Impact of Carbon Financing on Climate Change in Manufacturing Industries in Nigeria

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Abstract
Global warming and climate change are inescapable consequences of the expansion of industries everywhere in the world. Both conditions have a very real effect on the environment. In recent years, natural disasters such as landslides and floods have been fairly evenly spread over the world. These catastrophes are indirectly brought on by climate change, which results in global warming. Companies benefit from a competitive advantage from carbon financing. Today, organizations and institutions use carbon financing to inform their policy decisions on environmental preservation and climate change. The study showed the value of carbon financing in industrial companies as a reflection of climate change and how it connects to risk management. The research also demonstrates how ready industries are to manage carbon financing to lessen the effects of climate change on the environment and increase investor awareness.

Keywords: *Climate change, carbon financing, global warming, risk management, manufacturing industries, accounting.*

Introduction

Industries and the manifestation of climate change's effect has been a subject of interest due to the sensitive nature of climate change, the world over. It has therefore become clear that businesses have a responsibility to protect the environment, decrease pollution, and take climate change into account. Global warming is caused by a shift in climate on a global scale. Technology advancement and industry growth are unavoidable consequences of climate change. Global warming's adverse effects could be fatal for humanity.

The average temperature of the earth's surface is rising due to a rise in the atmospheric concentration of greenhouse gases, which is known as global warming. Climate change comes after that. Human activities, particularly those associated with the use of fossil fuels (petroleum

and coal) as well as other activities connected to forests, agriculture, and animals, are to blame for global warming and climate change. The natural composition of the atmosphere is altered by human activity, either directly or indirectly, leading to an increase in greenhouse gases on a worldwide scale. The average temperature of the atmosphere, the earth, and the oceans are rising due to global warming. Climate change, on the other hand, is a considerable alteration in the climate, such as changes in air temperature or rainfall over a 30 year or longer period. The projection of climate change is that global warming will continue.

The threat of global climate change, which is growing every day, is being addressed by nations today since it threatens not just economic development but also human health and the environment (XU, Y.S. 2019). There is growing empirical evidence that carbon emissions, which have a huge impact on how people live their lives, are the primary driver of climate change. According to Howard-Grenville et al. (2014), the process of climate change has been accelerated by expanding organizations and industrialized production. Because of this, reducing carbon emissions has been a top concern for industries. . Therefore, all firms have made reducing carbon emissions a top goal. According to numerous research, firms may or may not disclose all of their carbon statistics. Ascui (2014) examined a number of prior studies in the domain of carbon financing and came to the conclusion that more research was necessary. He also understood how carbon financing had been addressed in the social and environmental accounting.

According to Louis et al. (2010), carbon financing is the process of determining the amount of carbon generated by industrial processes, setting reduction targets, creating systems and programs to do so, and reporting on the program's progress. Companies can use carbon financing to determine their amount of carbon emissions using measurement findings. The company management can then develop strategies to reduce carbon emissions and communicate those strategies to the firm's stakeholders. Global issues have included climate change. It is a natural result of the world's rapid industrialization and the quick expansion of technology. The adverse effects of global warming have turned into a catastrophe for humanity. Flood catastrophes, landslides, and other natural disasters were frequent due to climate change brought on by global warming. All tactics and methods that reduce climate change must be used. This study's significance is to show how carbon financing relates to climate risk management as well as showing the impact as a reflection of climate change in manufacturing industries. The broad objective of this study is to present the impact of carbon financing as a reflection to climate change resulting from industrial activities. The specific objectives are as follows: To present the impact of carbon financing as a reflection to climate change in manufacturing industries. To present the impacts of risk assessment of climate change in organizations. To analyze the cost and benefits of carbon financing as a reflection to climate change.

