



Green Accounting and Financial Performance of Listed Oil and Gas Companies in Nigeria

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ABSTRACT:

The study evaluates the effect of green accounting on the financial performance of listed oil and gas companies in Nigeria. The study covered a period of 2012 to 2022. Secondary data gotten from annual financial reports were employed. Utilizing the Panel Cointegration analysis, the study reveals a negative and insignificant relationship between green investments and profit after tax. This underscores that investments made in controlling pollution do not have a significant bearing on the net income of listed oil and gas companies in Nigeria. Conversely, green investments are found to be positively and significantly related to the return on assets. This finding implies that the cost of pollution prevention has a beneficial impact on a firm's efficiency in generating profits from its assets. Green activities management were found to have a negative and insignificant effect on profit after tax, while exerting a negative and significant effect on return on assets. This emphasizes the negative influence of community development expenditures on the efficiency of listed oil and gas companies in generating profits from assets. Based on these findings, the study recommends that the management of listed oil and gas companies must develop a comprehensive sustainability strategy. A sustainability strategy that aligns with the company's overall business strategy can help identify opportunities for remediation costs that can improve financial performance. The strategy should cover all aspects of the business, from supply chain to operations to product development.

Introduction

Nigeria, with its substantial industrial goods reserves, plays a pivotal role in the global industrial sector. The exploitation and production of these resources have historically been associated with environmental degradation and socio-economic challenges (Akanle, 2019). This exploration is typically done by listed oil and gas companies. In the wake of unabated pollution, green accounting practices were enforced. Green accounting (EA) is a multidimensional approach that aims to incorporate environmental factors into traditional accounting practices. This comprehensive methodology recognizes the impact of economic activities on the environment and seeks to quantify and assess these effects in financial terms (Smith, 2020). As the global focus on sustainability and environmental stewardship continues to intensify, green accounting has gained prominence as a tool for organizations to understand, manage, and communicate their environmental impacts (Buhanita, 2015; Szczanowicz & Saniuk, 2016; UNIDO, 2018). One significant aspect of green accounting is the incorporation of environmental costs and benefits into financial statements. This involves identifying and quantifying various environmental costs, such as pollution control expenses, waste disposal fees, and environmental remediation costs. By integrating these costs into financial statements, businesses can provide a more accurate representation of their overall performance, including their ecological footprint. The lack of a universally accepted definition of EA could be attributed to the deviation in perceptions of the concept. The dimensions of EA outlined by Carroll (1993)—philanthropy, ethics, legal, and economy—have been interpreted based on the business conditions (Lee & Jung, 2016; Szczanowicz & Saniuk, 2016).

In addition to defining EA, researchers have attempted to determine whether EA is a valued component of contemporary business operations. One prevailing theory is that corporations exhibit strong social performance when there is a well-established association with their financial performance. Leaders of corporations operating in widely different industries maintain the belief that a balance must be achieved between financial goals, social involvement, and environmental action to realize lasting organizational sustainability (Boaventura, Silva, & Bandeira-de-Mello, 2012). Maintaining a balance between social responsibility, environmental stewardship, and economic viability along the entire supply chain improves the long-term economic performance of a company and aids in meeting the customer's needs and expectations (Ansari & Qureshi, 2015). Researchers also suggest that progress in EA efforts is dependent on the public's perception of the role businesses play in society (Doane, 2005; Sarbutts, 2003), so businesses should be vested in presenting a positive image. Another commonly held notion among scholars and environmental experts is that global corporate citizenship is based on the concept that corporate success is dependent on a prosperous and stable society and that businesses must be consigned in improving global conditions (Barnes, 2011). Currently, human civilization is experiencing profound challenges due to the marked shift in scarcity from people to natural resources and the resulting wealth imbalance that is created in a capitalistic marketplace (Barnes, 2011). Consequently, businesses are incentivized to adjust their long-term organizational sustainability strategies accordingly (Barnes, 2011; Lovins et al., 2007).

Researchers have also attempted to establish a statistically significant relationship between investments in EA and organizational performance. Several studies evaluated the extent to which recent quantitative studies have contributed to the continued development of EA-financial performance concept (Boaventura et al., 2012). Most of the studies employed return on assets (ROA) to express financial performance, followed by return on equity (ROE), return on sales (ROS), sales, and operational profit, whereas EA was mostly measured using corporate stakeholder perceptions in the areas of the global environment, employees, and community (Boaventura et al., 2012). A substantial number of researchers reported a positive relationship between EA and financial performance, justifying a corporate EA investment profit-minded rationale (Boaventura et al., 2012; Tsoutsoura, 2004). Researchers have also reported a statistically significant relationship between the degree of a firm's EA investment and their previous financial performance (Rusinova & Wernicke, 2016), suggesting that changes in a firm's financial costs affect subsequent EA investments. Given these specific constructs, businesses view EA as an integral part of their operational strategy (Rowe, Nowak, Quaddus, & Naude, 2014).

In pursuit of perceived potential financial advantages of EA investments, business leaders have made and continue to make substantial expenditures. In 2010, 184 of America's leading companies invested approximately \$15.5 billion dollars' worth of cash and products, amounting to just above 9% of profits before taxes (Rowe et al., 2014). In Australia, 10 of the largest corporations invested over AU\$500 million in the community in 2010. However, although these investments may well yield performance advantages, the internal capabilities of firms (i.e., product differentiation and outside investments) have a profound impact on the degree of positive relationship between financial performance and EA involvement (Lee & Jung, 2016). These

complicating factors represent additional challenges in decision making for business leaders involved in considerable EA investments.

As organizational performance addresses an organization's reaction to a disturbance, we consider the financial outcomes of companies in the face of three different adverse events. Furthermore, we consider these disruptions with an aim to capture organizational performance in two kinds of situations, i.e. (1) a situation triggered by a major financial shock, and (2) a situation linked to an environmental jolt. To examine the relationship in the first context, we assess the financial performance of companies to the global financial crisis of 2007. Concerning the environmental side, we assess company's performance to environmental-regulatory and company-specific environmental jolts caused by environmental controversies. In order to further investigate this topic and if 'doing business while doing good' is possible, this study will analyse the effects green accounting factors on corporate financial performance. The study will therefore evaluate the influence of green accounting on firm performance of listed oil and gas companies in Nigeria.

