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Exploring the Potential Benefits of Carbon Risk Assessment and Reporting for the Development of Business Strategy in the Nigerian Oil and Gas Industry: A Case Study of Oando Plc

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Abstract:

Climate change has gradually become a global problem of which Nigeria is not an exception particularly due to the large quantities of fossil fuel nature has deposited in the country. Extraction and production of these natural resources for commercial and economic purposes have resulted in carbon emissions with its associated adverse consequences on the health of ecosystems and biodiversity in Nigeria, especially in the Niger-Delta region. There is now environmental degradation because the level of environmental regulations and compliance is abysmally low. Hence, motivation to address climate change and reporting is hoped to change organizational behaviour such that organizations will put in place internal greenhouse gases' emissions measurement, reporting and monitoring systems that will cater for their internal information needs and meet demands of various stakeholders who require access to this information, including shareholders, regulators, commercial partners, investors, financial institutions and consumers. This research is exploratory; designed to seek and explore what companies in Nigerian oil and gas industry stand to benefit in terms of business development if they assess their carbon risks and report adequately, and to assess the challenges associated with this, and roles of professionals, majorly accountants, in carbon risk assessment and reporting. This research uses Oando Plc as a case study to develop a conceptual framework for oil and gas companies in Nigerian oil and gas industry using theories such as PESTEL, Resource Based View (RBV) and Dynamic Capabilities to develop and dig deeper into the study by means of abductive approach. The study intends to benchmark benefits currently being gained by advance countries such as the United Kingdom and Canada since they have commenced carbon disclosure either voluntarily or mandatorily in their business report and how replicating this will improve the development of oil and gas business strategy such as Oando Plc. Oando Plc discloses certain emission related information in its sustainability reports, the effects of the disclosures could be better if backed by regulation. The research established that carbon risk assessment and reporting would help firms develop business strategy and clear direction on action plan for goals attainment. It is further found that carbon risk assessment and reporting help investors and businesses with all-inclusive information needed for investment decisions and risk management. Furthermore, it is found that accountants have the ability to play an important role as carbon managers alongside other industry professionals like geoscientist and production engineers with a view to actualizing global emissions reduction targets as Nigeria is the highest contributor to the African greenhouse gases' total emissions and a member of Paris agreement. The study revealed that accountants in Nigeria are ready to undergo further training in order to possess all requisite expertise required for carbon accounting in line with available international best practices. Accountants and other professionals at Oando Plc are ready to embrace mandatory carbon assessment and reporting as soon as the regulators in the Nigeria oil and gas industry commence full implementation.

Keywords: *Climate change, fossil fuels, environmental regulations, carbon emission, greenhouse gas, global warming*

1. Introduction

Climate change and its mitigation have now, more than ever, been the concern of many countries, organizations and businesses such as the United Nations (UN), the World Economic Forum (WEF), International Energy Agency (IEA) and the European Union (EU) (Australian Academy of Science, 2015; WEF, 2020). Climate change touches everything and everybody so it must be tackled urgently and clear-headedly (Young, 2010). The world average temperature, since mid-19th century to the end of 20th century, moved from dark blue cooler than average years to red warmer than average years (figure 1) and still increasing in the 21st century (figure 2).

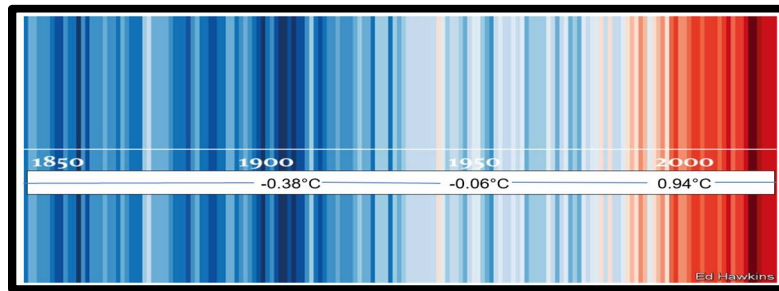


Figure 1: World Average Temperature to the End of 20th Century (Hawkins, 2019)

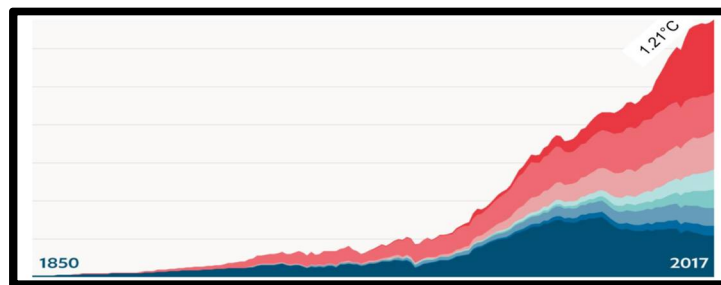


Figure 2: World Average Temperature in the 21st Century (Economist, 2019-F)

The world average temperature has increased by over 1 degree Celsius ($^{\circ}\text{C}$) since pre-industrial times. Between 1910 and 1919 world average temperature is -0.38°C and between 2010 and 2019 the average temperature has increased to 1.21°C (Statista, 2020-a, b). This change stems from the activities and processes of the world economy through the 'combustion of billions of tons of fossil fuels' resulting in atmospheric greenhouse gases (GHGs), including carbon-dioxide (CO_2) (Hawkins, 2019; Statista, 2020). According to Statista, 2019, CO_2 emissions from global fossil fuel combustion were 285.79 million metric tons (MT) in 1858. In 2018, CO_2 emission was at 36.57 billion, a 1,180% increase.

We have already seen extreme weather events like hurricanes which have impacted human and animal life and devastated ecosystems. Delay means humankind could suffer more harm (Field *et al.*, 2012; Ortega and Taspinar, 2016). Hence, responses and measures to check climate change should be immediate and wide-ranging- including efforts of government, industrial nations, international bodies, market economies, industries, and businesses. Since climate responds to total amount of GHGs in the atmosphere, every single country should contribute to its mitigation (Jeswani *et al.*, 2008). The best solution cannot be total eradication of capitalism or exploration, production and refinery activities but the reduction of emission through firm climate vulnerabilities assessment. Reporting, and associated transparency of action and impact would be a good start (Hawkins, 2019).

Figure 3 shows how fast and how far fossil fuels use has grown, as well as major contributors by fuel and by countries. If businesses and countries have benefited from emitting these GHGs, it then followed that they should mitigate against it (Economist, 2019-f).

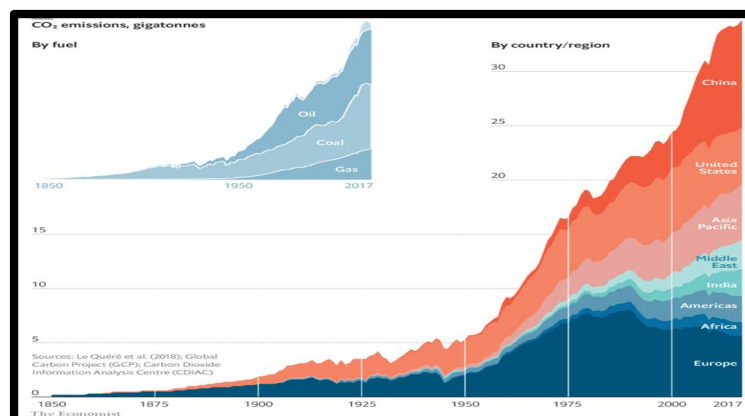


Figure 3: Fossil Fuels Major Contributors by Fuel and Region (Economist, 2019-F)

USAID (2019, p.2) stated that 'Nigeria's GHG emissions increased 25% between 1990 and 2014, averaging 1% annually, while GDP grew 245%, averaging 5.5% annually, although GDP grew faster than GHG emissions, in 2014, Nigeria's emissions relative to GDP were 1.6 times the world average, indicating potential for improvement'. According to the Economist (2019-f), 'integrated assessment models' suggest that getting to zero emission by 2050 means halving current emissions by 2030' but no nation is on course to do that. However, China, the highest emitter of CO_2 (Rapier, 2019) and at close to 10 gigatons of total emissions (figure 4), has pledged to cut its net CO_2 emissions to zero by 2060

(Economist, 2020); it is expected that achieving this will not be easy but making commitments and taking responsibilities are important.

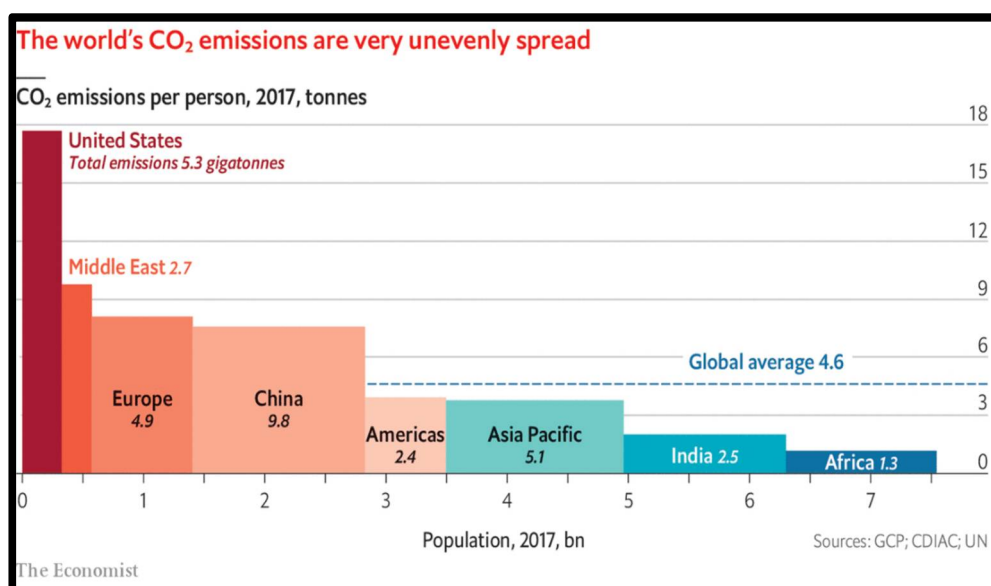


Figure 4: China Is the Highest CO₂ Emitter (Economist, 2019-F)

Conference of the Parties (COP) to the United Nations Framework Convention on Climate Change (UNFCCC) holds yearly by nearly 200 countries on how to mitigate climate change. In 2015, the conference yielded the Paris agreement signed by the parties, including Nigeria, to keep the earth's average temperature rise this century to a maximum of 1.5°C above pre-industrial levels (UNFCCC, 2020). Yet, human factors have continued to accelerate global warming and the world average temperature is already at 1°C (figure 5). Therefore, efforts need to be accelerated to meet the Paris agreement targets (Raingold, 2010; Flowers, 2017).

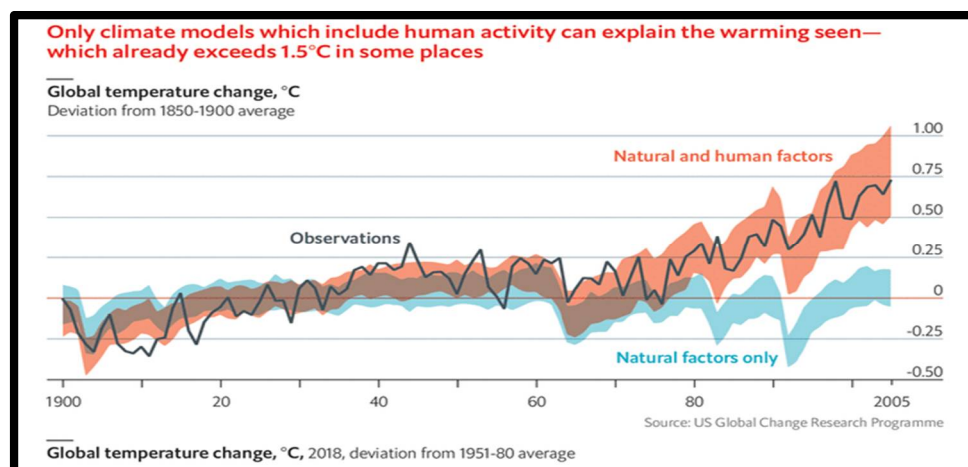


Figure 5: World Average Temperature at 1°C (Economist, 2019-F)

As replacing everything that burns oil, gas or coal might not be feasible for now. However, what gets reported gets measured and monitored. Therefore, assessing risk and reporting on carbon emission will focus management attention on waste reduction and minimize use of resources (Hayner and Weisbach, 2016).

1.1. Research Aim and Objectives

The aim of this research is to explore the potential benefits of carbon risk assessment and reporting for the development of business strategy in the Nigerian oil and gas industry using Oando Plc (Oando) as a case study.

The objectives are:

- To examine carbon risk assessment and reporting good practice generally in the oil and gas industry.
- To critically assess the current level of carbon risk assessment and reporting in the Nigerian oil and gas industry.
- To critically evaluate the potential benefits of carbon risk assessment and reporting for the development of business strategy of Oando and the effects on its business performance.

- To critically assess the role of accountants in promoting carbon risk assessment and reporting in the Nigerian oil and gas industry.