Conceptual framework

Beginning in the 1960s and 1970s, the necessity to take the environment into consideration while making accounting choices became apparent, giving rise to environmental accounting. Reference advocated for the inclusion of environmental and social considerations in accounting literature and practice in the late 1980s and early 1990s. These considerations included reporting on waste and energy use, compliance and ethical audits, social and environmental reporting, impact assessments, and accounting for environmental assets and liabilities. Elkington popularized the term "Tripple Bottom-Line (TBL)" in the 1990s, advocating that businesses should report on their social and environmental performance in addition to their financial transactions. Internal

carbon and greenhouse gas accounting later developed as a result of carbon and greenhouse gas emission legislation, and it is now used to assess a company's obligations with respect to the accounting of tradable rights resulting from emissions taxes and trading schemes to report on greenhouse gas (GHG) emissions. Haque and Islam claim that a variety of stakeholders, including governmental agencies, institutional investors, environmental non-profits, and media accounting experts, are driving climate change responsibility and disclosure. The primary goal of reporting to government agencies is to fulfill requirements related to the law on emissions rights. The major goal of reporting on corporate obligations and commitments is to enhance the organization's reputation and image among all sorts of stakeholders. According to Solomon et al., risk and risk management concerns are the key motivators for stakeholder pressures on climate change reporting. In other words, institutional investors' belief that climate change is a relevant risk, the most significant sustainability issue, and a relevant aspect for an organization's clients who need to manage climate change-related risk in their investment portfolios has led to the need for climate change disclosure.

Theoretical Framework

During an international workshop hosted by the United Nations Environmental Program (UNEP) and the World Bank in 1993, the UN published the Handbook of National Accounting and the System for Integrated Environmental and Economic Accounting (SEEA). The SEEA publications aim to offer knowledge about the environment and how it affects the economy within a framework.

The SEEA was updated in 2003, and the framework was then utilized as a manual for informing the public about institutional sustainability. More than 60 countries have contributed to the writing of this framework, including businesses, government universities, labor unions, and professional organizations. Stefan Schaltegger and Delphine Gibassier (2015) show that it is possible to combine two carbon management accounting systems that concentrate on the organization and the products into a combined carbon management accounting system.

This could have an effect on how effective carbon management accounting is for measuring performance and communicating with the outside world in businesses. The conclusion of numerous international agreements and conventions to combat climate change has contributed to the introduction of carbon financing to international markets. They include the following:

The 2005 Kyoto Protocol: A worldwide climate change amendment known as the Kyoto accord was signed in Japan by 175 nations outside of the European Union (CPA Australia, 2008; Jecttoon, 2010). Countries that have ratified it are dedicated to lowering greenhouse gas emissions, including carbon dioxide. This convention was signed on December 11, 1997, approved by 181 governments, and came into effect on February 16, 2005. The "Kyoto Protocol to the United Nations Framework Convention on Climate Change (UNFCCC)" is the term given to this agreement in official documents.2012 Al Doha Conference: in November 2012, as the first phase of the Kyoto Protocol was coming to an end, the United Nations sought to bring together industrialized nations to discuss the second phase of the agreement, which would focus on reducing carbon emissions and protecting the environment. It was decided to launch the second phase of the Kyoto Protocol, which will run from 2013 to December 31, 2020 (UNFCC, 2015). The Sustainable Development Mechanism (CDM), Joint Implementation (JI), and the Kyoto Carbon Trading System are the three stability frameworks that the accord established. Paris Accord (2015):Negotiation to develop steps to modify the Kyoto Protocol after 2020

contributed to the Paris Agreement being reached and implemented in December, 2015, (Bodansky, 2016). In 2016, 175 World heads of state signed the UN climate change conference in New York under the name of Paris Convention Climate Change. At the conference, it was stressed for the second time that developed countries should commit to mobilizing 100 billion dollars annually in favour of climate issues until 2020. The Paris Agreement aims to contribute to addressing and minimizing climate change caused by humane and human-managed companies and factories as well as treating the resulting pollutants. From the above, it is clear how much global attention is being paid to climate issues and the extent of international encouragement to mitigate environmental pollution.