Statement of the Problem

Over the last few decades, concerns about the environment are dramatically increased especially in relation to the activities of the listed oil and gas companies. These concerns are driven by the fact that the average national and global temperature is increasing, the amount of snow and ice is decreasing, and sea levels are rising, which has widespread impacts on human and the overall ecosystem (IPCC, 2014). While the human-induced greenhouse gasses (GHG) emissions are the main contributor to global warming, IPCC (2014) find that humans are influencing the climate system with a growing rate. As depicted in figure 1, the global decadal average temperature is continuously increasing since the industrial revolution era. It is clear now that among human-induced GHG emissions, industrial emissions are the main contributor, where they contributed the carbon emissions of about 78% to the total GHG emissions from 1970 to 2010 (IPCC, 2014). As these emissions are driven by an increase in energy usage, mainly from fossil fuel, a growth in world population and economic activity will further worsen the problem of climate change. Therefore, the impact on human wellbeing cannot be reduced if the path of sustainable development is not adopted (OECD, 2016).

Having a major contribution to the global GHG emissions, companies have been encouraged to implement environmentally friendly policies to address climate change and environmental issues, mitigate the economic impact on the environment, and develop eco-efficiencies (Linnenluecke et al., 2016; Banerjee et al., 2019). At an international level, institutions such as the World Business Council for Sustainable Development or the Conferences of Parties (COP) strongly support such practices (Bazillier et al., 2017). Environmental issues have thus become a crucial issue for companies, and all the more because stakeholders seem to be more and more sensitive to these elements (Flammer, 2013). An analysis conducted by PRI-Novethic (PRI-Novethic, 2017) reveal that global investors are considering actions on climate change as one of the most important long-term trends for investment. In their survey on PRI signatories, a 74% of 302 asset owners and 63% of 935 investment managers considered climate change as a long-term issue for action. Besides, a recent survey by KPMG reports that a solid majority of world's largest 250 companies (67% in 2017) are now disclosing their emissions abatement targets. Furthermore, the Global Risks Perception Survey (World Economic Forum, 2020) show that for the first time in history the environmental concerns have dominated all the global risks by likelihood. The survey shows that all the top five global risks by likelihood spots are occupied by the environmental risks, whereas, three of the top five risks by impact are also environmental. This indicate that companies are now facing a significant pressure from stakeholders, and they are acting on this by adopting environmental policies to make their production and processes eco-efficient.

While companies are trying to address the environmental issues, they are simultaneously confronting a turbulent and continuously evolving marketplace. Extreme events like natural disasters, terrorist attacks, organizational controversies, and pandemic diseases (like the recent COVID-19) are frequently disrupting supply chain and paralyzing the financial markets. While unexpected events and sudden changes in the natural or financial environment are frequently surprising them, companies are now facing more and more challenges to survive and compete. Indeed, companies will then need to mobilize their resources in a way to create performance in organization. A resilient organization has "both the ability to persist despite disruptions and the ability to regenerate and maintain existing organization" (Gunderson and Pritchard, 2002, DesJardine et al., 2017). In a challenging and unexpected adverse environment, resilient organizations have the ability to mitigate the shocks and to bounce back.

Despite capturing the success of an organization against disruptions, organizational performance remains unexplored in empirical academic literature. This work remain scarce may be because organizational performance is difficult to measure (DesJardine et al., 2017). Very few studies link some organizational attributes to this organizational outcome, while organizational performance can be measured by the recovery of company' market price to the level before a disruption. Gittell et al. (2006) examined the recovery of US airline companies in the aftermath of 9/11 terrorist attacks and find that a viable business model and financial resources help companies to recover faster from a crisis. While examining the role of CSR practices in recovery from the global financial crisis of 2007, DesJardine et al. (2017) find that strategic CSR practices, that establishes long-term adjustments in and builds interdependencies across organizational structure, improve the financial performance relative to tactical CSR practices. Moreover, Ortiz- de-Mandojana and Bansal (2016) find a low rate of failure of firms with high CSR relative to their matching peers in the industry.

Considering both the environmental and financial claims during a distress situation, it is however not clear that the resources dedicated to address the environmental issues are penalizing or helping companies. To consider the financial impact of high environmental performance (henceforth EP) on company's financial performance (henceforth FP), majority of previous work show a positive impact while few studies show a negative or no impact at all, therefore, remains inconclusive (Horvathova, 2010). According to the neoclassical economists' shareholders' expense view, for example Friedman (1970), "the social responsibility of business is to increase its profits". Then, spending money on social-responsibility activities such as environmental protection may drain resources from the business that could be mobilized in the core or other functions of the business to maximize profits, hence shareholders wealth. It seems unrealistic for managers to achieve various goals simultaneously, i.e. financial and social goals (Jensen, 2001), therefore, it may create the agency problem due to the difficulties for shareholders to monitor them (Barnea and Rubin, 2010). Managers may then pursue their own interests (Barnea and Rubin, 2010), entrench themselves (Jiraporn&Chintrakarn, 2013, Cespa& Cestone, 2007, Surroca&Tribo, 2008, Chahine et al., 2019) and use it to mitigate control mechanisms (Surroca&Tribo, 2008, Fabrizi et al., 2014).

On the contrary, the natural resource-based view (Hart, 1995, Russo and Fouts, 1997) sees EP as a key resource for firms, suggesting that environmental engagements improve firm reputation of being eco-friendly and can gain competitive advantage through the acquisition of rare, valuable, imperfectly imitable and non-substitutable resources. As stakeholders seem more and more sensitive to the environmental issues (Flammer, 2013), high EP may protect company from the consequences of a bad environmental event and may consider it as an anomaly (Bansal and Clelland, 2004). In this vein, high EP may then provide the insurance-like benefits in case of negative events (Godfrey et al., 2009). Recent work has identified some other benefits of EP, for instance, green firms may have easier access to finance (Banerjee et al., 2019, Nandy and Lodh, 2012, Cheng et al., 2014) and a lower cost of capital (Sharfman and Fernando, 2008, Heinkel et al., 2001, Gupta, 2018, Chava, 2014). Furthermore, high EP is also associated with a protection against the consequences of stringent environmental regulations, while carbon intensity is attributed to the latent environmental liability in the shape of future compliance or emissions abatement cost (Clarkson et al., 2015, Chapple et al., 2013, Clarkson et al., 2004).