1.2. Nature of the Study

The research methodology undertaken in this dissertation is a qualitative study using exploratory case study design based on Oando. Oando is a Nigerian indigenous and one of Africa's leading energy solutions providers. It has a primary listing on the Nigerian Stock Exchange market (NSE) and a secondary listing on the Johannesburg Stock Exchange market (JSE) (NSE, 2020; Oando, 2020-a). It has producing, development and exploration assets in Nigeria and Sao Tome and Principe (MarketLine, 2019). It employs highly skilled workforce comprising of accountants, scientists and engineers (Oando, 2020-b). Therefore, Oando provides a standard case of an oil and gas exploration and production company in Nigeria presenting a relevant explanatory scenario to the research aim (Saunders et al., 2019). This study will use an abductive approach based on literature review, primary and secondary data to answer the research question. Primary data is gathered through questionnaire survey and semi-structured interviews of Oando employees whose experiences are relevant to this study. Secondary data has been gathered from Oando financial statements and stock market performance over a five-year period as well as from some academic journals.

1.3. Organization of the Dissertation

There are six chapters for this work altogether. The second chapter provides a review of the literature on what carbon risk assessment and reporting is, the theoretical frameworks and empirical reviews as well as the benefits, effects and challenges of carbon risk assessment and reporting on business strategy development and performance. The chapter ends with a critical evaluation of the roles of accountants in carbon reporting and summary. The third chapter presents the research methodology used in this study. Then, findings chapter shows the analysis of the primary and secondary data findings. The fifth chapter is a discussion that pulls together the existing literature and the findings. Lastly, the concluding chapter summarizes the research findings and provides recommendations.

2. Literature Review

2.1. Introduction

This section reviews existing concepts and frameworks in both local (Nigerian) and international literatures on carbon risk assessment and reporting to guide our findings and enhance the achievement of the research objectives. Firstly, an analysis of the concepts of carbon emission, risk assessment and reporting are presented. This is followed by an analysis of theoretical frameworks. Next is the examination of the current level of carbon risk assessment and reporting in the Nigerian oil and gas industry. After that, the effects, benefits as well as challenges of carbon risk assessment and reporting on business development and strategy is considered. Then, there is a critical evaluation of the roles of accountants in promoting carbon risk assessment and reporting and finally, there is a summary of the reviewed literature.

2.2. Carbon Emissions

Carbon emission is the release of carbon into the atmosphere and the main source of GHGs. Haigh and Shapiro, (2012) demonstrated how carbon emission reporting could be used for investment improvement. Firms' equity price falls when negative corporate social responsibility (CSR) news is reported, of which environmental news is an important subset, while stock price increases for environmentally responsible firms. It reported that carbon reporting provides opportunity for capital structure and contribute to the firm value as being environmental sensitive (Kolk *et al.*, 2008). That means, polluting firms with higher carbon emissions, have lower stock prices and thus higher cost of capital due to ethical investment (De Aguiar and Fearfull, 2010).

The empirical work of Wang and Li, (2018) on carbon emissions performances of oil and gas producers in the United States, examined the carbon emissions performances of independent oil and natural gas producers in the United States between 2011–2015 using secondary data collected manually from their annual reports on drilling, oil and gas production data, and extract carbon emissions data from the EPA's Greenhouse Gas Reporting Program (GHGRP). The study found that the performance of the firms improved from 2012 to 2015 under natural disposability, while it did not under managerial disposability. Based on the findings of the study, it recommends that oil and gas producers 'invest more in emission mitigation measures, such as energy conservation, leak detection and repair, flaring reduction, and even renewable energy' for sustainable development (p. 110).

2.2.1. Carbon Emissions in Nigeria

Mesagan (2015) examined the relationship between carbon emission and economic growth in Nigeria from 1970 to 2013. The results show that economic growth positively impacts carbon emissions in the first period while there are negative impacts in the lagged period. It also revealed that in Nigeria, trade openness and capital investment positively impact carbon emission. They recommended that expedient means to promote carbon mitigation using regulatory frameworks with environmentally friendly innovations be adopted to enhance economic growth in Nigeria.

Ogwu *et al.*, (2015) assessed the environmental risks associated with the exploration of oil and gas in Niger-Delta region of Nigeria. The study established that the activities of the oil companies in the region have tremendous adverse

impacts on the health of ecosystems and biodiversity of the region. The environment is prone to degradation due to lack of appropriate environmental regulation and compliance. These findings necessitated recommendations for the protection of the Niger-Delta environment, loss of crude oil, lives, and livelihoods prevention in the region.

Another study by Akanonu (2017) examined carbon pricing in Nigeria's oil and gas sector. The design of an effective carbon pricing system that discourages air pollution but encourages the embracement of climate-friendly technologies by the private sector in Nigeria's oil and gas sector is recommended. The study observed that finance and public awareness might be a limitation. It, however, suggested that regional and international cooperation should be solicited to mitigate these drawbacks.

The studies above show the need to reduce environmental degradation and increase transparency among Nigerian oil companies to benchmark against international oil companies in terms of climate change mitigation and reporting. The implication is that positive economic growth is linked to the impact of carbon emission and regulations adopted by the successive government in tackling environmental regulations and climate change compliance. The private sector collaboration should be maximized to sustain the volume of investment required to drive carbon policies in Nigeria.

2.3. Carbon Risk Assessment and Reporting

2.3.1. What Is Carbon Risk Assessment?

Carbon risk assessment is the evaluation of all the risks associated with GHG emissions and could be physical and non-physical climate change-related factors affecting people, animals and plant, eco-systems, assets and companies (Görge *et al.*, 2019).

The process of risk assessment is a systematic one, which starts with risk identification, where the company determines what risks affect its business, and then evaluating the risk exposure based on the probability of occurrence and its potential impacts and lastly, risk control (Chapple *et al.*, 2013). At this stage, the company takes action to respond to the various categories of risks identified (Tang and Demeritts, 2017).

Carbon risk assessment brings to the fore some other risks companies are exposed to because of their generation of carbon as identified below:

- **Regulatory risk:** refers to risks associated with policy and regulation that firm would be exposed to while reporting carbon emission. These regulatory factors involve changes in international, national, and local government policies that could impact the operational and financial viability of carbon assets, for instance, carbon-pricing systems, carbon taxes or direct GHG emissions limit. The identification of regulatory risk could enhance efficient operation, support the development of low-carbon technologies and the overall demand for energy (Owen *et al.*, 2001; WRI and UNEP-FI Portfolio Carbon Initiative, 2012).
- **Physical risk:** refers to risks that are associated with physical impacts of climate change. For example, physical damage to people, environment and capital expenditures necessary in response to these damages caused by severe storms, floods, volcano, drought and rise in sea level (McGrath, 2019; Linnenluecke and Griffiths, 2010).
- **Financial risk:** refers to risks that result from market and liquidity risks. Market risk is risk arising from change in market and economic factors that affect company's income and its value such as a company's market share, foreign exchange rates, interest rates and equity prices (Tang and Demeritts, 2017). This could be due to shift in consumers' preference because of company's lack of carbon capture and reporting among others which may deny its access to capital (Grace *et al.*, 2010). According to Jung, *et al.* (2018), lenders and investors incorporate a firm's exposure to carbon-related risks into investment decisions through the cost of financing and ability to mitigate carbon related penalty.

Liquidity risk is the risk that a company will encounter difficulties in meeting the financial obligations that are settled by delivering cash or other financial assets. A company needs to ensure that it will always have sufficient liquidity to meet its liabilities when due without incurring unacceptable losses or risking damage to the company's reputation (Stechemesser and Guenther, 2012).

A company goes bankrupt when it could not manage its finances nor raise fresh capital.

- **Reputational risk:** refers to risks that a company's stakeholders might negatively change their perception of the company. A company can endanger its reputation and loss favor with key stakeholders through its lackadaisical attitude to climate change (Berthelot *et al.*, 2003; Munasinghe, 2010; Matisoff *et al.*, 2013). It encompasses financial or non-financial damage to reputation stemming from a direct or indirect association with a company. Companies, including oil and gas, that are involved in environmentally damaging projects, lose market share because green investors now use company's carbon emission awareness and mitigation reports to weigh in on their investment decision (Bansal and Kistruck, 2006; Khoiruman and Haryanto, 2017; Rokhmawati and Gunardi, 2017).

It is imperative for an organization to identify which of the risks could hinder its operations in the short, medium and long-term and fashion out plans to cushion the effect. Oil and gas companies in Nigeria are prone to all identified risks, especially reputational risk, due to the negative effects of their daily operations on the host communities.

2.3.2. What Is Carbon Reporting?

Carbon reporting is one of climate change mitigation approaches as well as CSR practice designed to identify commercial activities' contribution to climate change. It captures and report outputs from processes such as gas flaring, burning of fossil fuel, deforestation and industrial processes (Haigh and Shapiro, 2012). Carbon reporting could change organizational mind-sets towards minimizing pollution, reducing environmental harm and technological innovation for economic competitiveness. It increases transparency which increases accountability. This, in turn, has implications for the share price and increases stakeholder pressures such as lobbying the government on emission requirement or boycotting non-compliant organization.

The two major types of carbon reporting are voluntary carbon reporting and mandatory carbon reporting (Kauffmann *et al.*, 2012).

- Voluntary carbon reporting (VCR): is the type of reporting most organizations engage in and falls under environmental and social reporting (Armstrong, 2011). Hence, it is viewed as a CSR that can add value to the firm (Liu *et al.*, 2017). An example of voluntary reporting schemes is the Carbon Disclosure Project (CDP), which is probably the most prominent voluntary scheme for reporting GHG emissions, founded in 2003. CDP collects and processes GHG emissions and management systems' information on behalf of its 800+ institutional investor's signatories, and then publishes the emission performance data. These data are used by potential investors to make investment decision (Knox-Hayes and Levy, 2011; Zvezdov *et al.*, 2015; Tang and Demeritt, 2018).

Similarly, Climate Disclosure Standards Board (CDSB) 'is an international consortium of businesses and environmental NGOs' committed to providing climate change reporting frameworks that align climate change-related information an organization discloses to CDP into mainstream corporate reporting. This will mean that environmental information is reported with the same rigor as financial information and give investors and other stakeholders' decision-useful environmental information thereby enhancing the efficient allocation of capital (CDSB, 2013; 2015, p. 1).

CDSB's first framework was Climate Change Reporting Framework released in 2010 based on the risks and opportunities that climate change presents to an organization's strategy and financial performance. The framework discusses the following four-step process needed to provide and enhance more meaningful climate change disclosure in annual reports to appraise the significance of climate change for the business from a financial perspective (CDSB, 2013).

- Determination: is evaluating what to include in the mainstream report such as the expressed needs of investors regarding climate change.
- Preparation: for climate disclosures to be effective, it should be based on clear parameters such as identification of relevant standard and policies.
- Presentation: information should be prepared and presented in a way that enhances usability, for example, using climate change measures that show progress against targets.
- Review: ensures careful internal review and sign-off of proposed disclosure contents using some internal and external engagement and feedback to inform future publications.

According to CDSB (2013), the guide does not specify 'what' should be reported but 'how' organizations should present their climate change information to make it as useful and relevant to investors evaluating corporate performances on climate strategy and GHG emissions. This makes benchmarking with other companies challenging. To address this challenge, the scope of the framework was expanded in 2013 to include environmental information and natural capital mainly because of the developments in corporate reporting such as the introduction of mandatory requirements for the disclosure of environmental information in some jurisdictions (CDSB, 2015). CDSB seeks to standardize environmental information reporting by identifying and collaborating the most widely shared and tested reporting approaches that are emerging around the world through principles and requirement. 'The CDSB Framework acknowledges that there will be degrees to which organizations will conform to the requirements' (CDSB, 2015, p.6). However, when companies apply the laid down guiding principles (P) and reporting requirement (REQ) as shown in table 1, they will provide environmental information in annual reports that is useful to investors, correct and complete.

	CDSB Framework for Reporting Environmental Information & Natural Capital
Relevance and materiality	P1
Faithful representation	P2
Connected with other information	P3
Consistent and comparable	P4
Clear and understandable	P5
Verifiable	P6
Forward looking	P7
Policy, strategy and targets	REQ-01
Risks and opportunities	REQ-02
Governance	REQ-03

CDSB Framework for Reporting Environmental Information & Natural Capital	
Sources of environmental impact	REQ-04
Performance and comparative analysis	REQ-05
Outlook	REQ-06
Organizational boundary	REQ-07
Reporting policies	REQ-08
Reporting period	REQ-09
Restatements	REQ-10
Conformance	REQ-11
Assurance	REQ-12

Table 1: CDSB Framework for Reporting Environmental Information and Natural Capital (CDSB, 2015)

Still, Sullivan and Gouldson (2012) argued that VCR does not really meet investors' needs due to lack of meaningful comparisons between companies. Nevertheless, Lemma *et al.*, (2020) stated that firms with higher carbon risk exposure tend to provide financial statements of poorer quality and this outcome is partially mediated through VCR. Therefore, VCR is an effective tool to manage environmental risks and social issues confronting stakeholders.

- Mandatory carbon reporting (MCR):** is a compulsory carbon reporting which can provide several advantages such as the creation of standardized and comparable measures that enable benchmarking and best practices (Tang and Demeritt, 2018). MCR will be considered a form of 'civil regulation', or a mode of corporate governance in which civil society actors employ information disclosure mechanisms to exert pressure on businesses and governments to abide and comply with environmental safety requirements. MCR represents an extreme case of VCR where all the measurement and behavioral questions and consequences that accompany the report are considered (Chapple *et al.*, 2013). Over the past two decades, there have been growing number of reporting schemes and governmental voluntary and mandatory emission requirements have been introduced in Australia, Canada, the EU, the UK and the U.S. among others (figure 6).

