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EFFECT OF ENVIRONMENTAL, SOCIAL AND ECONOMIC SUSTAINABILITY REPORTING ON FIRM VALUE OF LISTED OIL AND GAS COMPANIES IN NIGERIA

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Abstract

Sustainability reporting has become a concern and demand for sustainable living and going concern of firms especially in the oil and gas sector. Thus, this study examined the effect of the 3Ps-people, planet and profit measured in environment, social and economic on firm value of listed oil and gas companies in Nigeria for study period of 2013 to 2025. Purposive sampling technique is used to select sample of eight out of the ten listed companies and the study adopted ex-post facto research design. The data were collected using the current sustainability reporting framework of global reporting initiative (GRI) 2020 and the data were analysed through panel regression Model with aid of E-view. The result showed that environmental sustainability reporting had positive insignificant effect on firm value while social and economic sustainability reporting had negative significant influence on firm value. The study concluded that negative and lack of robust environmental sustainability reporting by oil and gas companies in Nigeria reduce their market patronage and firm value. Poor social responsibility and sectional economic sustainability reporting reduces firm value. The study recommended that FRCN should set environmental industrial specific regulations of environmental protection, remediation and sustainability reporting indices of footprint for oil and gas sector. The FRCN and NUPRC should enforce detail reporting of the PIA 3% operating profit for social expenditure and the ministry of petroleum should set aside minimum of 2% profit of oil and gas companies for economic expenses and stipulate the method of reporting it there-of.

Keywords: firm value, sustainability reporting, legitimacy theory, oil and gas companies

1. Introduction

Firm value has become veritable tool of measuring financial healthiness and going concern of companies in the global perspective by stakeholders; especially potential and existing investors. Increase in firm value symbolizes increase in shareholders' wealth which is wealth maximization objective due to high premium customers place on the firm operation or high patronage of the companies' product.

Contrarily, decline in firm value is a major symptom of firm failure and loss of market share in the competitive market place. Falipe et al. (2025) stated that firm value is a critical concept in finance and accounting as it serves as fundamental measure of a company financial health, market performance and long-term viability. Therefore, it is often used by investors, policy makers and corporate managers to assess the attractiveness of a firm. Firm value is driven by customers operation,

policies and perception of the company products. In this case, firm value plays crucial role as a key indication in investment decision-making and in the overall assessment of corporate performance, including evaluating the impact of sustainability related policies such as the disclosure of sustainability reports (Hamdah, et al. 2025, Schaltegger et al., 2017).

Thus, in recent times the attention of scholars, industry experts and customers alike have been drawn to the impact of sustainability reporting on firm value considering the wide spread of industrialization, manufacturing and oil exploration activities and the society awareness that spur the demand for ethical operation of these companies.

The idea of sustainability reporting was birthed by Elkington (1994) for companies to create real economic value to the society rather than focusing on only absolute profit without taking into account external costs caused by companies' operation. As such, it was centered on the triple bottom line of three pillars of 3Ps: people, planet and profit measured by social, environmental and economic sustainability reporting respectively. Okafor (2013) stated that the triple bottom line (TBL) also known as 'people' planet and profit' or the three pillars, captures an expanded spectrum of value and criteria for measuring organizational success: economic, ecological and social performance.

In essence, corporate sustainability entails aligning the competitive activities of the organization to meeting the short-term needs of the current stakeholders without jeopardizing the long-term ability of future stakeholders in meeting their own needs, thereby adding economic, environmental and social values. Sustainability reporting brings the company closer to the stakeholders and showcases its ethical compliance and responsibility operation thereby enhancing its firm value.

Shaban and Barat (2023) opined that there are several reasons why it is important to study the impact of sustainability reporting on a firm's financial performance as sustainability reporting helps to improve a firm's reputation and brand image. Thus, by disclosing information about firm performance and impacts, companies can demonstrate their commitment to sustainability and responsible business practices ((Patara & Dhalla, 2022; Kostiuchenko et al., 2022).