The significance of the study on the relationship between green accounting and financial performance in the industrial goods sector, particularly in a context like Nigeria, has broad-reaching implications for both practitioners and scholars. The core content of the study revolves around evaluating the impact of green accounting on financial performance. Specific attention is directed towards the industrial goods sector, signifying an industry-centric focus. The study covers a decade-long period from 2011 to 2021. This time frame is substantial enough to capture significant trends, transformations, and impacts, providing robust findings that may be relevant for both contemporary and historical analyses. The geographical boundary of the study is confined to Nigeria, a nation with significant industrial goods resources and unique socio-economic and regulatory contexts. This localization enables a targeted investigation that may yield insights specific to Nigeria's industry and regulatory landscape. The unit of analysis is at the organizational or meso level, focusing on individual listed oil and gas companies. This allows for an in-depth examination of company-specific practices, strategies, and outcomes, rather than broader industry or macroeconomic trends.

Literature Review

Concept of green accounting

Green accounting is an essential subset of accounting, focusing on integrating environmental costs with traditional financial information (Burritt et al., 2002). It encapsulates the internal recording and monetizing of environmental costs and benefits, providing stakeholders with vital information. It is a multidimensional

approach that aims to incorporate environmental factors into traditional accounting practices. This comprehensive methodology recognizes the impact of economic activities on the environment and seeks to quantify and assess these effects in financial terms. As the global focus on sustainability and environmental stewardship continues to intensify, green accounting has gained prominence as a tool for organizations to understand, manage, and communicate their environmental impacts. One significant aspect of green accounting is the incorporation of environmental costs and benefits into financial statements. This involves identifying and quantifying various environmental costs, such as pollution control expenses, waste disposal fees, and environmental remediation costs. By integrating these costs into financial statements, businesses can provide a more accurate representation of their overall performance, including their ecological footprint.

Additionally, green accounting encompasses the concept of "natural capital accounting," which assigns economic value to natural resources and ecosystem services. By attributing a financial value to resources like clean air, water, and biodiversity, organizations can better grasp their dependence on these resources and make informed decisions to ensure their sustainable use.

Natural capital accounting also aids policymakers and stakeholders in understanding the trade-offs between economic development and environmental preservation. For instance, when considering the construction of a new industrial facility, a natural capital accounting approach would assess the potential loss of ecosystem services against the economic benefits generated by the facility. This holistic perspective facilitates more balanced decision-making that takes into account long-term environmental and economic implications (Johnson, 2019). While green accounting is undoubtedly a step in the right direction toward sustainable business practices, its adoption is not without challenges. Some critics argue that assigning monetary values to environmental resources can oversimplify their intricate ecological importance. Moreover, implementing comprehensive green accounting systems can be resource-intensive and complex, particularly for smaller businesses with limited financial resources. The characterization of EA has continued to evolve across the spectrum of social institutions. The traditional perception of EA is that companies should conduct business with social interests in mind, despite the short-term risks to business outcomes (Agudo-Valiente, Garcés-Ayerbe, & Salvador-Figueras, 2015). The early literature characterized EA as the commitment a company assumes to meet the standards established by society and governmental agencies (Cholette et al., 2014). Referring to the incorporation of social and environmental matters into strategic planning, the European Commission described EA as the responsibility of companies for the impact they make on society. The ethical focus of EA has diminished over time as corporate sustainability and corporate social performance gain prominence in defining EA (Moura-Leite & Padgett, 2011).

Dimensions of green accounting

Green investment (GRI)

Green investment refers to the funds that organizations spend on activities and technologies aimed at reducing or completely eradicating pollution and environmental degradation (EPA, 1992). The components include: Technological Investment: Implementation of cleaner technologies that minimize pollution at the source, rather than treating or disposing of waste (Klassen & Whybark, 1999). Training and Education: Educating employees about environmentally friendly practices can be part of GRI (Daily & Huang, 2001). Monitoring and Compliance: Ensuring adherence to environmental regulations and standards often entails costs for monitoring and enforcement (Gray & Deily, 1996). GRI can lead to long-term savings, enhance corporate reputation, and align with regulatory compliance (King & Lenox, 2002). Although, high initial investment, uncertainty about financial returns, and potential resistance to change within an organization (Sharma & Vredenburg, 1998). In the industrial goods sector, GRI can be highly significant due to the industry's inherent environmental risks, such as oil spills, emissions, and habitat destruction. Investments in GRI can mitigate these risks and demonstrate a commitment to sustainable operations (Gunningham et al., 2004).

Green activities management (GAM)

Green activities management encompass investments made by a corporation in the social, educational, health, and economic development of the community in which it operates (Porter & Kramer, 2006). Components of GAM are Education and Healthcare: This might include building schools and clinics or providing scholarships (Wartick & Cochran, 1985). Infrastructure Development: Investments in roads, water supply, and other essential services can fall under GAM (Carroll, 1999). Social Welfare Programs: Various community support and development programs like supporting local entrepreneurship, women empowerment, etc., could be included (Moir, 2001).

GAM enhances corporate image, fosters community support, and often leads to a more stable operating environment (Bhattacharya et al., 2008). Although, aligning community expectations with corporate goals, measuring the effectiveness of community investments, and avoiding perceptions of corporate paternalism (Muthuri et al., 2009).

For listed oil and gas companies, especially in regions with significant socio-economic disparities, such as Nigeria, GAM can be an essential part of building trust with local communities and ensuring the sustainable extraction of resources. It is also often part of broader corporate social responsibility strategies (Idemudia, 2009).

