowances can either be used or traded to other companies. Emissions trading, sometimes known as cap-and –trade policie3s, puts a limit on carbon dioxide emissions.

- **Reducing Energy Use**

The building industry now has multiple energy efficiency certifications. The standards help set measurable and achievable goals, reducing the amount of energy used from 12 percent all the way to 100 percent of typical building energy use. Some of the most common certifications include LEED Green Building certification, Energy Star, Net Zero Energy Building Certification and High-Performance Building Program by ICLEI. The industry sector can ensure new buildings are energy efficient by earning any of these ratings.

- **Rewarding Green Commuters**

Employers can encourage employees to use public transportation, carpooling, biking telecommuting and other environmentally-friendly commutes can add up and have tremendous effects. Employers can also undertake a mission no vehicle day in a month. Employers can offer commuter benefits that address limited or expensive parking, reduce traffic congestion, improve employee recruiting and retention, and minimize the environmental impacts associated with drive-alone commuting.

- **Reducing Fossil Fuel Dependence**

Convert the data to calculate the greenhouse gas emissions associated with each activity. The collected data needs to be converted into emission factors. Data x Emission Factor equals to Greenhouse gas emissions. Resources that can be used to this is DECC/Defra's GHG conversion factors.

- **Set Emission Reduction Targets**

Set emission reduction targets and continue to monitor emissions. The activities that are emitting maximum GHG should be identified and the ways that can mitigate these emissions should also be identified. Such steps cannot only be environmentally friendly but can also help SME to save money and be more competitive.

- **Report emissions**

If the above steps are performed and substantial savings and reductions are noted, reporting emissions is a good opportunity to gain transparency and loyalty from customers. Carbon reporting plays an important role in transmitting the results of carbon accounting to stakeholders with very different backgrounds and interests. One major initiative for providing information is the Carbon Disclosure Project (CDP). CDP acts on behalf of a coalition investors and provides and evaluation tool for institutional investors and other stakeholders.

Benefits of Incorporating Carbon Accounting

Carbon Accounting is very useful. There are many benefits of incorporating carbon accounting in business enterprises.

- **Economic Benefits**

Carbon Accounting can help business enterprises to reduce energy and reduce use of resources. This will lower the cost of the products and help them to set a reasonable price. Low prices will attract more and more customers and ultimately increase their profit margins.

- **Social Benefits**

The society as a whole will be benefitted if business enterprise is using carbon accounting. It can attract more and more workers and there will be less labour turnover. It can also develop trust and loyalty with customers. This is result in the development of business enterprises.

- **Environmental Benefits**

Business Enterprises will be more environment conscious by accounting their carbon emissions and taking active steps of mitigate these emissions.

Conclusion

Carbon Accounting has gained importance in last few decades. In this paper the temporal development of carbon accounting has been done by studying in different stages and characterized by different approaches. Although much has been achieved in carbon accounting during this period, there is still much to do in future. There should be development of a structural approach to climate change accounting. There should be mandatory reporting by the companies regarding carbon emissions. Another challenge is related to the resource need of companies to account for their carbon emissions comprehensively. In last, we can say carbon accounting for companies is not only about measuring, monitoring, benchmarking and reporting an organization's Greenhouse Gas Emissions in a defined reporting period but also about taking accountability and mitigating one's impact on the planet. Increasingly, information and tools are available to support companies in measuring and managing their carbon footprint.

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