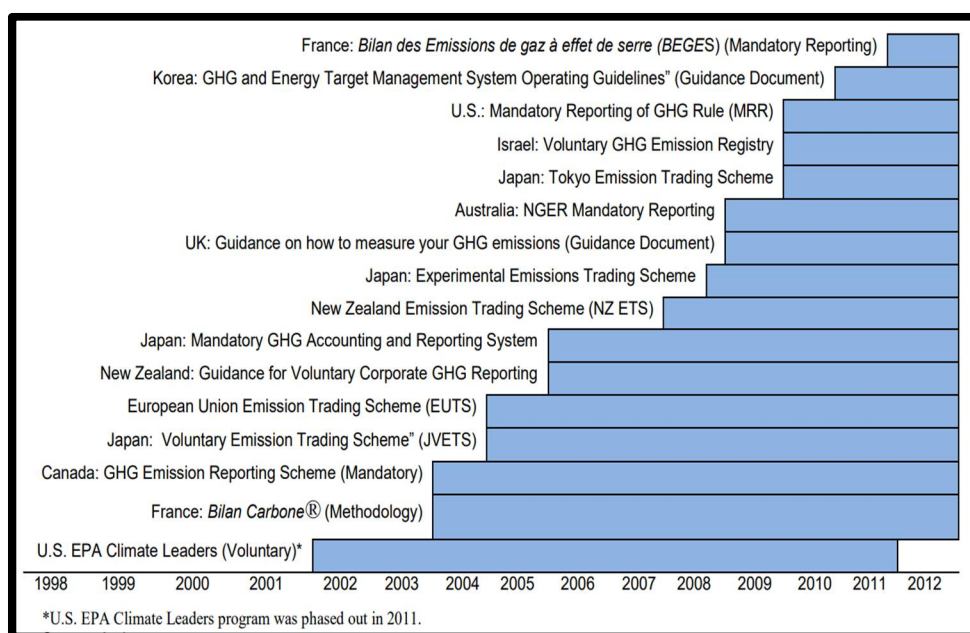


Figure 6: Emergence of Government Reporting Scheme (Kauffmann Et Al., 2012)

According to Hertwich and Wood, (2018) and Tang and Demeritt, (2018, p: 440), there are three broad categories of emission reporting schemes based on GHG protocol, a corporate standard. Scope 1 emission is the direct emission of CO₂ and other GHGs of an organization. Scope 2 emission is emission arising indirectly because of the energy that firms purchased and consumed. Scope 3 emissions, mostly related to voluntary schemes, is emission associated with the inputs other than the direct and indirect activities of an organization- indirectly attributable to firms because of the production of purchased inputs, transportation on common carriers, out-sourced activities, and the processing and ultimate disposal of firm products and waste.

Onat *et al.*, (2014) indicated that scope 2 emissions from direct purchases of electricity reported the highest carbon footprint in the U.S. buildings. Scope 3 emission from indirect emissions, is less than scope 2 but greater than scope 1 emission from direct emissions. This is an indication that electricity, which is usually generated from burning of fossil fuel, is the major contributor of carbon footprint. Hence, for oil and gas companies, scope 1 emission is the direct operational emissions from the self-consumption of fuel, flaring, and venting of methane that are attributed to the

extraction and production of oil, gas, and coal. Scope 3 emissions from the use of sold products accounted for 90% of total company emissions and result from the downstream combustion of coal, oil, and gas for energy purposes (Griffin and Heede, 2017).

Nigeria is a developing country and a signatory to Kyoto protocol under the clean development mechanism (CDM), but it is yet to have a standardized reporting framework on carbon reporting. Some organizations in Nigeria are only trying to adopt international best practices by practicing voluntary carbon reporting. It is expected that organization that complies now will be desired by local and foreign investors whenever the government mandates carbon reporting.

2.4. Theoretical Frameworks and Empirical Review

Theoretical frameworks will be used to provide direction for this research and limit its scope (Tashakkori and Teddlie, 2010). The incorporation of a social science theory into mixed methods study influences the entire research process such as the one at hand (Creswell, 2003; 2014). To this end, the following theories will guide this study.

2.4.1. PESTEL Framework

Porter's (1980) PESTEL framework is used to analyze how the external (macro) environment of an organization, broken into more manageable components of political, economic, socio-cultural, technological, ethical and legal phases, influences organization now and in the future.

- Political: the political system is the international, national, and local government policies or regulations. Therefore, the government can regulate and deregulate to create such an ideal environment for businesses and people (Kelly, 2013).
- Economic: 'economic environment is the totality of economic factors, such as demand, productivity and supply, employment, income, inflation, interest rates and wealth which influence the buying behavior of consumers and institutions' (Kelly, 2013, p. 52). National, regional and global economic environment are essential for business' survival.
- Social-cultural: the world is fast becoming one global market. Hence, organization should respond to social factors such as culture, marketing and health of the environment they operate in. This could put the organization in both local and international recognition (Kelly, 2013).
- Technological: the impact of technological changes and developments on business strategies could be far reaching. The effect of information and communications technology has been a key change in the world of technology. Business survival could depend on how fast it is keeping up with the changes in technology (Needle, 2015).
- Environmental: examines the implications of ethical and environmental issues such as the disposal of waste and the use of energy (Needle, 2015). Therefore, organizations must conform to the rules and belief systems prevailing in their environment to survive.
- Legal: an organization is duty-bound to produce products and render services that are not harmful to the consumers and the environment. Also, there are legal regulations such as stock market regulation, contract law or taxation that affect businesses. At times, there are disputes over the application or implementation of government policies and regulations resulting into actual litigation, or the threat of litigation (Kelly, 2013).

2.4.1.1. Limitations of PESTEL Framework

Needle (2015, p.61) identified some PESTEL framework limitations. A major limitation is that many of the PESTEL components are interrelated, overlapped, and operate together. For example, political, economic and legal factors cannot stand in isolation. It also assumes that only the environment can influence the organization.

Further, applying PESTEL framework to business environment requires lots of time and resources. This is particularly tasking when it involves a large organization and access to data gathering requires careful planning and capital base. The framework is based on assumptions because of the volume of data involved; such data changes from time to time thereby rendering research outcome subjective.

2.4.2. Resource Based View Theory

The Resource Based View (RBV) was propounded by Wernerfelt in 1984 but brought to the forefront by Barney in 1991. A firm's ability to earn profit more than its cost of capital depends upon the attractiveness of the industry in which it is located and its establishment of competitive advantage over rivals. This implies that strategic management is concerned primarily with seeking favorable industrial environments, locating attractive segments and strategic groups within industries and moderating competitive pressures. Thus, a resource-based theory of the firm entails a knowledge-based perspective. RBV is used to analyze the organization's efficiency and effectiveness in the management of their unique resources and core competences to attain competitive advantage (Gunardi *et al.*, 2016). Furthermore, it shows how the internal environment of an organization affects the external environment, a response to one of the limitations of PESTEL. The four key resource elements of RBV (Barney 1991) are:

- Physical capital: are physical resources such as products, patents, plant, equipment, and location.
- Human capital: includes the experience, skills set and talents of the workforce, their judgment, insights, the training and development they possess.

- Organizational capital: includes the organization structure, planning procedures, mechanisms for coordination and control and the nature of relationships internally and externally.
- Financial capital: relates to the firm's abilities to raise and manage funds.

In 2012, Barney and Hesterly developed a framework known as VRIO- Value, Rarity, Imitability and Organization, to assess a firm's competitive advantage through its resources (figure 7).

- Value: these are firm's activities and strategies that improve its effectiveness and efficiency that add value for the customer.
- Rarity: firms' resources and core competences should not only be valuable but uncommon. The efficient use of resources can help to ensure a firm's survival in competitive markets but cannot lead to competitive superiority in the long run.
- Imitability: firms should ensure that its unique resources and core competence should be impossible to copy or the cost of doing so is too high.
- Organization: this is when a firm put in place strategically equivalent substitutes and route to realizing potential.

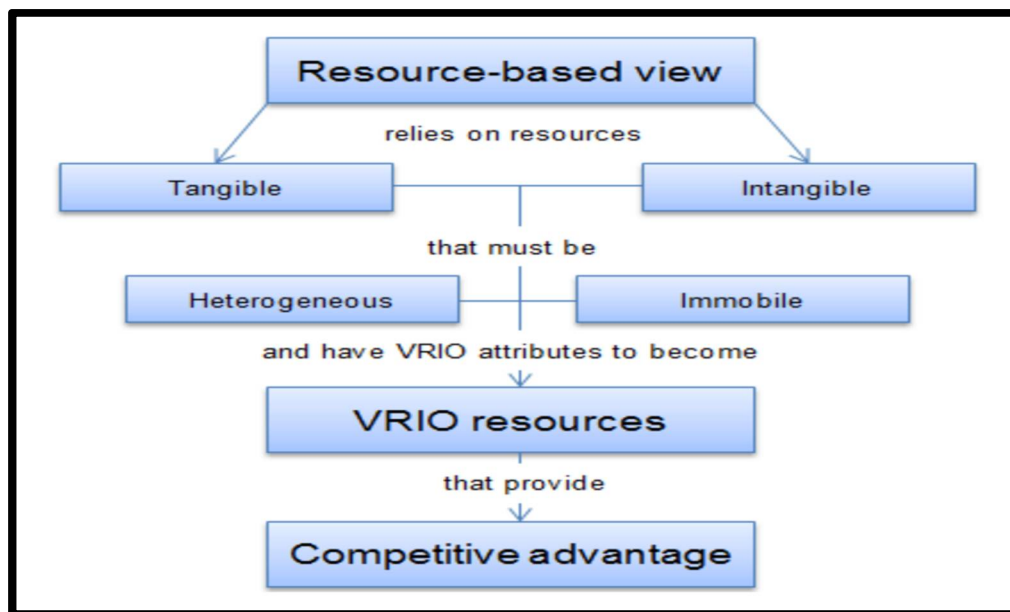


Figure 7: Resource Based View (Barney and Hesterly, 2012)

2.4.2.1. Limitations of Resource Based View Theory

RBV major limitation is that it did not consider the temporary nature of unique resources and core competencies. They may expire or be replicated by competitors in the long run, therefore cannot achieve sustainable competitive advantage (Kraaijenbrink *et al.*, 2010). Also, RBV is applicable on an entity specific basis, it does not allow generalization.

Internal limitations could result when the entire resources of an organization are not known or the knowledge is not maximized while external limitations may arise because of constraint such as economy and political policies (Needle, 2015).

2.4.3. Dynamic Capabilities Theory

This is a concept associated with the work of Teece *et al.* (1997). Dynamic capabilities relate to the ability of the firm to recreate its resources and capabilities to meet the needs of a changing environment in ways that are different from its competitors and achieve sustainable competitive advantage, a response to one of RBV limitations. Teece and his colleagues argue that such capabilities can be built into formal structures and processes such as research and development (R&D) and training.

Dynamic capabilities are strategic capabilities (Eisenhardt and Martin, 2000). It is not enough to have unique resources and competencies; it is important to regularly check that they remain useful as the environment changes to sustain innovation and growth. A firm has competitive advantage if it creates more economic value than competitors but will have sustainable competitive advantage if it can maintain the competitive advantage over some years. Proactivity is considered as firm's dedication to look for opportunities that create sustainable competitiveness.

2.4.3.1. Limitations of Dynamic Capabilities Theory

A firm should not just possess a dynamic capability, it must be able to adapt it appropriately to stand out from its competitors. This is difficult to attain. It is also difficult for a firm to pursue all forms of competitive advantages at the same time since its designs, incentives, processes must be able to align for it to implement a dynamic capability (Kelly, 2013).

The three theoretical frameworks that are examined in this section are all relevant to this study. For business to operate profitably in the long run, it must consider how the external environment affects its operation and how to survive in the environment to achieve not only competitive advantage but also sustainable competitive advantage over its competitors through adaptation of its resources to the changes in business world (Matsumura et al., 2014; Polycarp, 2019).

2.5. Current Level of Carbon Risk Assessment and Reporting in the Oil and Gas Industry in Nigeria

Nigeria is the largest oil producing country in Africa (CDIAC, 2014; World Population Review, 2020). Nigerian oil and gas companies' daily activities like extraction, production and flaring contribute to the global warming (World Bank Group undated; IEA, 2020-a; b). Nigeria gas flaring is the highest contributor to total GHG emission in Africa (Hassan and Kouhy, 2013). Apart from the fact that GHG emissions from gas flaring have negative environmental consequences, it can also be a waste of valuable energy resources from an economic point of view (Ayoola, 2011; Mohammed, 2020).

The Department of Petroleum Resources (DPR) is the government petroleum regulatory agency in Nigeria saddled with the responsibilities to ensure compliance to petroleum laws, regulations and guidelines in the oil and gas industry (DPR, 2020). Nigeria, in 2017, pledged in her National Determined Contributions (NDC) to unconditionally reduce GHG emissions by 20% by 2030 and 45% by 2030 provided she receives international support (DCCN, 2020). Despite all of these, there is no tangible action for mitigation such as carbon risk assessment and reporting in Nigeria. Carbon risk assessment and reporting implementation is still novel in Nigeria despite being a party to the Paris agreement.