Both Green investment and Green activities management are reflective of a modern business paradigm that recognizes the interconnectedness of economic, social, and environmental factors. While GRI focuses on internal practices to mitigate environmental impacts, GAM takes a broader, more outward-facing approach, building relationships and contributing to community well-being. In the context of the industrial goods industry, these expenditures are not only seen as ethical or socially responsible practices but increasingly as strategic imperatives, as they can contribute to risk mitigation, regulatory compliance, and building goodwill with various stakeholders.

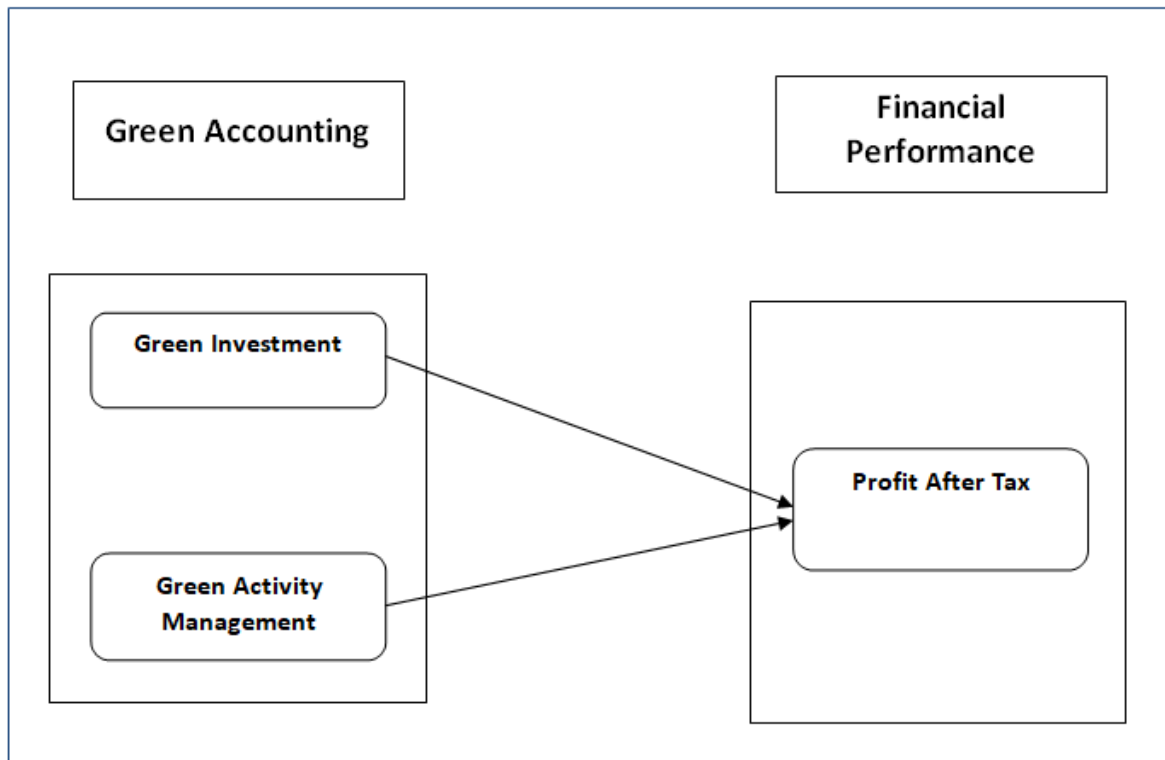


Figure 2.3: Operational Framework of green accounting and Financial Performance of listed oil and gas companies

Source: *The Researcher's Conceptualization 2024.*

Green accounting and Financial Performance

The EA literature has reflected that economic outcome is associated with firms' level of social involvement, even when considering stakeholder concerns (Agudo- Valiente et al., 2015). Studies exploring the relationship between EA and financial performance have revealed mixed results. Several researchers reported little to no association or a negative association between EA and financial performance (Srichatsuwan, 2014; Tsoutsoura, 2004). For example, Inoue and Lee (2011) reported a positive effect of the employee relations and product quality elements of EA on shortterm profitability, but the community relations and environmental EA elements had an insignificant effect. Brammer, Brooks, and Pavelin (2006) also concluded that composite social

performance gauges, including environmental and community aspects, were negatively correlated to stock returns, and that the poor financial performance was attributed to good social performance.

Other scholars have supported a positive correlation between EA and financial performance. Mikolajek-Gocejna (2016) performed an analysis of 53 empirical studies on the correlation between EA and financial performance and found that 71.7% of the studies indicated a positive relationship. Additionally, Boaventura et al. (2012) conducted a meta-analysis of 58 empirical and quantitative articles describing the relationship between firms' social performance and their financial performance, and the main result was a positive association with the financial outcome when firms engage in social and environmental-based EA. This result expanded the findings of Orlitzky, Schmidt, and Rynes's (2003) meta-analysis, which reported an overall positive EA-financial performance correlation, with moderation by the operationalization of both EA and financial performance. Several authors have suggested that the lack of agreement on the theoretical significance of EA concepts has led to diverse EA performance outcomes. The disparity in results may be attributed to the range of EA performance measures employed by researchers (Galant & Cadez, 2017; Gbadamosi, 2016; Tsoutsoura, 2004). Some researchers have argued that EA measurement approaches should reflect stakeholder interests due to the stakeholder theoretical foundation and multidimensional construct of EA (Boaventura et al., 2012; Gunawan, 2007). EA reputation ratings, content analysis of EA disclosures, and EA questionnaire surveys are measurement strategies for assessing social performance.