The purpose of sustainability report is to openly convey the firm's economic, social and environmental commitment and performance to stakeholders and the society. This transparency and accountability and compliance to social ethics would gain trust of stakeholders and enhance firm value in the different pillars of the sustainability measurement. Companies with material sustainability reporting practices would outperform their counterparts in terms of stock price. Sustainability reporting has gained global recognition as an essential tool for corporate transparency, accountability, and long-term value creation (Khan et al., 2016; Falipe, 2025).

Thus, improvement in every pillar of sustainability reporting can individually improve firm value; disclosure safety practice of products, working environmental safety, inclusive labour practices and better pay that would endears the company to stakeholders and avoid labor unrest and litigation and fines; from regulatory bodies thereby making more safe income and enhance firm value of the company.

Dienes et al. (2016) stated that companies can use sustainability reporting to identify and seize new opportunities, such as the development of new products or services that address environmental or social challenges, to drive operational improvements and cost savings for companies. According to the legitimacy theory, organizations must meet the expectations and norms of their stakeholders in order to

be perceived as legitimate business firm which highlighted that sustainability has a positive impact on firm value, as it enhances trust and loyalty among consumers and investors (Shaban & Bakarat, 2023; Zarefar et al., 2022; Ismail et al., 2022).

In the current era, many companies have shifted from only increased financial income to managing sustainability aspects that involves economic, social and environmental due to special investment and arising from the awareness and significant costs and fines arising from environmental impacts coming from firms' unethical operational activities such as air pollution, waste, forest fires and global warming.

Serem and Ombok (2024) stated that companies with greater environmental disclosure levels are associated with higher firm values, is due to the logical reason that environmentally sustainable methods and ethical business conduct is demonstrated through its environmental reporting thereby enhancing firm value. In other words, less environmental disclosure could create bad image and bad practice about the firm unfriendly product thereby reduce their sales and firm value (Nurudeen et al., 2025; Ono et al., 2023; Al-Naser, 2021).

It is worthy of note, stakeholders and investors quest to invest more in a company is largely hinged on their economic benefits earned and disclosed which include increase profit, assets size, dividend pay-out, loan and workers remuneration. Therefore, economic sustainability reporting is a veritable signaling tool to increase firm value. Nurudeen (2025) stated that positive economic sustainability reporting increase firm values of environmentally friendly firms in Nigeria as it an assurance for investors to retain their shares and show more patronage commitment and trust thereby enhancing the firm value.

In nutshell, sustainability reporting in a whole reveals non-financial information such as social, economic and environmental performance as such it provides more investable and compliance information and benefits to the company stakeholders. Firms that act ethically and maintain sustainability reporting to improve social well-being produce improved company performance and increased firm value ((Tolani et al., 2022; Igbinovia & Agbadua, 2023). Though, mostly in developed countries sustainability reporting has been found to enhance firm value but its effect on firm value is of two folds and dilemma as factors influence its impact on firm value could be varied.

Ibrahim et al. (2024) stated that cost of sustainability reporting creates a dilemma between fulfilling the investment goals of shareholders and establishing the legitimacy of their financial activity in the market. Sustainability reporting costs can serve as a conflicting issue in achieving the purpose for which shareholders invested. It can be in the form of additional costs used in purchasing eco-friendly machines, and training thereby reducing funds for profitable investments.

Firms' sustainability activities enhance their performance and success. Firms improve their social performance to reduce costs and enhance their operational efficiency. However, there is still a conceptual debate on whether sustainability activities lead to improved firm performance (Kumari et al., 2023; Ghardallou, 2022; Kumari & Joshi, 2023). Increase in sustainability reporting comes with financial costs thus could consequently reduce profit and firm value.

Buallay et al. (2020) argued in support that firms put themselves at a competitive disadvantage by allocating too much resource to support social programmes and initiatives compare to those institutions that is less socially responsible thereby, reduce their firm value. In no doubt countries brace for

sustainability reporting is due to its positive impact on firm value. Ojha (2025) posited that reliable sustainability disclosures are capable of increasing investor confidence, reducing information asymmetry and corporate resilience through the identification and management of long-term risks. All these benefits directly affect the performance of a firm in the capital market, especially in stock valuation, cost of capital, and sustainable finance.