Empirical Review

The Intergovernmental Panel on Climate Change (IPCC) reports, which compile the most recent body of knowledge on climate change, demonstrate that its effects, such as rising temperatures, shifting sea levels, and altering ice and snow cover, are now evident (Casti, 1997). The frequency, intensity, spatial extent, length, and timing of severe weather events, such as extremely hot days or heat waves, are likely to change dramatically due to higher climatic variability in the future (IPCC, 2012). It is reasonable to assume that, rather than gradual climate change, these trend shifts in extreme weather occurrences are specifically tied to the vulnerabilities of business and industry (Wilbanks et al., 2007). Any changes to the frequency of weather extremes have the potential to have large negative effects (Hertin et al., 2003; Keef and Roush, 2005; Wilbanks et al., 2007), frequently with significant knock-on effects such damages or disruptions to key infrastructure (Wilbanks et al., 2017). According to insurance statistics, losses from weather extremes have increased over the past few decades (Munich Re, 2012). These losses can be attributed to a number of underlying factors, such as increased exposure (caused by population growth and industrial expansion into higher-risk areas like cities and coastal zones) and negative climate impacts (caused by climate change and weather extremes) (Munich Re, 2009). As a result, impacts vary depending on the specific industry, as well as in those industries and places that are climate-sensitive or dependent on a stable environment. Unfortunately, despite some efforts, global development has been sluggish thus far, and greenhouse gas emissions are rising everywhere. Given that successfully mitigating climate change today seems increasingly unlikely. Researchers and decision-makers are focusing more on the creation of methods that will allow society to adapt in addition to mitigating measures. These tactics, which are sometimes referred to as adaptation (Dow et al., 2013), are intended to limit exposure to and vulnerability to climate change that has already occurred or is anticipated. Several types of adaptation solutions are possible, such as structural or physical alterations, ecosystem-based actions, and financial tools like insurance (Noble et al., 2014). Despite the importance of climate change adaptation, many businesses have only just begun to address the issue, frequently with a focus on reducing their greenhouse gas emissions in response to new regulatory obligations. Companies will need the risk assessment function (evaluating vulnerability and adaptive capability), valuation function (valuing adaptation costs and benefits), and disclosure function as the effects of climate change become more apparent (disclosure of risk associated with climate change impacts). It is of the opinion that accounting can provide a framework for proactively preparing organizations through the design of accounting procedures and has a role to play in supporting climate change adaptation by carrying out these functions. In the sections that follow, the study discusses these elements.

Both managerial accounting and financial accounting have a role to play as a risk assessment function to determine climate risk and how they affect value-creating activities (i.e. to determine the vulnerability of assets and operations to climate change). Investors will increasingly require information about climate change related Investment risk. While existing financial accounting standards address the disclosure of risk (e.g. IFRS 9 Financial Instruments and IFRS 13 Fair Value Measurement), areas such as vulnerability and adaptive capacity are not usually covered, and there is no robust consolidated approach to financial risk assessment of climate change (West and Brereton, 2013). Decision makers, on the other hand, will require information on climate impacts as they affect the organization and the adaptive capacity inherent in value-creating activities to understand how vulnerability can be reduced. To provide this information, an understanding of how climate change impacts an organization's value-creating activities is an important starting point for risk assessment.

Climate risks not only result from gradual change in climate, but in particular from trend changes in weather extremes- those types of impacts that exceed certain thresholds or climate records. In order to assess their organization's vulnerability to change impacts as they affect the location(s) in which the organization is operating, corporate decision-makers need data in regards to future climate change impacts changes in policy, economy, society and technology that exacerbate or mitigate climate change impacts and assessment of how vulnerable value-creating activities are as a result. Additional vulnerabilities can result from flow-on effects from climate change impacts that affect an organization's supplier, buyer or resource based. Information about vulnerabilities can be derived from hazard maps that overlay the organization's location with future climate data (Linnenlueck and Griffiths, 2014; Noson, 2015) and can be used as a basic input for future risk assessments to understand which assets and activities might be affected. As part of a vulnerability assessment, organizations can also use scenario planning exercises which evaluate vulnerabilities of assets and operations to climate change under different climate change scenarios to achieve a quantification of the likelihood of adverse climate impacts and resulting consequences for the organization.

While adaptive capacity is regarded as important to adapt the organization to future climate impacts and risks, many investors currently view adaptive capacity as idle resources "in excess of minimum necessary to produce a given level of organizational output" (Nohria and Gulati, 1996:1246). Examples for adaptive resources that can aid with climate change adaption are changes to the organizational infrastructure (such as changes to buildings) to be able to adjust to climate change impacts above the level that would be deemed necessary for an organization to continue operating within its current business environment (West and Brereton, 2013). For example, BHP Billiton reports that the identification and assessment of increasing storm intensity and storm surge levels has resulted in raising the height of the trestle at their coal port facility in Australia (BHP Billiton, 2014).