Theoretical Framework

The Stakeholder Theory

Stakeholder theory is the most employed theoretical framework for evaluating EA and is the primary motive of business managers for EA initiatives beyond regulatory requirements (Cantrell, Kyriazis, & Noble, 2015; Perrini, 2006). The term stakeholder was not defined prior to 1963 and has since been defined as individuals or sets of individuals who can affect an organization's objectives (Freeman, 1984). The core concept of the theory is that organizations are required to address stakeholder concerns while conducting business (Sen & Cowley, 2013). Researchers over the years have challenged the notion that organizations are required to address stakeholder issues and have now emphasized the concept of a dutiful relationship towards stakeholders (Sweeney, 2009). The relative salience of multiple stakeholders drives the prioritization of EA managerial attention and accompanying resources (Cantrell et al., 2015). Primary stakeholders include employees, customers, and suppliers, while secondary stakeholders are those who were not directly influencing the outcomes and overall survival of a business. Although Freeman's (1984) original description of stakeholder theory did not specify levels of stakeholders, the theory remains a prominent component in EA research as the moral and ethical rationale regardless of stakeholder level (Srichatsuan, 2014). Stakeholder theory influences EA strategies of firms and provides a lens through which to evaluate those strategies (Cantrell et al., 2015; Moura-Leite & Padgett, 2011). However, it may not be fully applicable for smaller firms (Perrini, 2006; Sen & Cowley, 2013).

Social Capital Theory

Social capital theoretical concepts have developed over time. The term social capital dates back to the early 1900s, with a broad reference not to the traditional connotations of the term capital but to the less tangible concept social networking (Bourdieu, 1986; Hanifan, 1916; Sen & Cowley, 2013). This early impression served as the inspiration for the seminal work of Coleman (1988) and Putnam (1993), which led to the development of the two prevailing theoretical models for social capital. In the first model, Coleman and Bourdieu suggested that social capital is not a single entity, is defined by its functions, and exists essentially in the structure of relationships between and among individuals. This concept contrasted with Putnam's model, which showed social capital as an attribute of communities. The current literature describes social capital as the available goodwill among individuals and groups, with effectiveness coming from the flow of information, influence, and camaraderie between actors (Adler & Kwon, 2002; Sen & Cowley, 2013). Putnam (2000) conveyed that the networking framework amid these groups of actors, fostered by social capital actors, is a determining factor in the groups' economic prosperity and competitiveness. Social networking with stakeholders is a significant EA tactic for SME firms (Russo & Perrini, 2010; Sen & Cowley, 2013). Social capital theory is more appropriate to understand the relationship between EA and SME than stakeholder theory (Perrini, 2006). Thus, social capital can serve as the theoretical framework for the evaluation of EA-SME relationships and supports SME management in developing EA strategies, given the fundamental principles of social capital theory (Perrini, 2006).

Empirical Framework

Weston and Nnadi (2023) conducted various tests to establish a link between green accounting via Corporate Social Responsibility (CSR) and Corporate Financial Performance (CFP). This paper adds a strategic management element by establishing various frameworks that corporations can include in the decision-making process and includes CSR and Environmental, Social and Governance (ESG) principles when making investment decisions. The sample chosen for this paper includes the iShares MSCI KLD 400 Social exchange traded fund (ETF), iShares Core S&P 500 ETF as well as firms that follow the Principles for Responsible Investing (PRI). Overall, there is no evidence to suggest that ethical ETFs outperform conventional ETFs however PRI following firms outperform those who do not follow the guidelines.

Taqi et al. (2021) determined the development of research trends on green accounting published by national and international journals. The data analyzed consists of 500 indexed research publications during the period 1981-2020. The data is then processed and analyzed using the R Bibliometric application to determine the bibliometric map of green accounting developments. The results showed that the number of publications on the development of the role of research related to green accounting has increased significantly. Then, the most common type of document that analyzes green accounting is journal articles. The most popular writer was Wood R, who during the research period he consistently conducted research on this theme, and the most popular keywords were energy, environmental and assessment.

Ifada et al. (2021) examine the effect of environmental performance, independent board of commissioners, and firm size on environmental disclosure measured by the Indonesian environmental index. The population in this study is manufacturing and coal mining companies that follow "PROPER" and are listed on the Indonesia Stock Exchange (IDX) from 2017 to 2019. This research was conducted by reviewing annual reports to collect information on environmental disclosures. The sampling used in this study was purposive sampling technique and obtained a sample of 117. Also, the data analysis technique used was multiple linear regression analysis with statistical hypothesis testing. The results showed that environmental performance and firm size had a positive effect on financial performance. Meanwhile, the independent board of commissioners does not affect financial performance. Furthermore, environmental performance, firm size, and financial performance have a positive effect on environmental disclosure. While the independent board of commissioners does not affect environmental disclosure. The findings of this research suggest that environmental performance has a significant positive effect on financial performance. The hypothesis is accepted, meaning that companies that are sensitive to environmental problems and run eco-efficiency operations will strengthen the company's profitability.

DesJardine et al. (2017) also examined the contribution of social and environmental practices to organizational performance but in the aftermath of the subprime crisis of 2007. The authors discriminate these CSR practices in two categories, labelled as strategic and tactical practices. Strategic SEPs include practices that are embedded within an organization. They measure these practices by "the sum of firm's strengths from KLD database in categories of environment, diversity, employee relations, human rights, product quality and safety, and corporate governance". Besides, tactical SEPs represent philanthropic contributions of firm that do not require a substantial adjustment in an organizational structure. The authors also took tactical practices from KLD database, by taking the "sum of firm's strengths in the community domain that include charitable giving strength, innovative giving, non-U.S. charitable giving, support for housing, support for education, volunteer programs, and other strengths". The authors considered the stability, measured by the severity of loss in firm value, and flexibility, measured by the time to recovery of firm value, as the two financial dimensions of organizational performance. They employed the two-stage least squares and Cox PH models to investigate the impact of SEPs on stability and flexibility of 963 U.S.-based firms. The authors find that strategic SEPs improve both the stability and flexibility dimensions of performance in face of the subprime crisis. They also postulate that tactical SEPs improves the financial flexibility of firm, although less important, but they could not find significant evidence in support of this hypothesis. The authors argue that tactical practices do not create interdependencies among organizational system relative to strategic practices, and that, therefore, strategic practices contribute more to organizational performance that enable them to cope with a financial shock.