Nevertheless, the issuance of sustainability reports can positively influence the firm's image, fostering greater consumer loyalty. With the growth of consumer loyalty over time, there is an expectation of increased firm sales, potentially resulting in enhanced profitability as such sustainability reports serve not only as a tool to mitigate financial risks but also as a strategy to cultivate positive consumer relationships, paving the way for long-term business expansion (Karina et al., 2026; Ismail et al., 2022; Zak, 2015).

Sustainability reporting is most sensitive concept to industry differential as some industries are most environmental and social impacted which the oil industry is most environmental and socially impacted sector in Nigeria as the source of major revenue to tiers of government with major cases of oil spills and environmental degradation in Africa over decades. Salama and Farghali (2025) posited that the energy sector not only serves as the backbone in meeting the demand for electricity, fuel, and other essential resources but also faces significant responsibility concerning the environmental impacts resulting from its operational activities.

Considering the importance of the sector to the economy and as a source of liquidity to other sectors prioritizing sustainability reporting would enable steady inflow of income, stem environmentally sustainable living and reduce communities' unrest to promote better economy. The oil and gas sector is the back bone and mainstay of Nigeria economy, it accounts for over 95% of her foreign exchange earnings, 40% of GDP of the federal government collectible revenue. Therefore, prioritizing sustainability reporting would enable steady inflow of income; stem environmental crisis and agitation to promote better economy (Agboola et al., 2019).

The motivation for the study is drawn from the fact, that despite the huge oil and gas exploration and financial inflow from the sector the number of listed Oil and gas companies still declined to ten due to firm value failure and the market value decline as the firm value indices of oil and gas companies NSE, in 2017 and 2016 stood at 330.69 and 312.68 to trail behind other sectors such as the banking with 475.44 and 274.32, Consumer Goods: 976.10 and 712.65, Industrial Goods 1975.57 and 1575.33, Pension: 1379.74 and 810.00 for the respective years(Onyema et al., 2018). This necessitated the study to examine the effect of sustainability reporting on the firm value of oil and gas companies in the period of IFRS implementation of 2013 to 2025, considering that the oil and gas sector is most environmental and sustainability inclined sector in Nigeria.

The Nigeria government and international bodies have enshrined various environmental and humanity laws for sustainable companies' operation in Nigeria, and more so the current trend and demand for sustainability reporting by all stakeholders is another milestone in tandem with those social and environmental sustainability laws but the compliance and positive effect on social life and firm value is still a concern in Nigeria especially in the oil and gas sector.

Tolani and Gabriel (2023) stated that Nigeria oil and gas industry environmental protection and sustainability records are extremely poor compare with international and global average; as companies operating in Nigeria spilled seven

times oil, and flared six times more gas, for every barrel of oil or equivalent they produced. This is as a result of weaken laws enforcement and poor compliance by international oil companies and domestic oil companies as some international oil companies play safer in developed oil producing countries.

An average of 240,000 barrels of crude oil are spilled in the Niger delta every year, mainly due to unknown causes (31.85%), third party activity (20.74%), and mechanical failure (17.04%) and it is estimated 13 million barrels (1.5 million tons) of crude oil have been spilled since 1958 from over7000 oil spill incidents which had greatly contaminated the surface water, ground water, ambient air, and crops have been negatively impacted (Ordibioha & Brisibe, 2013; Abaa et al., 2024; Agboola et al., 2019).

Despite the growing adoption of sustainability reporting through the use of Global reporting initiatives (GRI) and Sustainability Accounting standard board (SASB) statistical studies of its effect on firm value are fewer especially developing countries such as Nigeria and the oil and gas that is more environmental prone sector, has not gotten desired attention. Thus, given the economic and national important of the sector this study is carried out to examine sustainability reporting effect on firm value since the implementation period of IFRS, 2013. Though there are previous studies in sustainability reporting but this study differs in methodological and others regards.