To date, the creation of adaptive capacity to respond to climate change impacts has not yet been given much consideration in accounting framework or standards, neither in external financial reporting nor in internal planning and decisions. Companies such as BHP Billiton are in the minority. On the contrary, the creation of adaptive capacity may incur detrimental accounting treatment if it occurs in the absence of tax relief under certain accounting principles and standards (West and Brereton, 2013). In addition, investment in adaptive capacity may be regarded by investors as "unnecessary" investments in the short run and perceived as disadvantageous to the organization's overall competitive position. These issues are likely to

change as climate change adaption standard development progress, but are still important investment consideration in the short term.

Valuation function: Given that the impacts of climate change are not fully visible and foreseeable yet, many existing company activities may appear misleadingly profitable. Appropriate provisions for potential future vulnerability and resulting losses due to climate impacts are often not fully included as costs in investment and infrastructure decisions, and are also incorporated and monitored within current accounting systems. For organizations, the question arises how to derive appropriate discount rates to a portfolio of climate-impacted assets. Some assets may change in vulnerability over time – for example, because of changes in their life expectancy and changes in climate impacts. Using a climate change-free risk assessment is clearly much simpler from an operational view point, but does also not reflect future impacts and vulnerabilities.

A common assumption in the literature on the adaptation of socio-economic systems to climate change is that early investment in climate change adaptation will likely be more cost-effective and bring greater incentives in the long run, compared to a "wait and see" approach. However, in contrast to climate change mitigation (i.e. efforts targeted at the reduction of greenhouse gas emissions), there are no established frameworks for evaluating adaptation success and effectiveness of different adaptation options overtime. While the costs and benefits of undertaking mitigation efforts can be established through mechanisms such as greenhouse gas emissions accounting, similar approaches do not yet exist for adaptation. The difficulty here is that adaptation strategies, as compared to mitigation strategies, cannot as easily be linked to financial performance benefits for organizations...

Mitigation strategies such as emission reductions efforts that encourage resource (e.g. energy) savings directly correspond to decrease expenditure for resource inputs, while adaptation strategies are intended to deliver outcomes in the long run. These aspects also make it easier for companies to evaluate against others within the same industry in terms of carbon footprint and emission reduction objectives and achievements.

Disclosure function: Institutional investors and other interest group are pressing organizations for greater disclosure about climate impacts, in particular because of the potential material negative financial effects and low disclosure rates (Stanny and Ely, 2008). The Carbon Disclosure Project (CDP) already request information on greenhouse gas emissions, energy usage, as well as risks and opportunities associated with climate change from thousands of the world's largest companies and 767 institutional investors with US $92 million in assets. The voluntarily disclosed information is made available for integration in organizational, investment and policy making. While the CDP has mostly focused on greenhouse gas emissions in the past, the scope is increasingly extending to cover information on climate exchange impacts and risks.

In addition to the CDP, the Climate Disclosure Standards Board (CDSB) is also committed to the integration of climate change-related information into mainstream company reporting (Climate Disclosure Standards Board, 2015). It developed a Climate Change Reporting Framework which focuses on the disclosure of non-financial information. The framework proposed that companies present this information in their reports and in alignment with the requirements of Integrated Reporting. (Table 1).

Integrated Reporting is a process that results in a periodic integrated report about value creation over time. It includes information on a company's strategy, governance performance and prospects, in the context of its external environment, which lead to the creation of value in the

short, medium and long term (Integrated Reporting, 2015). The International Integrated Reporting Council (IIRC) and the IASB entered into a memorandum of understanding to promote the harmonization and clarity of corporate reporting frameworks, standards and requirements to promote coherence, consistency and comparability in corporate reporting (IASB, 2014). While existing financial accounting standards already address disclosure of risk, such as a liquidity interest rate and exchange rate risks (e.g. IFRS 6 Exploration and Evaluation of Mineral Resources, IFRS 7 Financial Instruments: Disclosure, IFRS 12 Disclosure of Interest in other Entities and IFRS 13 Fair Value Measurement), the IASB recently issued Agenda Paper 7. Non – IFRS Information, which includes the issues of incorporating climate change information into annual reports.