Ortiz-de-Mandojana and Bansal (2016) study the collective contribution of company's social and environmental practices (SEPs) to organizational performance. Though, their study is based on a long-term approach rather than focusing on a single environmental shock, one of their method, i.e. comparing the failure rates of companies in the sample period, may be relevant to organizational performance. The authors applied a matched-pair analysis to compare the performance of treated group, firms with high SEPs from KLD 400, with a control group. To identify the candidates of the control group, they applied propensity score matching technique by

considering firm's total assets, net sales, return on assets, return on equity, and return on sales. By taking 121 pairs of matched companies over a period 1994-2008, the authors compared the financial volatility, sales growth, and survival rates. Financial volatility for each year is measured by taking the standard deviations of monthly market returns. The authors considered the long-term growth by accumulating the growth in sales over the sample period. Survival is measured by the survival rates through a survival model, i.e. Cox (1972), which considers if a firm is failed or not in the sample period and its duration of survival. By applying matched-pairs t-test and repeated ANOVA test, the authors observed a low financial volatility, higher growth, and rates of survival of firms with high SEPs. Furthermore, they did not find significant evidence in support of a hypothesis that postulates that firms with high SEPs have lower profitability over the short-term; lower profitability is measured by change in return over assets between two consecutive years. The authors argue that high SEPs enable firms to cope with shocks and keep them on their desired state, thus showing less volatility and high stability. Furthermore, they argue that SEPs help companies to attract more customers that adds to their growth.

Considering the reviewed study, several gaps can be identified within this literature that may warrant further exploration and investigation. The existing literature demonstrates mixed results regarding the EP-FP link, with some studies indicating positive, negative, or even insignificant relationships (Endrikat et al., 2014; Horvathova, 2010; Jacobs et al., 2010). This inconsistency could stem from the following: Different studies employ diverse methodologies such as portfolio analysis, event study, and regression analysis, leading to heterogeneous findings (Horvathova, 2010). The utilization of different measures of EP and FP may lead to disparities in outcomes (Konar and Cohen, 2001). Firm size, geographic location, and industry profile may act as moderating factors, influencing the EP-FP link (Cohen et al., 1997; King and Lenox, 2001). However, the following gaps exist: The focus on the airline industry may limit the applicability of the findings to other sectors, such as industrial goods. The study may lack an examination of long-term sustainability strategies that encompass social and environmental dimensions. While the literature discusses environmental performance and its financial implications, there may be a lack of detailed investigation into specific environmental costs such as green investment and regulatory compliance. However, the study reveals gaps in terms of inconsistencies in empirical findings, limited focus on specific environmental costs, crisis management, long-term benefits, and regional or cultural contexts. This study addresses these gaps by conducting nuanced investigations into the listed oil and gas companies in Nigeria considering both short-term and long-term effects.

Methodology

The study utilizes the *ex-post* factor research design. *Ex-post facto* study or after-the-fact research is a category of research design in which the investigation starts after the fact has occurred without interference from the researcher. The target population are the 6 listed oil and gas companies (presented in Appendix I) as a result of extensive and accessible data. The accessible population are yet the 6 listed oil and gas companies based on their provision of annual financial report. In line with the research decision on the sample, the behaviour of the oil and gas companies in both upstream and downstream sector when studies against a time series or period of eleven (11) years would result in sixty-six study observations to explain individually and collectively. The sample period is 2011 to 2021. This period is selected in light of the availability of data and the statistical sufficiency which is above the prescribed minimum of five-year range of accounting statement. The data for the study were derived mainly from the secondary panel data sources which includes; firm-specific data. These data would be gotten from Annual reports of the various employed companies. The data collected are time series as it spans over a period of time.

Operational Measure of Variables

Profit after Tax (PAT): Profit after Tax, often referred to as net profit or net income, is a fundamental financial metric that represents the residual profit a company generates after all taxes have been deducted from its revenue. It is a measure of a company's ability to generate profits while accounting for its tax obligations. PAT reflects the ultimate financial outcome and is a key indicator of a company's financial health and sustainability (Smith, 2020).

Green investment (GRI): Green investment is a significant environmental metric that quantifies the expenses a company incurs to prevent or minimize pollution and environmental harm. This cost includes investments in technologies, processes, and practices aimed at reducing the company's negative impact on the environment. GRI reflects the company's commitment to sustainability and environmental responsibility (Brown & Clark, 2016).

Green activities management (GAM): Green activities management encompass expenses incurred by a company to support and contribute to the well-being and development of the local communities in which it operates. These costs often include investments in education, healthcare, infrastructure, and other community-oriented initiatives. GAM underscores a company's commitment to social responsibility and its role in positively influencing the communities it serves (Waldman et al., 2019).

Overall, the operational measures of variables, including Profit after Tax, Green investment, and Green activities management, play crucial roles in evaluating a company's financial, environmental, and social performance. These metrics provide insights into the company's financial sustainability, asset efficiency, environmental responsibility, and community engagement. By analyzing and understanding these measures, companies can make informed decisions that contribute to their overall success and positive impact on various stakeholders.

Model Specifications

The main aim of this study is to evaluate the influence of green accounting on financial performance of listed oil and gas companies in Nigeria. The study therefore employs the following multiple equation models as follows:

$$PAT_{it} = f(GRI_{it}, GAM_{it}) \quad 3.1$$

For estimation purposes, models 3.1 is re-written as follows to accommodate the estimation parameters;

$$PAT_{it} = \beta_0 + \beta_1 GRI_{it} + \beta_2 GAM_{it} + \Psi_{it} \quad 3.2$$

Where:

PAT	=	Profit after tax
GRI	=	Green investment
GAM	=	Green activities management
β_0	=	Constant Parameters
β_{1-2}	=	Estimation parameters
μ/Ψ	=	Error term
i	=	Individual Firms
t	=	Time period

Apriori Expectation

The study expects that green accounting operations should deepen the level of management and consequently affect the financial performance of listed oil and gas companies. Therefore, the study expresses a positive apriori expectation mathematically below as follows;

$$\beta_{1-2} > 0.$$

The individual nature of the relationship between the green accounting mentioned (Green investment and Green activities management) and the various performance measures for industrial goods companies (Profit after tax, Return on asset) may vary depending on the specific context of each company. In general, however, higher green accounting may indicate a greater level of investment in sustainable practices and environmental responsibility, which could potentially lead to long-term benefits such as improved reputation and increased stakeholder trust. On the other hand, high green accounting may also indicate poor environmental performance or a high level of environmental risk, which could negatively impact a company's financial performance. Regarding the performance measures, Profit after tax is a measure of a company's net income after all expenses, and higher values may indicate better financial health and profitability. Return on asset is a measure of a company's efficiency in generating profits relative to its assets, and higher values may indicate better management of assets and greater profitability. Therefore, while there may be some correlation between green accounting and performance measures, the exact relationship would depend on the specific circumstances of each company and the industry as a whole. The aforementioned therefore shows that, an increase in green accounting within the firm should increase the level of financial performance in terms of profit after tax (PAT).