Very few Foreign Multinational Oil Companies (FMOCs) operating in Nigeria, such as Shell, report on carbon emissions in the sustainability report section of their annual reports. This non-disclosure of both financial and non-financial environmental information by FMOCs is due to original incentive arrangement offered by Nigerian government to FMOCs to operate as unincorporated partners in a joint venture with Nigerian National Petroleum Corporation (NNPC). In this regard, FMOCs and the joint venture companies, through which they operate, do not have any legal duty to report both financial and non-financial information in Nigeria (Hassan and Kouhy, 2013). Legalizing VCR or MCR will mandate FMOCs and indigenous oil companies to report and have an idea about the extent of gas flared and its effects on the environment just like in advance countries (Crawford et al., 2010; Liu et al., 2017; Mateo-Márquez et al., 2020).

2.6. Effects of Carbon Risk Assessment and Reporting on Business Development

It has been argued that carbon risk assessment and reporting offer opportunities for efficient business development because of their importance in the calculation of emitted carbon and inventory where accounting plays indispensable role in carbon trading and capital structure building (Bebbington and Larrinaga-González, 2008; Wang, 2017).

Carbon reporting has been credited with improving business performance since it allows firms in energy sector such as the oil and gas industry to vigorously govern and manage their emissions (Lovell and MacKenzie, 2011). Wang and Li (2018) proved that carbon reporting could impact positively on business development and performance of oil and gas companies by encouraging them to invest in emission mitigation technologies.

Tang and Demeritt (2017) stated that VCR is a reputation management scheme that boosts management's confidence that they are doing the right thing and advance their access to capital. Access to capital improves business performance since carbon reporting attracts international investors (Handoko, 2016). Furthermore, carbon risk assessment and reporting are great ways of employing human and organization capital to ensure better firm's performance (Barney, 1991).

Having said that, carbon risk assessment and reporting seriously expose liabilities and risks facing businesses. Companies with higher carbon risk exposure confront with higher risk because of the heightened uncertainty of their future cash flows resulting from increased regulatory, physical, business, and reputational risks (Chapple et al., 2013).

2.7. Benefits of Carbon Reporting for the Development of Business Strategy

The following has been identified as benefits of carbon reporting for the development of business strategy (Porter, 1985; 2008; Ki Hee Kim, 2009).

- It will help the firm make economically and environmentally sound decisions (Magrini and Lins, 2007; Tang and Demeritt, 2018). In the development of a firm's business strategy, the consideration of its level of disclosure gives direction to development of climate strategy for mitigation (Jermias, 2008).
- It provides comprehensive, standardized and reliable information required for change in investment decisions, strategy and risk management (Yuan et al., 2020).
- Carbon reporting, according to Sridana et al., (2014), can be used to implement the carbon trading system and only companies that are prepared for the new regulation on international carbon market will become relevant when it comes into effect.
- It reduces environmental cost. Environmental cost, which includes waste management cost, will be significantly reduced and inefficiency eliminated as a result of business decisions to measure and report its carbon emission and invest in cleaner production (Nwaiwu and Oluka, 2018).
- It influences organizational behavior and strategy for long-term benefit such as enhanced brand value. It not only minimizes pollution and environmental harm, but also promotes economic growth, technological innovation and higher profitability since process optimization will reduce emissions and costs. There are significant financial and

environmental benefits in improving efficiency, it not only reduces cost but also saves it (Nwaiwu and Oluka, 2018).

- Matisoff *et al.* (2013) stated that firms involvement in carbon reporting is a means of differentiating a company from its competitors and gain recognition. In addition, carbon risk assessment and reporting allow for benchmarking firm's strategies with others and realization of the need for change in business strategy when necessary (Porter, 1979; Hoffman, 2011-a, b; Honggowati *et al.*, 2017).

2.8. Challenges of Carbon Risk Assessment and Reporting

Several challenges of carbon risk assessment and reporting have been identified; they include but are not limited to the following:

- Lack of concession among policymakers is a key challenge. The Paris agreement commits its signatories to keeping global warming below 2°C. For effective implementation, there should be a 'mechanism' for countries to trade GHG emissions credits across borders, such that countries with reduce emissions could sell the excess to large emitters. This would have been the basis for an international carbon market and global carbon pricing (Economist, 2019-a). At the last climate summit in December 2019 (COP25), policymakers' efforts to lay plan for such global carbon market failed yet again and a decision on regulations for new international carbon markets was deferred until the following year (Giddens, 2009; Economist, 2019-c; KPMG, 2019).
- The efforts to reach the Paris agreement target are inadequate. According to Economist, (2019-e) the UN Secretary General, António Guterres, told all in attendance at COP25 to hammer out further details of the Paris agreement as efforts to reach these targets have been absolutely insufficient and the world will not begin to cool off until CO₂ levels start to fall.
- Assessing and reporting on carbon emission could be largely inaccurate. For example, Britain's 'net-zero' target only includes domestic emissions for its carbon impact using only production-based measures. For this reason, among others, Greta Thunberg, a teenage Swedish climate activist, warned Britain's Parliament in April 2019 that its climate goals amounted to little more than creative carbon accounting (Economist, 2019-d). Many countries that have promised to get to net-zero emission do not account fully for the emissions created by imported products that are consumed in their countries but produced outside them. Figure 8 shows a huge gap between consumption and production emissions measures. Consumption emissions are embedded in imports or cross-border trade. Imported products consumed in a country should also be accounted for under scope 3. Therefore, for more accuracy, countries and firms should account for production and consumption emission to include products provenance CO₂ (Price Waterhouse Coopers and International Emissions Trading Association, 2007). This could be the reason that the EU is considering a carbon 'border-adjustment' tax (Economist, 2019-d).

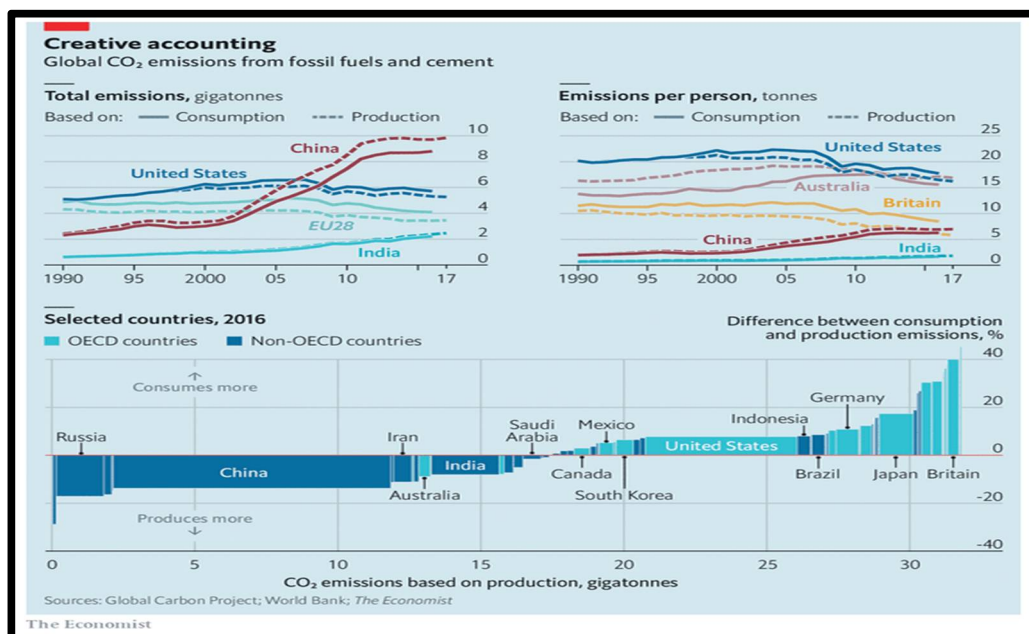


Figure 8: Consumption and Production Emissions Measures (Economist, 2019-D)

- Around 50 countries have a carbon tax system; yet, little agreement is in place about how much polluters should pay. Currently, Sweden has the highest tax rate in the world at \$127 per ton of CO₂, while most other countries with a carbon price charge emitter less than \$25 per ton. (Economist, 2019-a). For example, Canada carbon price is as low as \$15 per ton (Government of Canada, 2017; Migiro, 2019). Hence, carbon levies that are generally far too low have been identified as a major challenge to reaching the target (Romi, 2014).

Although low carbon levies is identified as a hindrance in achieving the Paris agreement target (Economist, 2019-a); higher carbon levy will also affect business performance and reduce its profit.

- The challenge of cost greatly affects Nigeria. Investments in technology to reduce environmentally hazardous emissions and report them are quite expensive (Igwenagu, 2011; Nwaiwu and Oluka, 2018). It is considered cheaper to wastefully burn the associated gas due to lack of infrastructure to facilitate effective utilization of gas from oil production (Olson, 2010; Hassan and Kouhy, 2013). In addition, putting in place and maintaining carbon disclosure systems require a lot of funds and the cost might outweigh the benefits for some (Lohmann, 2009; Kauffmann *et al.*, 2012). Meanwhile, Economist, (2019-f) asserted that the costs and benefits of carbon reporting are fundamentally uncertain and unevenly distributed.
- Lack of universal accounting standards for carbon accounting is another fundamental challenge. Sridana *et al.* (2014) mentioned that carbon accounting practices vary from firm to firm. There are no universal rules about how to account for emission allowances, and this uncertain situation has allowed a range of accounting models to grow (Simnett *et al.*, 2009; Lovell, *et al.*, 2010). VCR frameworks often collect different kinds of information and are disclosed in different ways that make comparison difficult and less useful for investors (Goldhammer *et al.*, 2016). Despite the large number of companies that now report climate change-related information through initiatives such as the CDP, investors have consistently criticized companies for not providing information that can be readily used for investment decision-making. Companies, in turn, have criticized investors for not utilizing the information that they provide. Therefore, there is a need for accurate carbon accounting like financial accounting (Haigh and Shapiro, 2012; IFRS, 2020).

2.9. Critical Evaluation of the Roles of Accountants in Promoting Carbon Reporting

This section critically evaluates the role of accountants, an important human capital, not just as a bookkeeper, accounting, auditing and financial mediator but as sustainability experts who conduct business in an environmental and socially accepted manner (Hoffmann *et al.*, 2009).

Egbunike and Emudainohwo (2017) aimed to find the role of carbon accountant in corporate management systems. The study found that there is a statistically substantial relationship between carbon accounting and corporate performance of companies. They concluded that the focus of finance and accounting system should cover both management of short-term and long-term climate risk.

Expressing his views on the role of accountants, Bakker (2013) said, 'accountants are going to save the world'. He listed the roles of accountants to include minimizing information irregularity and investment risks, creating integrated reporting and audit, providing and testing standards of sustainability accounting, reporting and auditing within the new business model. With specific professional skills and involvement in governance, risk management, business analysis, due diligence and corporate transparency, professional accountants today are reassessing their roles because of corporate sustainability (Tang and Luo, 2014; Makenenko and Plastan, 2017; Caliyurt, 2019).

Similarly, accounting functions help to assess risk by determining the vulnerability of assets and control their operations to climate change and emission (West and Brereton, 2013). To cope with rising investors' demands for transparent and credible exposure to carbon levels and associated abatement costs (CIMA, 2010; PricewaterhouseCoopers, 2012; Hahn, *et al.*, 2015), organizations have to incorporate the assets, liabilities and risks associated with managing carbon emissions into traditional accounting, governance and control mechanisms (Deloitte, 2009). This informs the role of accountants as carbon managers in organizations as claimed by Hartmann *et al.*, (2013).

Although there is no universal rule for carbon reporting, it is interesting to know that accountants are being called to action in respect to climate change through a statement signed by chief executives of 14 global accountancy bodies organized by the Prince of Wales's Accounting for Sustainability Project (A4S), in support of public policy that is consistent with net zero emission and climate change adaptation goals (Accounting for Sustainability, undated). Clearly, the accountancy profession has crucial roles to play in addressing emission measure and reporting.

It is believed that accountant should be responsible for measuring, evaluating and disclosure of environmental performance in financial reports; no doubt accountants needs data other than the conventional accounting data, such as pollution ratios and production data but quantitative emission data that comes from emission generation activities like gas flaring, refining, exploration and production (Hopwood, 2009; Nwaiwu and Oluka, 2018). This means that accountant cannot deliver on carbon assessment and reporting in isolation without input from other experts like production specialist and engineers. Therefore, even if the VCR and MCR records may not be entirely precise, accountants must give best estimates in accordance with the current level of knowledge and techniques used (Ratnatunga, 2007; Ratnatunga and Balachandran, 2009; Tang and Demeritt, 2018).

If we can only change what can be measured, then the role of accountants cannot be over-emphasized since they produce firms' financial reports which also contains firms' carbon risk assessment and reporting (Jimena, 2010; Linnenluecke *et al.*, 2013; 2015).

2.10. Summary

This chapter explores carbon risk assessment and reporting, the benefits and impacts on business performance and strategy development. The current level of carbon reporting in Nigeria and the challenges of carbon risk assessment and reporting are also considered. Relevant concepts, theoretical frameworks and empirical studies with focus on carbon

assessment and reporting and the roles of accountant were reviewed. The review shows that PESTEL, RBV and Dynamic Capabilities theories are all appropriate for us to fully understand how the core objective of an improved financial performance can be achieved if carbon risk assessment and reporting is embraced and practiced. Whilst this study reviewed carbon risks and emissions generally, a focus on Oando will provide more insight into the potential benefits of carbon risk assessment and reporting and the impacts on business strategy and performance in the Nigerian oil and gas sector.