The study adopted modified Tobin-q measurement as in the work of Aruwa et al. (2026), in the banking sector, in line with the position of Chung and Pruitt (1994), to reflect the original opinion of the proponent, James Tobin 1969 and to take in consideration of inflation level and market declining value of asset of oil and gas companies to ascertain fair premium of the Tobin-q.

The study examined each pillar of Triple bottom line measured in environmental, social and economic using the global reporting initiative (GRI 2020) and their combined effect on firm value for effective policy making which others studies ignored. Furthermore, the study examined the significant accounting and economic period of IFRS adoption and implementation in Nigeria of 2013 to 2025. Therefore, the objective of the study examined the effect 3Ps-people, planet and profit measured in environment, social and economic sustainability reporting on firm value of listed oil and gas companies in Nigeria.

2. Literature Review

Conceptual Framework

The research framework which shows the pictorial association between the dependent and independent variables of the study. Form the diagram below, The H_1 explained the direct relationship between the sustainability reporting (factors) and firm value.

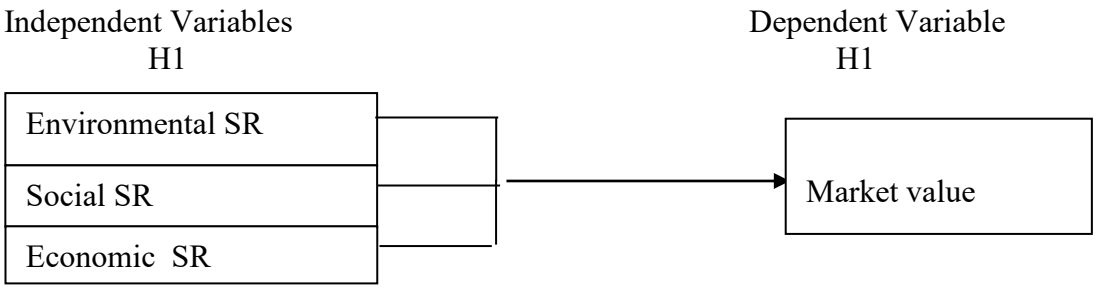


Figure 1: Conceptual Framework
Source: Authors' Compilation

Firm Value

Due to the attractiveness of firm value, it has necessitated various definitions and views to subject matters by scholars and industrialists. Firm value is defined by Akhor and Oroboh (2023) as the perception of a company by investors and it is usually associated with the prices in the market. Therefore, stakeholders and customers' attraction and patronage would drive up by the firm value or increase in its going concern on the principles of forces of demand and supplies. This definition is in line with definition of Motto and Sistrisno (2020) that says firm value is in eyes of customer valuation.

In the same vein, Fatima and Choairbi (2021) stated that that firm value creates a benchmark for investors through bumper rate of return to investors. This implies that more returns to investors would materialize to more patronage and increase firm value. Firm value is the company worth based on the total value of its outstanding shares in a market, which is the market capitalisation (Muruqi, 2025). This indicates that firm value is the price or amount money company assets would fetch in the marketplace. This can also imply that the value of company depends on the efficacy and worth of its assets.

Hamdah et al. (2025) defined firm value as the value that reflects market expectations of the company to create future wealth for its stakeholders. This means that it is not just snapshot of current performance but a critical indicator of future company stability and existence used by stakeholders in decisions making.

Chinyonga and Mwanga (2024) stated that firm value is the measurement of company's success and prosperity. This is closely related to price share value as firm value determination. That is, increase firm value is increase in shareholders wealth which is fulfilling shareholders wealth maximization objective. It is an unbiased and reliable metric that stakeholders and investors use to assess performance and operation of a company (Yudistira et al., 2017).

Ibrahim, et.al. (2024) opined that firm value is the actual value of ordinary stock, as well as the estimated values of preferred stock. This definition disclosed that shareholders and company wealth is not limited to only ordinary shares but also preference stocks as both were used to financed the companies' assets that fetch the profitability of the business. Summarily, firm value is the monetary value of company operation in the market place.