Table 1:
Emerging Disclosure Demands for Risks Associated with Climate Impacts

Body	Details
Carbon Disclosure Project (CDP)	The CDP request on behalf of institutional investor) information from thousands of the world's largest companies on their greenhouse gas emissions, energy use and climate change risks and opportunities. Disclosure takes place via the CDP questionnaire and is voluntary. Results are collated and presented on the CDP website (https://www.cdp.net/).
Climate Disclosure Standards Board (CDSB)	The CDSB is a consortium of global business and environmental non-governmental organization (NGOs). The CDSB Climate Change Reporting Framework is a voluntary reporting framework designed for companies to disclose climate change-related risks and opportunities and implications for shareholder value in their financial reports. The reporting framework is available via the CDSB website (http://cdsb.net/).
International Accounting Standards Board (IASB) International Financial Reporting Standards (IFRS).	The IASB is the independent standard-setting body of the IFRS Foundation. IFRS standards already address the disclosure of a wide variety of risks. A more explicit integration of climate change risks in disclosure standards is likely to occur in the future as climate becomes more visible.

The Carbon Tracker Initiative, in conjunction with former Securities and Exchange Commission Standards Board (FASB) on 10 December 2013, arguing that organizations with significant fossil fuel reserves should be required to submit a financial disclosure of carbon content. While this submission primarily reflects a concern about changes in future demand and prices due to legislative and/or technological changes, it nonetheless demonstrates an increasing awareness around the significant implications of climate change.

Furthermore, as climate impacts become more noticeable, the assets allocation of financial institutions as well as investment and superannuation funds is likely to change, with implications for risk accounting in investment portfolios.

The Readiness of Industries Managing Carbon financing

In conjunction with accounting, carbon cost management is a new era in the idea of economics transactions based on ecology, which we call carbon-accounting. Some research on manufacturing industries shows that, the quality of awareness of the environment at the company is low hence the need to develop carbon financing standard. Carbon management reporting can be used as a measure of environmental performance. In addition, Ja'far and Kartikasari (2009), state that industry actors require accounting standards for carbon. With carbon-accounting, companies can know the level of carbon emissions it produces from the measurement results, then the company's management can establish strategies to reduce carbon emissions and report it to the company's stakeholders.Based on the above results, it can be said that carbon-accounting becomes an inevitable requirement. The increase in waste and carbon emissions generated by manufacturing industries are the real cause of global warming which in turn causes climate change. To provide understanding of the importance of carbon financing, it is necessary to socialize the company's manager in form of seminars, or workshops.

Conclusion and Recommendations

Based on the findings, the study suggests that: Manufacturing industries should set up frameworks for assessing adaptation successes and effectiveness of various adaptation options over time, as early investment in climate change adaptation is likely to be more cost-effective and bring greater incentives over time than a "wait and see" approach. While such a strategy has not yet been developed for adaptation, greenhouse gas emission processes can be used to determine the costs and advantages of performing mitigation actions. Businesses should implement mitigation and adaptation strategies in order to reduce their carbon footprints and emissions, as doing so will make it simpler for them to assess their progress and compare themselves to other businesses in the same sector. In order to quantify the likelihood of unfavorable climate impacts and the ensuing consequences for the industry, organizations can use scenario planning exercises as part of a vulnerability assessment to assess the vulnerability of assets and operations to climate change under various climate change scenarios. Risk assessment must begin with the provision of information and a knowledge of how climate change affects an organization's value-creating operations.

As a result, managerial and financial accounting both have a part to play in providing investors with information about the risks associated with climate change-related investments. Unquestionably, climate change will have a significant future impact on standards and regulations, as well as accounting functions. By implementing the aforementioned methodologies as advised by businesses and industries, organizations will develop a best practice approach for understanding how climate impacts can be accounted for and delivering information to decision-makers.

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