3. Research Methodology

3.1. Introduction

The research method used in this study is described in this section. Starting with the research rationale to the assessment of the primary and secondary data gathered and how they were obtained. Then, it will provide a rundown of the data analysis methods used as well as highlighting the main quality, strength and limitations of the study. Finally, research ethics that govern this work is considered.

3.2. Rationale

The main purpose of this research is exploratory. The aim of this research is to explore the potential benefits of carbon risk assessment and reporting for the development of business strategy of Oando in the Nigerian oil and gas industry. Therefore, this study is designed as qualitative exploratory research to gain insight into a critical business issue of exploring the benefits of carbon risk assessment and reporting within the oil and gas industry in Nigeria using frameworks such as PESTEL to inform and develop the study.

Since Nigeria is still developing, the subject of carbon risk assessment and reporting is new. Hence, this research will explore the benefits derived by advanced countries who have adopted one form of carbon reporting or the other in their accounting practices to highlight potential benefits of carbon risk assessment and reporting in the development of business strategy of Oando. Therefore, the research question is: what are the potential benefits of carbon risk assessment and reporting for the development of business strategy of Oando in Nigeria oil and gas industry?

3.3. Research Methods

This section discusses the research philosophy, approach to theory development, methodological choice and strategy employed in this study based on Saunders *et al.*, (2019).

- Research philosophy: pragmatism is employed for the purpose of this study. The aim of pragmatism is to make a difference in organizational practices through the provision of practical solutions that will guide future practices (Elkjaer and Simpson 2011; Ragab and Arisha, 2017). Also, pragmatism has been adjudged as the 'best paradigm' because it combines the use of qualitative and quantitative methods (Tashakkori and Teddlie, 2010).
- Research approach: the approach to theory development employed is abductive approach where data is used to explore a phenomenon, identify themes and explain patterns. It is a combination of deduction and induction approaches as pure deduction or induction is almost impossible to attain. Abductive approach is suitable for business and management research of this nature due to its flexibility and suitability for different research philosophies including pragmatism (Eisenhardt, 1989 Eisenhardt and Graebner, 2007). It is the best approach for incomplete observation (as reporting is scarce) and can lead to predictors for best practice.
- Research design: the methodological choice used is mixed methods. The pragmatism philosophy and abductive development approach allow the use of mixed methods research design which integrates qualitative and quantitative data collection techniques with analytical methods in one study. Pragmatism is also of the view that there are multiple realities to a subject hence, the use of mixed methods research design is more appropriate (Johnson and Onwuegbuzie, 2004). The advantages of mixed methods design include enhancing the validity of findings and substantiating the relevance of data collection (Onwuegbuzie and Johnson, 2006). Based on its identified advantages, mixed methods design overcomes the disadvantages of single research method (Tashakkori and Teddlie 2010).
- Research strategy: case study strategy is employed for the purpose of this study (Patton and Appelbaum, 2003). This strategy has been hailed as an extensive inquiry into a topic or phenomenon within its real-life setting and could be used for exploratory study, which is the reason for its use. The 'case' in case study research may refer to a person, an organization or an event (Yin, 2014 as cited in Saunders *et al.*, 2019). In this study, the 'case' is Oando- one of Africa's leading energy solutions providers and an oil and gas company situated in Lagos, Nigeria. The organization has over 130 professional employees in accounting, engineering, technology and related positions (Oando, 2019; 2020-c). Therefore, Oando presents a representative case of an oil and gas company in Nigeria thus, relevant for the research aim.

Despite the advantages of the case study research strategy, it has some limitations which include time constraint which might militate against in-depth analysis. Also, gaining access to participants might be challenging owing to their busy schedules and in the case of a pandemic such as Covid-19, it may be impossible to conduct a face-to-face interview necessary to gain more insight to the case study. To mitigate against these limitations, mixed methods research design is

employed for the study. Similarly, in order to tackle the challenge of gaining access, telephone and internet mediated access such as the use of email and Zoom calls were used.

3.4. Data Collection

The research aim will be achieved with quantitative and qualitative data from primary and secondary data sources. The sampling method selected is non-probability sampling technique since the research is exploratory case study where the researcher is interested in opinions of key informants (Baxter and Jack, 2008; Flipp, 2014-a). Purposive sampling techniques are non-random methods that warrant that certain categories in the sampling frame are included in the final sample. Purposive sampling is also appropriate while working with small samples as seen in the case Oando. While selecting a sample for a single case study, heterogeneous sampling is best suitable (Saunders *et al.*, 2019). The heterogeneous purposive sampling technique is used because no quota variables are available, access is not difficult and the research purpose is to discover key themes. Participants with appropriate distinct characteristics that will raise key themes were selected using researcher's judgment.

Participants of the questionnaire survey are accountants and engineers who have been in the oil and gas industry for at least three years. It is expected that they would be aware of carbon risk assessment and reporting and how it can be a tool for business development strategy. The sample size for the survey is expected to be thirty-two (32) and attrition rate is projected to be 2% (Flipp, 2014-b; Saunders *et al.*, 2019).

Nine (9) participants were selected for the interviews. They were selected because they are knowledgeable and skilled in accounting practices, exploration and extraction in the oil and gas industry coupled with their years of experience to give informed and expert opinions about the topic under exploration, hence, should be able to give detailed information (Creswell, 2007; 2014).

Regarding access to participants at Oando, the Head of Human Resource of the organization granted a written consent in August 2020 and each participant voluntarily consented to fill out the questionnaire and be interviewed.

3.4.1. Primary Data

- Questionnaire Survey: primary quantitative data is collected using 36-item questionnaire. Some questions are open ended to allow for flexibility in the responses of the respondents. The questionnaire is in two sections: Section A consists of 5 demographic information of the participants, such as educational and professional qualifications, designation, years of work experience and years on the present position. Section B consists of 31-items opinions which are further divided into six sub-sections with each focusing on variables in the objectives; each sub-section has at least 4-items opinion, details of which could be found in appendix A and B. The questionnaire is written in simple English language and administered using Google form sent to participants via their e-mail addresses.
- Semi-structured interview: primary qualitative data is gathered through semi-structured interview to draw out participants' motives, opinions and feelings regarding carbon risk assessment and reporting. This was achieved via Zoom meeting for the one-on-one interviews which follows the Covid-19 social distancing protocols. Meetings were pre-arranged with the interviewees and semi-structured interviews were used to allow participants clarify their answers to understand the reasons behind their views. Three finance managers, four senior accountants and two production engineers in Oando were involved in the interviews.

The interview protocol contained the personal information such as name, institution of the researcher and purpose of the research to establish rapport with interviewees in the case organization and make them comfortable. Next, informed consent was obtained, time frame for the interview stated to be approximately 30 minutes, number of interview questions (the interview questions were subjected to adjustment based on experts' opinions and were adjusted during the main interview; main questions for the interview are in appendix C), and appreciation note for the interviewee for their time (Saunders *et al.*, 2019). All interviews are transcribed and saved into a file on a password-protected computer for easy access again during data analysis.

3.4.2. Secondary Data

Some sources of secondary data have been pinpointed during the research. One of the main sources is from archival records- annual reports of Oando. The data provides an overview into the financial performance of the company for a five-year period. Similarly, the share performance of Oando is examined to determine how much its emission disclosure in its sustainability report affected its shares in the stock market.

Tang and Demeritt (2018) have made available documentation regarding the carbon disclosure requirements and compliant of 168 UK companies including oil and gas companies. Some other academic journals were also considered.

3.5. Data Analysis

Both quantitative and qualitative data analyses are adopted for this study (Leech and Onwuegbuzie, 2007). Questionnaire survey is analyzed using descriptive statistics such as frequency table, percentage distribution, and pie chart (Gapminder, 2010). Interviews are processed using thematic analysis (Boyatzis, 1998; Silverman, 2011). This method focuses on finding themes and patterns across a qualitative set of data and fitting for abductive approach as well as several research philosophies including pragmatism. The initial codes are first generated from the data set. After that,

the codes are grouped into potential themes. Then, the themes are re-examined and adjusted to produce the ultimate results (Saunders *et al.*, 2019). To achieve the correct analysis, the NVivo12 software is used via Oxford Brookes University portal.

3.6. Quality

Saunders *et al.*, (2019, p. 216-218) explains that traditional criteria for research quality are considered as 'philosophically and technically inappropriate in relation to qualitative research where reality is regarded as being socially constructed and multifaceted', therefore proposes four criteria to guarantee the quality of the research:

- Dependability: the study draws extensively on existing literature for modification as the research progresses and the interpretation of the data that may be understood and appraised by others.
- Credibility: the study satisfies these criteria by in-depth engagement in the topic such that the representation of research participants' socially created realities match what they intended and the completeness of the data collection and its analysis.
- Transferability: the study provides clear and detailed description of the data collection and data analysis as well as providing a fit between the philosophical perspective adopted and the research method which provides the reader with the opportunity to judge the transferability of the study to another setting of the reader's interest
- Authenticity: the study develops the theoretical understanding to promote fairness by representing all views, raise awareness, generate learning and bring about change to carbon disclosure in Nigeria.

3.7. Strengths and Limitations

This is a case study research strategy with multiple strengths (Saunders *et al.*, 2019):

- It is appropriate for qualitative analysis
- Data gathered is within the context of its use
- It is a true reflection of real-life scenario
- Use of multiple sources gives a holistic view of the phenomenon under research

However, it is quite impossible for a study of this nature not to encounter any limitations. The oil and gas industry in Nigeria is quite large being the mainstay of the economy, but due to logistics constraint, the research has been limited to Oando. The sample size for the survey is 32 and 9 participants were interviewed; this might be viewed as too small hence, making generalization of the findings limited. Also, conclusions may be influenced by biased views because case studies are criticized for lack of objectivity and scientific accuracy (Brown, 2006; Bryman and Bell, 2007; Bryman, 2016).

3.8. Research Ethics

This research involves human participants. It, therefore, adheres strictly to the *Oxford Brookes University's Code of Practice Ethical Standards for Research Involving Human Participants* and *General Data Protection Regulation* (GDPR) (Oxford Brookes University, undated-a; b). This research involves access to confidential information. However, the data collected for this research did not involve the deception of participants, financial inducements or psychological stress. Participants' information sheet was shared with participants and consent obtained with consent form. Participants gave voluntary opinions towards carbon reporting, emission and Oando's compliance level during interview. Hence, interviewees use pseudonyms to ensure anonymity and survey is anonymized. All information collected will be treated confidentially and saved on a password-protected laptop whilst data files will be encrypted and used solely for this research to ensure the protection of participants.

4. Findings

4.1. Introduction

The aim of this research is to explore the potential benefits of carbon risk assessment and reporting for the development of business strategy of Oando in the Nigerian oil and gas industry. Thus, this chapter presents the findings and summary analysis of primary data gathered from questionnaire survey and semi-structured interviews, and secondary data. Quantitative and qualitative data analyses were done concurrently.

The objectives of this research are:

- To examine carbon risk assessment and reporting good practice generally in the oil and gas industry.
- To critically assess the current level of carbon risk assessment and reporting in the Nigerian oil and gas industry.
- To critically evaluate the potential benefits of carbon risk assessment and reporting for the development of business strategy of Oando and the effects on its business performance.
- To critically assess the role of accountants in promoting carbon risk assessment and reporting in the Nigerian oil and gas industry.

To meet these objectives, this chapter discusses how Oando approaches carbon risk assessment and reporting as a recognized leading indigenous oil and gas company in Nigeria. It starts with analysis of the theories, findings from the questionnaire survey by selected senior finance and production specialists' staff who are at the forefront of carbon

emissions data and reporting for Oando, followed by thematic analysis of semi-structured interviews using NVivo12. Next, it will establish the nexus between carbon risk assessment and reporting and the development of business strategy of Oando, using its five-year annual reports and stock performance as secondary data.

4.2. Theoretical Frameworks Analyses

4.2.1. PESTEL Framework Analysis

PESTEL is a recognized approach for analysis within the oil and gas field. Fragouli and Joseph (2016) assessed the external environment impact on oil company's operations and how it eventually influences the value of the oil company. They also identified the interrelated limitation of the factors and that not all factors of PESTEL framework enhance the effectiveness of risk management in the oil and gas industry. The PESTEL assessment was necessary since oil projects are risky due to external environmental factors. Oil and gas industry is considered as one of the most polluting sector in the world due to oil spills and increasing pollution rates on oil platforms. Most oil and gas sector projects lack the ability to maintain environmental integrity; this has led to environmental crisis. Most precisely, public outcry over environmental effects (environmental factor) of oil and gas companies has required government to enact new regulations (political factor) such that companies with health and safety capabilities may be awarded contracts or licenses (legal factor) to explore and exploit resources thus increasing the exploration and development costs (economic factor).

PR Newswire (2019) also analyzes the U.S. carbon market using the PESTEL framework. The report's unique analysis provides detailed information about the external factors that affect the market, how to manage business macro environment and gives insight into the carbon market in United States.

In practical application, the national government not only gives operating mining license to oil companies for extraction of crude resources but also has the responsibility to create an enabling environment where businesses can flourish without causing harm to the ecosystem. Although, due to globalization, laws and regulations are increasingly made at international level such as EU and WTO, yet there is an issue of national sovereignty on policies where government can revoke the license of defaulting oil companies.