Data Analysis Technique

The study used panel regression defined as an equation with one dependent variable and more than one independent variable. The researcher employed the Panel Least Square (PLS) estimation technique. The test instruments in the PLS are the T-statistics and probability values which were used to test the significance of variables and the overall significance of the regression respectively. Other test instruments also employed were the Durbin Watson test which was used to test the presence or absence of autocorrelation between and among

the explanatory variables and the coefficient of determination (R-Square) used to test the percentage variation of the dependent and the independent variables.

By employing panel data regression, there are certain advantages. First, panel data can deal with more complex information as it combines both cross-sectional and time-series data. This leads to an increase in the number of degrees of freedom and thus the power of the test. Furthermore, the impact of certain forms of omitted variables bias in regression results can be mitigated in panel data regression, the study maintained further that panel data can better detect and measure effects that simply cannot be observed in pure cross-section or time-series data, as panel data gives more informative data, more variability, less collinearity among variables, more efficiency and better dynamics of change.

Nonetheless, we notice panel data pose some estimation and inference problems. Since such data involve cross-section and time dimensions, problems that plague cross-sectional data (heteroscedasticity) and time series data) need to be addressed. With panel data, three models are generally employed: pooled regression, fixed-effects model, and the random-effects model. To determine the most suitable regression model, several statistical tests need to be conducted. We first tested whether the pooled regression can be used by conducting redundant fixed effect test, and further tested the fixed effects model and random-effects model by using the Hausman test. In the rest of the chapter, we presented an introduction of each model and more detailed discussions about how we chose the most suitable model, as well as the corresponding tests.

Results and Discussion

Panel Stationarity Test

Panel stationarity test is used to check if a panel dataset is stationary over time. In other words, it tests whether the mean and variance of the panel dataset are constant over time. The panel dataset consists of multiple individuals or entities observed over a period of time.

Table 1: Panel Unit Root Test at First Difference 1(1)

Variable	Test Methods	Coefficient	Prob.
PAT	Levin, Lin & Chu t*	-6.12737	0.0000
	Im, Pesaran and Shin W-stat	-4.20284	0.0000
	ADF - Fisher Chi-square	73.9589	0.0000
	PP - Fisher Chi-square	172.258	0.0000
GRI	Levin, Lin & Chu t*	-17.0644	0.0000
	ADF - Fisher Chi-square	114.359	0.0000
	PP - Fisher Chi-square	189.744	0.0000
	Levin, Lin & Chu t*	-19.7916	0.0000
GAM	ADF - Fisher Chi-square	102.444	0.0000
	PP - Fisher Chi-square	211.472	0.0000

A unit root test is a statistical test that simply determines how bad or good the trend of employed data is for estimation purposes. The null hypothesis is rejected on the ground that the absolute value of the calculated ADF test statistic is larger than the absolute value of the Mackinnon critical value. This study adopted three test statistics (Levin, Lin & Chu t*, ADF- Fisher Chi-Square, and the PP-Fisher Chi-Square) to test the stationarity of the variables within the study periods. From the table above, all the variables are stationary only at first difference and the probability coefficient of the variables is less than the critical value of 0.05 at a 5 percent level of significance. This implies that the null hypotheses are rejected.

Panel Cointegration test (Model 1)

The study proceeds to test for the nature of long run relationship using the random effect progressively.

Table 2 Pedroni Residual Cointegration Test for Model 1

Series: PAT GRIGAM

			Weighted	
	<u>Statistic</u>	<u>Prob.</u>	<u>Statistic</u>	<u>Prob.</u>
Panel v-Statistic	-1.617353	0.9471	-2.181428	0.9854
Panel rho-Statistic	1.609804	0.9463	1.305844	0.9042
Panel PP-Statistic	-4.434431	0.0000	-4.975363	0.0000
Panel ADF-Statistic	-5.314670	0.0000	-5.834179	0.0000
Alternative hypothesis: individual AR coeffs. (between-dimension)				
	<u>Statistic</u>	<u>Prob.</u>		
Group rho-Statistic	2.972578	0.9985		
Group PP-Statistic	-6.443721	0.0000		
Group ADF-Statistic	-7.030727	0.0000		

The evidence from the table 4.8 shows that the panel cointegration test found the existence of a long-run relationship with the probability values of ADF and PP which are less than 0.05 level of significance, we, therefore, reject the null hypothesis of no cointegration but we do not reject the alternative hypothesis of a long-run relationship.

Error Correction Mechanism Test (Model 1)

The error correction model is a statistical relationship that demonstrates the speed of adjustment, i.e. the rate at which the dependent variable adjusts to changes in the independent variables. The study consequently tests for the speed of adjustment using the short-run dynamism of error correction model (ECM).

Table 3: Vector Error Correction Estimate for Model 1

Cointegrating Eq:	CointEq1
PAT(-1)	1.000000
GRI(-1)	-0.706428 (0.15325) [-4.60951]
GAM(-1)	-0.676355 (0.47481) [-1.42448]
C	25.49990

The evidence from the table 4.10 above revealed that a one percent change in remediation cost (RMC), Green investment (GRI), and Green activities management (GAM) will result to 0.706428 and 0.676355 percent decrease in changes in profit after tax (PAT).