Sustainability Reporting

The term sustainability reporting has related term such sustainability disclosure, responsibility reporting, environmental accounting reporting, triple bottom line and social responsibility reporting. All the terms echo the ethical and moral operation demand of a company to remediate its impact on the environment, people, investors and communicate financial and non-financial of its operation to all stakeholders as it holds in the legitimacy theory.

On this premise, Hanufuri and Gunarsih (2024) defined sustainability reporting as annual report published by a company to connect corporate social responsibility activities and results. This definition emphasized the physical content of the report; therefore, the mechanism of its value is to ensure that companies consider the impact of sustainability issues and make companies more open about the risks and the opportunity they face. It is the practice of being accountable to both internal and external Stakeholders of organizations by measuring and disclosing firms"

performance in relation to the goal of the organization (Okafor, 2013; Mohammad & Wasiuzzaman, 2021).

More succinctly, Onoh et al. (2023) described sustainability reporting (SR) as an accounting language based on the ethics and principles that enable the accountant to report about the social and environmental events. This premise has led to the development of accounting standards in collaboration with SR and financial reporting standards. Sustainability is driven by three main factors of social, economic, and environmental. This definition emphasizes the ethical and professional demand on stakeholders not only to prioritize absolute reporting tool of financial performance gains from the environment but also equate it with sustainability living of every stakeholder in the eco system their companies operate.

Ozen (2025) described sustainability reporting as a system, which persists or survives business operation. This indicates sustainability reporting are environmental and social actions and strategy that keeps the company in existence. This emphasizes the low penalties consequent on infringement on environmental and social laws by companies. In essence, corporate sustainability reporting entails aligning the competitive activities of the organization to meeting the short-term needs of the current stakeholders without jeopardizing the long-term ability of future stakeholders in meeting their own needs, thereby adding economic, environmental and social values (Onoh et al., 2023). According to Ballon et al. (2009), businesses have gradually learned that meeting stakeholders' expectations is a vital requirement for long-term viability and, as a result, is required to achieve the overall strategic business goal.

GRI (2016) defined it as a practice of measuring, disclosing, and being accountable to internal and external stakeholders for organizational performance toward the goal of sustainable development. This definition implies that sustainability does not only implies to reporting positive economic events of companies but also thorough measurement of negative and positive operation events and faithfulness in disclosing them. In nutshell, sustainability reporting is sum up to mean a sub-category of non-financial information which gives a report on economic, social and environmental aspects of various activities carry out by the company. Thus, emphasizes the three pillars of people, planet and profit. Thus, means measuring environment, economic and people interest in the company operation for sustainable living without compromise anyone. In summary sustainability reporting is the faithful measuring and disclosing of sum economic information and non-financial events effects on stakeholders thereof.

Review of Previous Empirical Studies

Environmental Sustainability Reporting and Firm Value

Unethical environmental degradation by company can spell bad image while a positive environmental footprint, remediation activities and reporting can earn a company good reputation in the eye of stakeholders consequently enhance its firm value. On this assertion, Ibrahim et al. (2024) examined sustainability reporting and firm value of listed banks in Nigeria between study period of 2018 and 2022 and ex-post-facto research design and multiple panel regression were used to analyses the data. The result revealed environmental sustainability reporting had significant positive influenced on firm value of banks. Social sustainability reporting was found with positive influence on firm value while economic showed contrary finding. This showed that the stakeholders, value and response positively to environmentally friendly operation of firms consequently influence their patronage and firm value.

Though, the study above looked at the triple bottom line factors of environment, social and economic sustainability reporting but in the banking industry industrial that is less environmental challenged in Nigeria compare to exploratory and manufacturing sectors. Thus, this study examined oil and gas industry that is most inclined to environmental and sustainability demand due exploration of oil activities.

Onoh et al. (2023) assessed the effect of sustainability reporting and market value of listed oil and gas in Nigeria between 2010 and 2020. Descriptive and correlational matrix were used to determine the effect of sustainability on firm value of Tobins-q. The result affirmed that environmental reporting significantly influences market value of oil and gas listed companies while economic had significant negative influence on firm value. This could imply that Nigeria stakeholders are paying more attention to environmental challenges and disclosure but oil and gas firms do not disclose corresponding economic value to stakeholders. Though this study examined the three-3Ps of sustainability, this study would further examine their combined effect on firm value and use GRI, 2020 in data collection for more efficient analysis.