Economic forces such as global financial institutions may boycott oil companies that are not reporting on their carbon emissions and mitigation. Also, monetary policy such as interest rates and fiscal policy such as carbon tax and penalties could be higher for non-compliant organization (He *et al.*, 2013; Rokhmawati and Gunardi, 2017).

Oil and gas firms are just a part of the broader social system they operate in. Hence, organization should respond to social factors such as culture, marketing and health by assessing and reporting on their carbon emission. For example, Oando is a multi-cultural organization, with offices in other countries like UK and Canada (MarketLine 2019; Oando, 2019). Therefore, oil firms can use carbon reporting as a social approach to environmental issues and represents a firm's response to society's expectations.

Oil companies' activities, such as gas flaring, cause pollution, resulting in global warming and climate change. Technological changes increase the attractiveness of alternative and low-carbon technologies. Technology, such as renewable energy, solar power invention and innovation rapidly displace existing technologies. Therefore, oil companies need to invest in technological innovation and R&D to capture and report carbon emissions and address increasing global demand for reliable supplies of oil and gas and new fuel sources. They need to embark on sustainable development such as carbon mitigation and reporting to achieve sustainable environment (Jones *et al.*, 2017).

Oil companies have legal requirement to extract and produce crude oil without harm to the community and environment. Otherwise, there could be consequences of threat of litigation, actual litigation, boycott or high carbon tax. In addition, changing regulations and policies are challenging for the oil companies. Governments make critical decisions based on geopolitical priorities of environment or economics of their nation. Therefore, globalization poses a challenge for oil companies venturing into new regions with different regulations where PESTEL framework will be adapted differently.

4.2.2. RBV Theory Analysis

Alsaifi *et al.*, (2020) stated that RBV is arguably becoming the dominant theory on environmental practices debate and how they are linked with firm performance. RBV clearly identifies the importance of the creation of resources to take a proactive approach on environmental issues. Companies' directors need to start emission mitigation from an in-depth understanding of firm-level footprints and the related firm-level strategies to reduce these footprints using available or newly developed unique resources (Boguski, 2010; Backman *et al.*, 2017) Such advantage-creating resources that organizations use to gain competitive advantage can be created, retained, or improved through various carbon disclosure practices that will enhance organizational reputation before stakeholders (Reid and Toffel, 2009). Strategic technologies, such as cloud computing, virtualization and green IT, are unique resources needed by businesses including Oando to cut costs, increase efficiencies and responsibilities (Issa *et al.*, 2010-b). In Nigeria where VCR is still optional, oil companies that engage in voluntary reporting will enjoy relative competitive advantage.

4.2.3. Dynamic Capabilities Theory Analysis

Tece *et al.*, (1997) stressed the need for dynamic capabilities; organization must show quick responsiveness to new business development such as carbon risk assessment and reporting. Sustainable competitive advantage can only be achieved with dynamic capabilities when organizations adapt quickly to the environmental changes. Both recognition and

anticipation of climate change opportunities are said to be significant and positively associated with sustainable competitive advantage (yourSRI, 2015; Eljido-Ten, 2017).

Saenz Delgado, S. (2014) implies that one of the major dynamic capabilities that firms must possess to respond and adapt to changes in the environment should be technology related. Technological innovation, such as pollutant reduction technologies, allows an oil and gas company to change its pollutants into less harmful emissions as well as yielding carbon credits with which they can also trade with higher emission companies. He suggests further that the foundations for developing dynamic capabilities are the ability of managers to recognize and interpret challenges in the external environment as opportunities instead of threats. This will lead to proactive and innovative carbon management policy responses (Okereke, 2007). Communicating these responses to stakeholders, that is stakeholder management, will strengthen co-operation with them and result in an organizational dynamic capability that will bring about sustainable competitive advantage.

These analyses indicate that by undertaking carbon risk assessment and reporting, organization could respond to climate change mitigation call from its macro environment, improve the organizational behavior, resources and capabilities and adapt them to enhance organization's performance and value, thus achieve sustainable competitive advantage.

4.3. Primary Data Findings

4.3.1. Questionnaire Survey

The questionnaire was sent to 32 respondents, while 30 responses were received. 100% of respondents opted into the survey.

As shown in the frequency and percentage tables in appendix B and C, the questionnaire was divided into 7 parts: Part 1 with question 1 to 5 is about respondent demographics. There are 5 respondents whose highest educational qualification is PhD, while majority possess M.Sc. /M.B.A. /M.Ed., and all possess at least one professional qualification. Table 2 shows participants' professional qualification(s). This infers that they possess the necessary skills and abilities to answer the questions. Half of the respondents have 6 to 10 years of work experience; one quarter has 11 to 15 years of work experience and 5 have over 16 years of work experience in the Nigerian oil and gas industry.

The designation of respondents is majorly in finance; however, there are responses from other professionals such as production engineers and geoscientists. 18 out of 30 respondents have spent between 6 and 15 years on their current designations. This implies that majority of the respondents have enough requisite experience of the job and should be able to provide the correct information on the topic.

Other Professional Qualification(s)	Frequency
ICAN	10
ACCA	9
ACCA, ICAN, CIMA	3
CIMA, ICAN	2
ICAN, ACCA	2
CMFGE	2
CPA	1
CIMA	1
Total	30

Table 2: Questionnaire Survey Participants' Professional Qualification(s)

The mode response is 86.7% (figure 9- pie chart). 26 out of the 30 respondents agreed that accountants develop business cases and manage performance relating to carbon accounting.

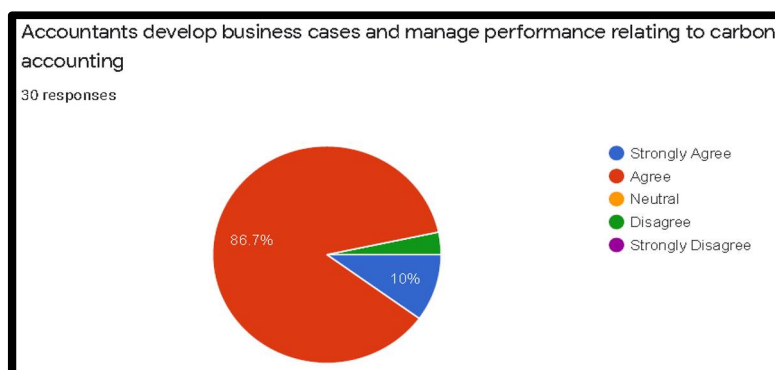


Figure 9: Survey Mode Response

This shows that accountants play a significant role in achieving both climate change mitigation and adaptation because carbon reporting is important to external stakeholders as they require true and fair representation of the organization carbon footprints (Finkbeiner, 2009; Gibassier and Schaltegger, 2015).

Accountants ensure improved firm's value by providing comprehensive, relevant and adequate information for the investors to enhance their informed business investment decisions and management to make decision that ensure firm's better performance. By and large, accountants will have to continue leading the vanguard for migration to cleaner energy sources to meet the global emissions reduction targets.

Opinion is most widely distributed to the point that the carbon risk assessment and reporting improve oil and gas companies' ability of raising capital. 20.7% of respondents strongly agree, 48.3% agree, 10.3% are neutral, 17.2% disagree and 3.5% strongly disagree. This shows that likely; many investors (local and international) do not sometimes consider the carbon reports before making investment decisions. This means that accountants will have to do more to institutionalize both VCR and MCR that could attract the right investors to turn things around in Nigeria.

Questionnaire survey key responses are graphically presented in figure 10. The next chapter will further elaborate on this.

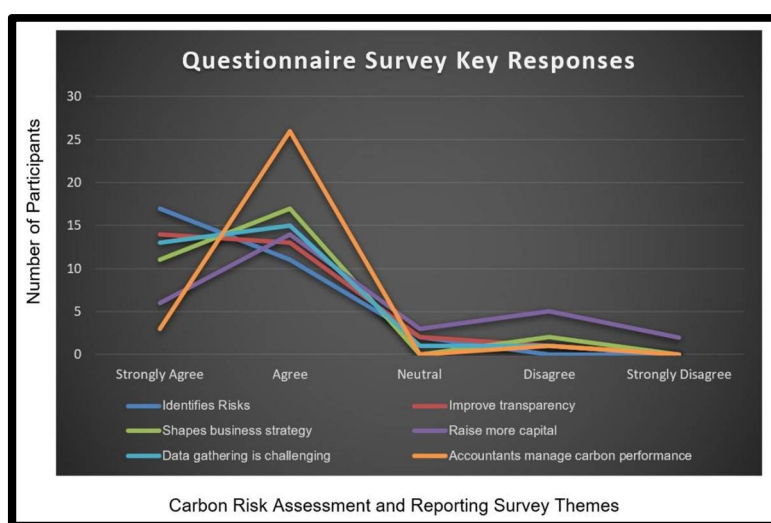


Figure 10: Questionnaire Survey Key Responses

4.3.2. Interviews

Thematic analysis was employed for the interview data analysis. Thematic analysis performed using NVivo12 on the nine (9) semi-structured interviews undertaken has generated a total of 97 codes with 466 references. From all the codes, 14 themes were identified. The themes that have emerged from the interviews are in table 2.

The interview responses show that as much as carbon reporting is important for climate change mitigation, there is not enough resources and capabilities to perform the disclosure in a way that will affect business performance and allow comparison in Nigeria. According to a production engineer in Oando, 'not that we are mandated to because we do not get any support from the government. We report voluntarily to be able to access our sustainability efforts and we think we should set the pace as industry leader'.

Another interviewee, a finance manager says, 'it has helped us to restructure our business operation to be more environmentally responsible. We enjoy an improved relationship with our host communities.'

The Head of Finance also said, 'the responsibility of gathering data collected in each emission units rest mostly with management accountants who collect the data to monitor performance and financial accountants report this in the annual reports. As a result, finance enjoys a good working relationship with all units in the organization.'

Themes	References	Percentage of Total References
Carbon risk assessment and reporting is novel and challenging in Nigeria	57	12.23
Accountants are committed to their carbon reporting role	53	11.37
Carbon risk assessment and reporting improves business reputation	50	10.73
Climate change is real, and mitigation is low	46	9.87
Lack of government regulations on carbon risk assessment and reporting in Nigeria	43	9.23
Carbon disclosure shapes business strategy	35	7.51
Carbon reporting should be made mandatory for oil companies in Nigeria	33	7.08

Themes	References	Percentage of Total References
Carbon reporting comparison is difficult, seen as corporate social responsibility	29	6.22
Lack of generally acceptable framework	28	6.01
Oil field engineers perform carbon risk assessment	21	4.51
Improves business dynamic capabilities and economic performance	20	4.29
Lack of resources like technology for carbon risk assessment and reporting in Nigeria	20	4.29
Voluntary carbon reporting done by Oando Plc	19	4.08
UK companies leading in reporting good practice	12	2.58

Table 3: List of Themes from Primary Data Thematic Analysis

These responses show that oil and gas companies need to adopt strategies that improve business sustainability to avoid reputational loss resulting in brand devaluation and revenue losses or additional capital expenditures.

The next chapter, particularly section 5.4 and 5.5, will discuss these further.

4.4. Secondary Data Findings

Oando first published sustainability report was its 2013 sustainability report and the latest was 2018 sustainability report (Oando, 2020-d). The company's revenue and profits/ (loss) over five years are shown in figure 11.

Oando's revenue increased, though unstable, each year since 2016 after an 11.5% decline in revenue in 2015. The revenue later increased by 18.3% in 2016, 6.1% in 2017 and 26.8% in 2018. The same effect was seen on the profit/ (loss) for the same period. A look into the financial performance of Oando shows an unstable increase in its annual profit / (loss) over five years after its sustainability report which included some elements of carbon emission disclosure. After coming out of loss from 2014 and 2015, Oando rose to profit position in 2016 though with declining increase in profit through to 2018.

Year 2014 and particularly 2015 were years that threatened the global economy, especially the oil and gas industry, due to challenging market conditions caused by sharp decline in oil prices since mid-2014 from over \$105 per barrel (bbl) to about \$37 per barrel (bbl) in 2015 (Baffes *et al.*, 2015). Therefore, the revenue and profit/ (loss) path of Oando between 2014 and 2018 matches that of the global economy. In addition, revenue and profit findings give solid evidence of robust accounting.