Table 4.11: Extract of Error Correction Model Results for Model 1
 $PAT_{it} = f(GRI_{it}, GAM_{it})$

Variables	Coefficient	Standard Error	T-Statistics	Probability Value
ECM(-1)	-0.060657	0.028924	-2.097142	0.0366
D(PAT(-1))	-0.531073	0.090032	-5.898698	0.0000
D(PAT(-2))	-0.410175	0.083027	-4.940273	0.0000
D(GRI(-1))	-0.014455	0.041532	-0.348046	0.7280
D(GRI(-2))	-0.134746	0.038735	-3.478664	0.0006
D(GAM(-1))	-0.116031	0.103245	-1.123842	0.2617
D(GAM(-2))	-0.130702	0.079966	-1.634476	0.1029

From the table 4.11, the ECM (-1) test is negative with a coefficient value of -0.060657. The speed of adjustment (Lambdha) from the short run disequilibrium or dynamics to its long-run equilibrium is only 6.06 percent and statistically significant at 5 percent level of significance since its probability value is $0.0366 < 0.05$. The coefficients of current and past (lag 1 & 2) values of RMC are positive, suggesting that an increase in RMC results to increase in PAT and their t-values are insignificant at 5 percent level of significance. The coefficients of current and past (lag 1 & 2) of GRI are negative indicating that increase in GRI results to decrease in PAT at the same proportion but their t-value at lag 1 is statistically insignificant at 5 percent level of significance while their t-value at lag 2 is statistically significant since the probability value of 0.0006 is less than 0.05 significant level. Once more, the coefficient of current and past (lag 1 & 2) of GAM are similarly negatively signed and their t-values are statistically insignificant at a 5 percent level. The implication is that as these variables increases, PAT decreases at the same proportion.

Green investment and Profit after tax

Empirical findings from research question six and hypothesis demonstrated evidence of a negative and insignificant relationship between green investment and assets profit after tax in listed oil and gas companies in Nigeria. The beta coefficient of 4.60951 as a parameter for green investment proved evidence that a unit increase on the variable will lead to a 4.6 percent decrease in assets profit after tax in listed oil and gas companies in Nigeria. The insignificant effect of green investment on assets profit after tax in listed oil and gas companies in Nigeria implies that an increase or decrease in the variable will have a meaningful effect on the dependent variable. The negative effect of green investment on assets profit after tax in listed oil and gas companies in Nigeria gives credence to our a-priori expectations of the results as we expected a positive relationship between the variables.

A positive relationship between green investment and profit after tax for listed oil and gas companies would imply that as the firms increase their spending on pollution prevention, their profits after taxes also increase. This may be due to several factors such as improved public perception of the company, reduced regulatory penalties, and increased operational efficiency resulting in cost savings. Additionally, investors and consumers are becoming increasingly conscious of environmental issues and may be more likely to support companies that prioritize pollution prevention.

Green activities management and Profit after tax

Findings from research question nine and hypothesis which was formulated to examine the relationship between green activities management and Profit after tax in listed oil and gas companies in Nigeria proved that there is a

negative and insignificant relationship between green activities management and asset turnover in listed oil and gas companies in Nigeria. The beta coefficient of -1.42448 as a parameter for green activities management proved that a unit increase on the variable will lead to a 4.5 percent decrease in assets turnover/profit margin in listed oil and gas companies in Nigeria. The t-statistics of 1.42448 is less than the critical value of ± 1.98 at 9 degrees of freedom and the probability coefficient of 0.2871 is greater than the critical value of 0.05 at 5 percent level of significance which implies that there is no significant relationship between Green activities management and assets profit after tax in listed oil and gas companies in Nigeria within the periods covered in this study. The insignificant effect of Green activities management on assets profit after tax of the firms implies that an increase or decrease in the variable will not have any meaningful effect on the dependent variable. The negative effect of Green activities management on assets profit after tax in listed oil and gas companies in Nigeria is contrary to our a-priori expectations of the results as we expected a positive relationship between the variables. The negative effect of Green activities management on assets profit after tax is in line with the principal agency theory. The negative effect of the variable agrees with the empirical work of Ikechukwu (2013) who found a significant negative relationship between ownership concentration and financial performance. However, the finding contradicts the empirical work of Ogbonnaya *et al.*, (2016) who opined that CEO and managerial ownership have a positive significant effect on financial performance; the findings also revealed that price-earnings ratio, net assets per share of the firm affect financial performance.

Conclusions and Recommendations

The present research study has empirically investigated green accounting and how they affect financial performance of quoted industrial goods firm using cross-sectional data of selected listed oil and gas companies for a period of 11 years. The criterion variable was proxied by profit after tax while the predictor variables were proxied by remediation cost (RMC), Green investment (GRI), green activities management (GAM), external audit committee size/presence (EXS), and external audit quality (EAQ). Nine hypotheses were postulated in this research study. Consequently, based on the test of the hypotheses, the following conclusions are drawn:

1. There is an observed negative and insignificant relationship between green investment and Profit after tax in listed oil and gas companies in Nigeria.
2. Green activities management equally show a negative and insignificant effect on Profit after tax in listed oil and gas companies in Nigeria.

Recommendations

In light of the observed findings, the study recommends that;

- i. Firm management must develop a comprehensive sustainability strategy: A sustainability strategy that aligns with the company's overall business strategy can help identify opportunities for remediation costs that can improve financial performance. The strategy should cover all aspects of the business, from supply chain to operations to product development.
- ii. They must also involve stakeholders in decision-making: Involve stakeholders, including investors, employees, customers, and community members, in the decision-making process for remediation costs. This will help ensure that the investments are aligned with stakeholder interests and values.
- iv. A lot will be achieved if management of firms implement a robust monitoring and reporting system to track the impact of remediation costs on financial and non-financial performance. This will help the company identify areas for improvement and demonstrate the value of remediation costs to stakeholders.
- v. Firms should collaborate with partners, such as suppliers, customers, and industry associations, can help identify new opportunities for remediation costs and leverage shared resources and expertise.
- vi. Effective communication of the company's sustainability strategy and remediation costs can help enhance the company's reputation and attract environmentally conscious investors and customers.

By implementing these recommendations, industrial goods companies can maximize the positive impact of remediation costs on their financial performance and long-term sustainability.

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