Okulenu et al. (2023) investigated environmental accounting information and performance of listed manufacturing companies in Nigeria between 2019 and 2023 measuring performance with triple dependent variables of ROA, ROE and profit margin. The study finding revealed that environmental sustainability reporting influenced the performance of manufacturing companies. This can be due to environmental inclined nature of this industry as such sustainability would interest stakeholders and induce their patronage. The use of absolute performance measurement alone would not be able to assess enough of public market perception; therefore, this would use Tobin-q to measure performance.

In Indonesia Wiharyo and Ekadjaja (2021) assessed effect of sustainability reporting on firm value on non-cyclical and cyclical companies, with the data of 22 companies between period of 2021 and 2022 and the data were analysed with multiple regression. The result environmental sustainability had positive significant influence firm on value measured in Tobin-q compare to social and economic sustainability reporting with inverse result. This result indicated environmental issues tend to have more damages and their remediation reporting are much valued by stakeholders.

Also, Nurudeen et al. (2025) investigated sustainability reporting effect on market value of environmental sensitive companies in Nigeria using 46 companies for period of 2017 to 2023 and the data were analysed with the adoption of the pool ordinary least square regression technique and panel fixed effect model. The result revealed environmental having insignificant positive effect on firm value while economic had positive significant value on firm value. This contrary finding of environmental effect on firm value showed that in environmental prone industries enough assessment and reporting were not done to create positive future sustainability operation of companies in Nigeria.

Emovon et al. (2025) analyzed impact of environmental accounting disclosure on cost of capital that is firm value of listed oil and gas companies in Nigeria using descriptive and inferential statistical technique to analysed the data. The result showed that component of environmental reporting had different impact on firm value, while waste reporting and adherence to laws were insignificant to firm value but energy disclosure had positive significant value on firm value. This finding is inferred that oil and gas are energy inclined industry therefore stakeholders pay more attention to their report on impact. This study further examined the 3Ps effect on firm value rather examining environmental alone as an improvement to the above study.

Serem et al. (2024) examined effect of sustainability reporting on firm value among the among 64 companies listed in Kenya stock exchange with the sample of eleven companies between study period of 2012 to 2022. Content analysis was employed for data collection while data were analysed on the platform of longitudinal research design and the finding showed that economic reporting had negative and significant effect on firm value while environmental reporting had positive significant influence on firm value. Contrarily, social sustainability reporting was insignificant to firm value measure in Tobin-q. The result implies that stakeholders pay more attention to environmental issues as it poses more danger to human existence, as result its positive disclosure enhance firm value. This study would use more prudent measurement of firm value to improve on the above study.

Abaa et al. (2024) examined environmental accounting on firm performance of three out ten listed on the NGX oil & gas companies in Nigeria. The study adopted ex-post research design and data analysed with OLS weighted multiple regression. The study found environmental accounting significantly impact account practice due to avoidance of fines and penalties; contrarily account practice does not influence economic well-being of the people and performance; that is, it does not influence firm value. This implies that operational sustainability effect on the environment exceed economic benefits to stakeholders.

Social Sustainability Reporting and Firm Value

Chinyonga and Mwanza (2024) investigated impact of sustainability accounting and reporting on firm value of sectoral listed companies on LUSE Zambia using ROA and environmental and social, sustainability reporting as dependent and independent variables respectively. The correlation findings indicated that there is weak relationship between dependent and independent variables but environmental and social sustainability reporting had positive significance on firm value. The study implies that stakeholders valued and reciprocate social benefits of a company. This is line with the stakeholders' theory, that every stakeholder's interest desire attention.