OANDO PLC Consolidated and Separate Financial Statements Five-Year Financial Summary (2014 - 2018) For the year ended 31 December 2018					
GROUP	2018 N'000	2017 N'000	2016 N'000	2015 N'000	2014 N'000
Property, plant and equipment	355,020,085	343,466,113	293,541,702	223,130,072	314,042,207
Intangible exploration assets, other intangible assets and goodwill	432,321,760	426,866,670	361,530,468	254,715,745	245,705,184
Investment property	1,033,000	1,033,000	-	-	-
Deferred income tax assets	45,093,156	46,108,713	44,758,179	35,042,529	12,328,465
Financial assets at fair value through profit or loss	11,106,341	-	-	-	-
Financial assets available for sale	6,424,732	7,540,014	10,653,425	5,067	10,834
Investments accounted for using the equity method	-	-	-	2,530,813	3,409,413
Deposit for acquisition of a business	93,992,819	108,221,428	90,350,582	74,298,769	123,118,474
Other non-current assets	(318,484,290)	(293,123,502)	(263,760,105)	(260,443,505)	(329,001,646)
Net current liabilities	(1,162,585)	-	(2,472,438)	(23,492,732)	-
Assets/(liabilities) of disposal group classified as held for sale	(76,848,651)	(99,587,920)	(101,639,606)	(55,998,437)	(162,328,636)
Borrowings	(214,662,084)	(222,207,944)	(198,908,983)	(155,907,424)	(148,727,530)
Deferred income tax liabilities	(56,717,572)	(54,880,692)	(41,711,512)	(42,986,971)	(14,945,994)
Other non-current liabilities	-	-	-	-	-
	277,116,711	263,435,780	192,344,579	50,893,926	43,610,771
Share capital	6,215,706	6,215,706	6,017,309	6,017,309	4,542,343
Share premium	176,588,627	176,588,627	174,806,923	174,806,923	131,554,223
Retained earnings	(128,534,432)	(138,677,099)	(151,868,568)	(199,723,265)	(150,300,361)
Other reserves	144,604,935	131,475,022	93,407,737	55,750,740	45,342,918
Non controlling interest	76,241,975	87,833,624	69,981,178	14,042,219	12,471,648
	277,116,711	263,435,780	192,344,579	50,893,926	43,610,771
Revenue	679,465,339	497,562,993	467,091,722	381,740,752	425,693,102
Profit/(loss) before income tax	11,188,120	27,068,142	(32,394,054)	(51,136,898)	(137,696,205)
Income tax credit/(expense)	17,609,623	(7,295,365)	36,306,661	1,447,021	(7,959,845)
Profit/(loss) for the year	28,797,743	19,772,776	3,912,607	(49,689,877)	(145,655,150)
Per share data					
Weighted average number of shares	12,431,412	12,406,408	12,034,618	11,940,150	8,698,231
Basic earnings per share (kobo)	197	113	30	(422)	(2,076)
Diluted earnings per share (kobo)	197	113	30	(274)	(1,390)
Dividends per share (kobo)	-	-	-	-	-

Figure 11: Five-Year Financial Summary (2014 - 2018) (Oando, 2019)

Oando stock market performance from 2014 to 2018 is shown in figure 12. Oando stock closed at trading day on Friday, December 28, 2018 at 4.90 Naira per share on the NSE but has lost 81.7% off that price valuation since it began in the year 2014 with a share price of 26.73 Naira, ranking 145th on the NSE in terms of year-to-date performance (African Exchanges, 2020).

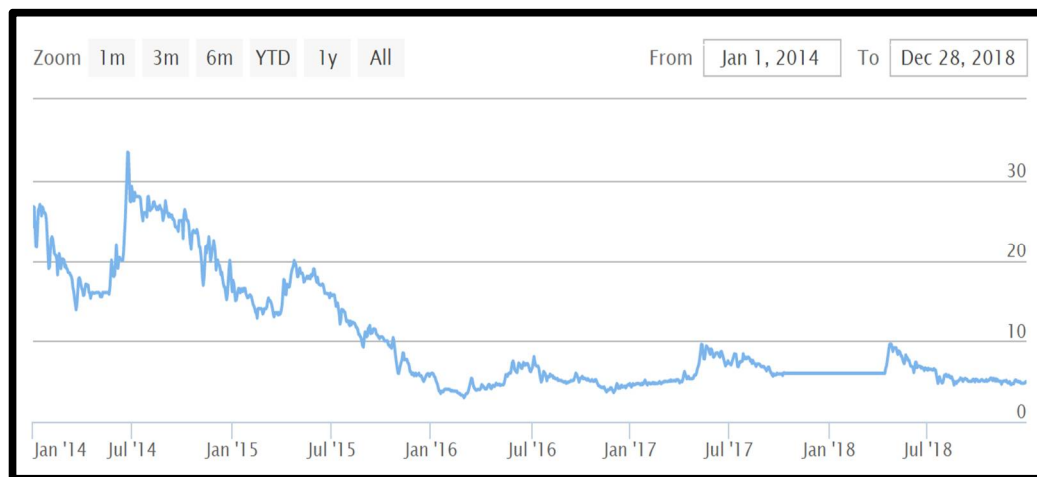


Figure 12: Oando Stock Market Performance (2014 - 2018) (African Exchanges, 2020)

Consequently, table 3 shows Tang and Demeritt, (2018) survey on some UK companies reporting requirement and their compliant, involving 168 companies in 10 sectors including oil and gas sector.

Industrial Sector	Firms in Sample	Reporting Prior to MCR	Subject to MCR	Fully Compliant With MCR	Exceeding MCR Requirements
Oil & gas	5	4 (80%)	5 (100%)	5 (100%)	1 (20%)
Basic materials	15	13 (87%)	1 (7%)	14 (93%)	5 (33%)
Industrials	39	21 (54%)	19 (49%)	25 (64%)	4 (8%)
Consumer goods	12	10 (83%)	12 (100%)	11 (92%)	5 (42%)
Healthcare	6	3 (50%)	6 (100%)	5 (83%)	3 (50%)
Consumer service	22	18 (82%)	22 (100%)	21 (95%)	6 (27%)
Telecommunications	5	4 (80%)	5 (100%)	5 (100%)	2 (40%)
Utilities	37	21 (57%)	5 (14%)	18 (49%)	7 (8%)
Financials	23	21 (91%)	23 (100%)	21 (91%)	10 (43%)
Technology	4	4 (100%)	4 (100%)	4 (100%)	0 (0%)
TOTAL	168	119 (71%)	116 (69%)	129 (77%)	43 (26%)

Table 4: Greenhouse Gas Reporting by Firm Study Sample (Tang and Demeritt, 2018)

Out of the 168 companies in the sample, 5 oil and gas companies were included and all 5 are subject to MCR. However, only 1 exceeds the MCR requirement by giving additional information over and above what is required. This shows that without a regulation mandating the disclosure, many companies, including oil and gas, might not fully disclose their emissions information except if they see the need to disclose voluntarily. This indicates that regulation (PESTEL political factor) is key to achieving good practice of carbon reporting and its benefits. The next chapter will discuss further on this.

5. Discussion

5.1. Introduction

The following discussion analyses are the most outstanding and pertinent findings from the primary and secondary data. It will present the discussion in relation to each of the identified objectives of this study. The findings from the questionnaire survey are explored. The analyses of six key themes from the qualitative primary data analysis generated from NVivo12 are also discussed and literature review were used to assess framework for carbon risk assessment and reporting as it affects the development of business strategy of Oando.

A total of 14 themes were identified from 97 different codes that were referenced 466 times. The six most referenced themes from NVivo12 analysis to be mapped to the key objectives are:

- Carbon risk assessment and reporting is novel and challenging in Nigeria
- Accountants are committed to their carbon reporting role
- Climate change is real, and mitigation is low
- Carbon risk assessment and reporting improves business reputation
- Lack of government regulations on carbon risk assessment and reporting in Nigeria
- Carbon disclosure shapes business strategy

5.2. Objective 1: To Examine Carbon Risk Assessment and Reporting Good Practice Generally in the Oil and Gas Industry

The third highest theme referenced at 9.87% found that climate change is real and mitigation is low. However, continuous struggle to advocate for stronger mitigation efforts and carbon risk assessment and reporting good practice that is seen generally in the oil and gas industry shows that efforts to greatly reduce climate change is ongoing. Many oil and gas companies in the UK, USA, Canada and Australia engage in both VCR and MCR. With carbon-pricing systems and carbon taxes, it is evident that putting a price on carbon could stimulate new forms of emission cutting innovations.

Britain, for example, legislated for massive cuts in emissions by 2050 (Legislation.gov.uk, 2008). This does not imply discontinuing all activities that cause emissions but taking out as much GHGs as let loose (Economist, 2019-e). Cutting-edge technology, such as 'negative emissions and solar geo-engineering', has been identified as useful in this regard (Jordaan *et al.*, 2017; Economist, 2019-f). It has put negative emission technology in motion with Drax power station in Yorkshire (Economist, 2019-b). The effectiveness of its emission reduction will be known when it is reported (Huisingh *et al.*, 2015). Furthermore, oil industry seems like a market that carbon capture and storage could grow into; many oil companies use enhanced oil recovery (EOR) by injecting CO₂ to bring oil out of the rock (Moolna, 2012; Flowers, 2017; Economist, 2019-b); reporting such activity could make a company stand out.

Furthermore, there is need for businesses to review their strategies due to financial crisis and climate change as well as the need to consider their priorities, expenses and save strategically. Issa *et al.*, (2010-a) identified the importance of cloud computing in analyzing the environment using the PESTEL framework and the future implications and limitations of adopting cloud computing as an effective eco-friendly strategy to reduce carbon footprint.

5.3. Objective 2: To Critically Assess the Current Level of Carbon Risk Assessment and Reporting in the Nigerian Oil and Gas Industry

The highest interview references agree that carbon risk assessment and reporting is new and challenging to practice in Nigeria which represent 12.23% of the total references. The participants are of the opinion that oil and gas companies do not underplay carbon reporting because it is viewed as a CSR with increased awareness. The concerted efforts on carbon mitigation and the willingness to undertake carbon risk assessment and reporting as a CSR point to their understanding of the essence of CSR to business and carbon reporting as environmental sustainability efforts (Beck *et al.*, 2010; Hopwood *et al.*, 2010; Antoncic, 2019). Yet, the involvement of the government and oil companies is low. This could be due to the fact that many oil and gas companies in Nigeria would require training on carbon risk assessment and reporting (Akinwande, 2014).

The fifth leading theme with 43 references shows that there is a lack of government regulation on carbon emissions in Nigeria. Although in the survey, 37.9% 'strongly agree' and 31% 'agree' but there are 10.3% 'neutral' and 20.7% 'disagree' that operators of oil fields in the Nigerian oil and gas industry might not comply with carbon reporting due to methodological uncertainty. This shows that even in the absence of regulation enforcement, oil companies can still embark on VCR (ENDS, 2012).

The data established that Oando identifies political, legal, economic and environmental risks as they relate to carbon risk assessment and reporting. It is noteworthy that respondents agree to this point more than any other in that sub-category with 62.1% 'strongly agree' and 37.9% 'agree'. Also, that Oando is opened to setting carbon disclosure and reduction targets as confirmed by 66.7% who agree and 23.3% who strongly agree. In the same manner, the study established that Oando possesses some level of resources and capabilities needed to perform carbon risk assessment and reporting. This could be seen from the profile of their personnel confirming that the company has qualified certified accountants and experienced hands that are skilled to carry out carbon reporting. Knowing where we are and what needed to be done is a great step towards the right direction.

5.4. Objective 3: To Critically Evaluate the Potential Benefits of Carbon Risk Assessment and Reporting for the Development of Business Strategy of Oando and the Effects on Its Business Performance

This study and many academic journals (IPCC, 2013; Hahn *et al.*, 2015; Fragouli and Joseph, 2016; Makeenko and Plastan 2017; Tang and Demeritt, 2017; 2018; Lemma *et al.*, 2020; Mohammed, S. D. 2020) established that carbon risk assessment and reporting improve transparency of oil and gas companies as it helps the public become aware of the level of carbon emission in the atmosphere and of the likely dangers that might be posed to the environment and human. This means that increase awareness on carbon risk assessment and reporting may further enhance accountability by oil and gas firms (figure 10).

Fifty (50) interview references, which represent 10.73% of total references, indicated that carbon risk assessment and reporting improve business reputation. This shows that oil and gas companies in Nigeria will likely be willing to embrace the practice since it has an established benefit (Okafor, 2018). This is evident in the current reputation of Oando as a top leading indigenous oil and gas company in Nigeria.

Nevertheless, all interview participants agree that carbon policies leave huge financial burden on a firm; similarly, 30% 'strongly agree' and 56.7% 'agree' in the survey. The Nigerian government to a great extent operates a mono-product oil-based economy which imposes high tax burden on the oil and gas firms who then see carbon assessment and reporting as an additional expense (Amadi *et al.*, 2020). Little wonder then that the exercise is mostly avoided except it a regulatory requirement (Tang and Demeritt, 2018).

There is an indication that there is a lack of political will to enforce carbon risk assessment and reporting policies in Nigeria. Nigerian oil and gas industry has not been fully deregulated; hence, there is government interference in the day-to-day operations of the private actors which makes policy enforcement prone to corruption. There is a weak legal framework to enforce carbon risk assessment and reporting violation by firms in Nigeria (Hassan and Kouhy, 2013). The Federal government of Nigeria is yet to ratify and enact the Petroleum Industry Bill (PIB) into law (Amadi et al., 2020). In fact, NNPC publishes its first audited financial accounts in 2020 after 43 years. Hence, there is no consequence for non-disclosure and non-reporting as confirmed by 30% 'strongly agree' and 60% 'agree' in the survey, making environmental information disclosure inadequate (Udo, 2019; 2020).

Further, the study found that carbon risk assessment and reporting data gathering is challenging because the process is not yet automated as it relies on input from technical operators in the oil field due to lack of infrastructure. Participants believe that if eventually implemented, carbon risk assessment and reporting will be the next game changer in Nigerian oil and gas industry space.

The annual reports of Oando from 2014 to 2018 indicate a slight steady growth in its financial performances. The share performance from same period demonstrated that investors might not have been taking cognizance of the sustainability reports of Oando which highlights its efforts at reducing carbon emissions from its operations activities and has invested a huge chunk of its revenue in various corporate social responsibilities that promote greener environment. When carbon disclosure becomes a common place, there is much likelihood that it will impact on investors' decision and improve Oando performance since carbon disclosure will further enhance the company's goodwill as it presents it as being environmentally sustainable and provides market advantage which improves its capital base.

The sixth theme established that carbon disclosure shapes business strategy with 35 references and 7.51% of total references. This is a benefit to all companies who are willing and ready to practice either VCR or MCR. Stakeholder management strategy is a dynamic capability a company could possess to remain competitive. Using stakeholders' relationships to lead organizations into deploying resources and capabilities to meet the threats and opportunities arising from emissions related to change in climate is essential (Ratnatunga, 2008). Companies' selection of mechanisms to deal with drivers and barriers to carbon disclosure is influenced by the level of commitment of stakeholders as well as strengthening the relationship with stakeholders to accelerate the organizational capabilities required for carbon reporting (Ratnatunga *et al.*, 2011; Lopes de Sousa Jabbour *et al.*, 2020). To have a sustainable competitive advantage, organizational capability should be communicated to commercial onlookers in a proper, reliable and open format. A proactive carbon policy tends to achieve highest possible operational efficiency and reduces risks to humans and the environment, for example, through engaging in green procurement and supply chain (Cook, 2009; McKinnon, 2010; Backman *et al.*, 2017).

5.5. Objective 4: To Critically Assess the Role of Accountants in Promoting Carbon Risk Assessment and Reporting in the Nigerian Oil and Gas Industry (Theme references to the importance of the roles of accountants is also above average).

It established that accountants are committed to their carbon reporting role with 53 references, representing 11.37% of all the references. Accountants confirm that they are ready to bridge any identified knowledge gap once the MCR is institutionalized by regulators. The findings established that accountants promote the disclosure of carbon emissions that impact firm's operations for environmental sustainability but other professionals such as production engineers' roles are as important as accountants' roles in firm's carbon risk assessment and reporting with 43.3% 'strongly agree' and 50% 'agree' to this point. 66% of respondents agree to the crucial roles of accountants (figure 10). It is noteworthy that only a handful of 3.3% of respondents disagree to the role of accountants and other professionals in promoting carbon risk assessment and reporting in Nigeria.

Although participants speak about many accountants in Nigeria not yet being aware of their roles in carbon risk assessment and reporting, it presents an excellent feedback as one interviewee said, 'This research will contribute to heighten awareness in the country.' Interestingly, 53.3% agree that accountants in Nigerian oil and gas industry will be ready to take up the role of carbon managers (Egbunike and Emudainohwo, 2017; Okwuosa and Amaeshi, 2018). This implies that accountants would be willing to attain self-improvement and obtain other professional qualifications. In addition, 86.7% of respondents agree that accountants develop business strategies that help manage performances relating to carbon accounting. Remarkably, this is the highest percentage in the survey. Therefore, accountants are responsible for minimizing information asymmetry and mitigate against investment risks to carbon emission in the annual reports (Bakker, 2013). This shows that investors' confidence in the carbon risk assessment and reporting to make viable investment decisions would be boosted.

6. Conclusion

The subject of carbon risk assessment and reporting is not altogether new, but little has been done or investigated about it in Nigeria. To fill this vacuum, this study is to shed light on the subject and address the major question of what would be the potential benefits of carbon risk assessment and reporting in Nigeria oil and gas industry and the implications for Oando. To answer this question, the research developed around four key objectives. Theoretical frameworks like PESTEL, RBV and Dynamic Capabilities were used to address the research aim and objectives. For example, PESTEL framework was used to examine how macro environment of an organization could influence its business operations. On the other hand, RBV shows how the internal environment of an organization (resources) affects the

external environment while Dynamic Capabilities address the need to have capabilities that can quickly be adapted to different situations.

Focusing on the gains, the aim of this research is to explore the potential benefits of carbon risk assessment and reporting for the development of business strategy of Oando and by extensions the Nigerian oil and gas industry. The research has found that carbon reporting enables a firm make sound decisions on economic and environmental issues (Magrini and Lins, 2007; Tang and Demeritt, 2018). It also provides relevant information needed for investment decisions and risk management (Yuan *et al.*, 2020). To manage the risks of climate change we face due to release of GHGs, markets should measure and reward good practices in controlling emissions. Therefore, investors and businesses alike are progressively recognizing the importance of understanding the risks and opportunities arising from climate change mitigation efforts.

Climate change-related information, such as carbon risk assessment and reporting integration into annual reports is an important step in helping investors understand the extent to which a company's strategy is addressing the issue and the extent to which corporate value is being protected and enhanced. To avoid creative accounting while presenting environmental information in annual reports, organizations could use CDSB Framework for legal disclosure requirement, to assess environmental risks and opportunity or to adapt good reporting practices and show leadership and accountability (CDSB, 2015).

In this study, financial accountants and other professionals in Oando were engaged and it was discovered that following good practices in carbon reporting will result in a win-win situation for the oil and gas companies, the oil producing communities and the investing public. The study majorly established that the oil and gas industry in Nigeria have not given carbon issue the priority it deserves possibly because it is not made mandatory by the government and is costly to execute. Meanwhile, many companies would rather voluntarily report or make it a CSR undertaking. The research also established that financial accountants would play a pivotal role as carbon managers in setting business case for carbon risk assessment and reporting and accountants will be ready to be trained alongside other professionals to actualize this aim and objectives.

Many potential benefits of carbon risk assessment and reporting for the development of business strategy of Oando in Nigeria oil and gas industry have been identified. At present, Oando's share is sought-after by investors at the Nigeria Stock Exchange (NSE) market as evident in its last 5 years financial reports. The company operates a very strong corporate governance principles and meeting its obligations to shareholders and investors even when Nigeria is bedeviled with economic recessions twice in the last 5 years.

Additionally, carbon reporting by Oando albeit voluntary has distinguished it from other competing firms in the industry. Investors' confidence is sustained leading to business expansion beyond the shore of Nigeria.

6.1. Limitations and Future Research

One limitation I encountered was that interview participants were somehow hesitant to give their express opinions as they might be considering the reputation of their organization and the need to uphold professional code of conduct because researcher is a former staff who might be viewed as spy for industry competitors.

Additionally, a major limitation is the use of single case study strategy and the use of purposive sampling technique. Oil and gas companies in the industry are quite many; hence, generalization based on responses from a single case study will be low (Saunders, et al., 2019).

Another limitation encountered is physical restrictions occasioned by Covid-19 pandemic. Interviews are conducted using internet mediated access which ultimately lacked the objectivity and personal touch of face-to-face interview; biased view could not be ruled out.

There is no general metrics of determining carbon levy across all the countries that have been implementing carbon risk assessment and reporting mandatorily. Hence, existing carbon levy is too low to serve as deterrent against non-compliance firms and organizations. This development has cropped up an intriguing question of how standardized carbon tax and carbon reporting could be achieved across board. This would be an interesting field for future related study to explore.

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Appendix

Questionnaire Section a Frequency Tables (30 Responses)

Highest Educational Qualification	Frequency
PhD	5
M.Sc./M.B.A./M.Ed.	14
B.Ed./B.Sc./B.A.	10
HND	1
Total	30

Table 5

Other professional qualification(s)	Frequency
ICAN	10
ACCA	9
ACCA, ICAN, CIMA	3
CIMA, ICAN	2
ICAN, ACCA	2

Other professional qualification(s)	Frequency
CMFGE	2
CPA	1
CIMA	1
Total	30

Table 6

Years of Work Experience	Frequency
16 years and above	5
11 - 15 years	8
6 - 10 years	15
3 - 5 years	2
Total	30

Table 7

Designation	Frequency
Finance Manager	5
Senior Finance Manager	4
Tax Manager	3
Senior Management Accountant	3
Financial Accountant	3
Geoscientist	2
Senior Tax accountant	2
Senior Financial Accountant	2
Business Development Manager	1
Assistant Finance Manager	1
Senior Production Engineer	1
Production Engineer	1
Supervisor	1
Head of Finance	1
Total	30

Table 8

Years spent on the Present Position	Frequency
11 - 15 years	3
6 - 10 years	15
1 - 5 years	12
Total	30

Table 9

Appendix

Questionnaire Section B Percentage Table (30 Responses)

S/N	Questionnaire	Strongly Agree (SA) %	Agree (A) %	Neutral (N) %	Disagree (D) %	Strongly Disagree (SD) %
A	Carbon risk assessment and reporting good practices generally in the oil and gas industry					
1	My company always identifies all possible political, legal, economic, and environmental risks as they relate to carbon risk assessment and reporting	62.1	37.9	0	0	0
2	My company underplays carbon risk assessment and reporting	6.7	20	13.3	46.7	13.3
3	My company is open to setting carbon disclosure targets	23.3	66.7	10	0	0
4	My company possesses the resources and capabilities needed to perform carbon risk assessment and reporting	33.3	40	13.3	10	3.4

5	My company always discloses clear carbon reduction targets	23.3	60	10	3.4	3.3
B	Current Level of Carbon Risk Assessment and Reporting in the Nigerian Oil and Gas Industry					
6	Carbon risk assessment is done in line with laid down international standards	50	30	13.3	3.4	3.3
7	Operators in the Nigerian oil and gas industry might not comply due to methodological uncertainty	37.9	31	10.3	20.7	0.1
8	Many oil and gas companies in Nigeria would require training on carbon emission assessment and reporting	43.3	56.7	0	0	0
9	Many oil and gas companies in Nigeria will be willing to undertake carbon risk assessment and reporting as a corporate social responsibility	41.4	55.2	0	0	3.4
10	Carbon risk assessment and reporting would improve transparency in the Nigerian oil and gas industry	40	56.7	0	3.3	0
C	Potential Benefits of Carbon Risk Assessment and Reporting					
11	Carbon risk assessment and reporting helps to communicate firm's performance against carbon disclosure targets	30	60	0	6.7	3.3
12	Carbon risk assessment and reporting shapes firm's business strategy	36.7	60	0	3.3	0
13	Carbon risk assessment and reporting provides a better idea of how a company's performance will be affected if a risk materialises	56.7	43.3	0	0	0
14	Investors decision will be enhanced with carbon risk assessment and reporting	34.5	55.2	10.3	0	0
15	Carbon risk assessment and reporting enhances a company's goodwill	23.3	70	6.7	0	0
D	Effects of Carbon Risk Assessment and Reporting on Business Performance					
16	Carbon policies and schemes impact operational costs	43.3	43.4	6.7	6.7	0
17	Carbon risk assessment and reporting improves a firm's business performance	30	53.3	13.3	3.4	0
18	Carbon risk assessment and reporting presents a firm as being environmentally sustainable	50	46.7	0	3.3	0
19	Carbon risk assessment and reporting provides market advantage for firms as it enables firms to be proactive	20	76.7	0	3.3	0
20	Carbon risk assessment and reporting improve oil and gas companies' ability of raising capital	20.7	48.3	10.3	17.2	3.5
E	Challenges of carbon risk assessment and reporting in Nigeria					
21	There is lack of political will to enforce carbon risk assessment and reporting policies in Nigeria	50	33.3	16.7	0	0

E	Challenges of carbon risk assessment and reporting in Nigeria					
22	There is a weak legal framework to enforce carbon risk assessment and reporting violation by firms in Nigeria	30	60	3.3	6.7	0
23	Carbon risk assessment and reporting increases the overhead costs of firms, so it is mostly avoided	30	56.7	3.3	10	0
24	Investors sometimes disregard carbon risk assessment reports when making investment decision	20	40	16.7	20	3.3
25	Carbon risk assessment and reporting data gathering is challenging	43.3	53.3	0	3.4	0
F	Role of accountants and other professionals in promoting carbon risk assessment and reporting in the Nigerian oil and gas industry					
26	Accountants promote impact assessment of carbon emissions on the firm's operations for environmental sustainability	30	66.7	0	3.3	0
27	Other professionals such as production engineers' roles are as important as accountants' roles in firm's carbon risk assessment and reporting	43.3	50	3.4	3.3	0
28	Many accountants in Nigeria are not aware of their roles in carbon risk assessment and reporting	26.7	43.3	6.7	23.3	0
29	Accountants in Nigerian oil and gas industry will be ready to take up the role of carbon managers	26.7	53.3	16.7	3.3	0
30	Accountants develop business cases and manage performance relating to carbon accounting	10	86.7	0	3.3	0
31	Accountants minimise information asymmetry and mitigate against investment risks relating to carbon emission	23.3	50	0	27.7	0

Table 10

Interview Questions

- Please introduce yourself (use pseudonym) and kindly state your current position
- Could you please state how long you have been in oil and gas industry and with this firm?
- What is your take on climate change and its mitigation?
- Could you briefly discuss carbon risk assessment and reporting good practice generally in the oil and gas industry?
- How would you describe the current level of carbon risk assessment and reporting in the Nigerian oil and gas industry and especially in your firm?
- Please briefly discuss how political, legal, economic and environment factors could affect carbon risk assessment and reporting in your company?
- What are the unique specific resources that are needed to extensively assess and report on carbon emission in your company?
- Are there measures and capabilities in place to address the dynamic nature of climate change mitigation and carbon emission disclosure?
- Could you talk about the potential benefits of carbon risk assessment and reporting in the Nigerian oil and gas industry? Please, give reason(s) for your answer.
- In your own view, what are the effects of carbon risk assessment and reporting on business performance?

- Do you think that there is sufficient regulatory framework on carbon reporting?
- What are the challenges of carbon reporting in Nigeria as it relates to the government, investors, and companies?
- How would you describe the role of professionals such as accountants and production specialist in promoting carbon risk assessment and reporting in the Nigerian oil and gas industry?