Nguyen (2020) examined impact of sustainability reporting on firm value of 97 listed largest German companies between 2013 and 2017 to determine large firms' adherence to sustainability reporting and their effects. The data that were collected using the principal guidance of GR1 for empirical comparison were analyzed with OLS multiple regression. The result showed significance negative influence of sustainability reporting on firm value. The finding could be inferred that the firm spend much on sustainability reporting compare to the gain they derive from it; thereby retarding their value and profit. Also, using different sectors could also differ finding and their effect on firm value as sectors sustainability reporting effect on firm value differ. Thus, this study would concentrate oil and gas sector in Nigeria for specific inferences.

Amrigan et al. (2021) carried out the study to determine effect of compliance sustainability disclosure and firm performance between 2018 and 2021, using variable of environmental, economic and social disclosure to Tobin-q; sampling the companies that received bronze award to platinam rating ABSTRAT for the 2018 to 2021. The study data were analyzed under panel regression model with the aid of STATA 14.2. The result showed that social sustainability reporting had positive significance influence on performance white economic and environmental showed negative significance to performance respectively. This result implied that organisations and corporate bodies valued social sustainability reporting benefits as it touches the spectrum of the people as an imaging making tools.

Zheng et al. (2026) stimulated the impact of ESQ performance reporting on firm value using listed China's A-share listed manufacturing firms from 2011 to 2023. The data were analysed with and OLS in a multiple panel resgression. The result showed overall significance positive influence ESG/sustainability reporting on firm value measured in Tobin-q. The combined finding of study would enhance policy making of combined effect of environmental, social and governance reporting on firm value, thus this study would examine specific effects of 3Ps on firm value for specific policy attention as one variable effect can over shadow other in regression result.

Tonali and Gabriel (2022) examined Nigerian oil and gas practice and social responsibility on the firm performance using seven listed companies between the period 2010-2019. The study used content analysis for data collection, ex-post factor research design and the data analysed with technical tool of SPSS. 23.0 under pearson product moment correlation. The finding indicated that social sustainability reporting and practices influence performance of listed oil and gas companies Nigeria. The study finding can be interpreted those social benefits, reporting and activities induce public positive perception and enhance company reputation of proper stakeholder ship approach. Though the study focused on the oil and gas most sustainability challenging sector in Nigeria but thus. this study would use improved statistical method with use of GR1 2020 guidelines and E-views statistical tools.

Maureen and Syariff (2023) were carried out a study to determine the impact of sustainability disclosure among other variables on firm value using a total of 14 listed companies out of 30 in Indonesia between 2020 and 2023, measuring SR by the IDX /ESQ Index for the period. The data were analysed with OLS on panel effect regression model with fixed effect model. The result indicated positive significance influence of sustainability reporting on firm value likewise, leverage and firm size. This implied that other firm characteristics can moderate effect of sustainability reporting on firm value

Economic Sustainability Reporting and Firm Value

The primarily purpose of business to increase economic value of investment as such more sustainability reporting of economic profit and welfare would stimulate more investment and enhance firm value. In this position, AKhor and Oroboh (2023) investigated social, economic and environmental sustainability reporting on the firm value of sixteen listed consumers' goods in Nigerian for years of 2016 to 2021. The data were analysed with robust OLS regression technique and the result showed social sustainability having significance negative influence on firm value, contrarily economic and environmental were found with positive significance influence on firm value. The negative influence of social sustainability reporting may be due to low activities of social benefits to stakeholders and paucity of items disclosed compare to industry demands. This study would improve the above study by examining combine effect of the 3PS on firm value.

Suleiman et al. (2024) did exploratory literatures and theoretical reviews of impact of sustainability on firm value and most effects determination were done with OLS multiple regressions of fixed and random effect models. The study found out that sustainability reporting influence performance but with mixed and conflicting results. This finding on the effect of sustainability reporting on firm value differ to industry, variables and data collection method. Thus, this study used the GRI the most objective and worldly in use for sustainability data collection framework.

Serern et al. (2024) examined the effect of sustainability reporting on firm value of all the 64 NSE listed companies for years of 2012 to 2023. The secondary

data were collected through content analysis and the data were analyzed under longitudinal research and correlation research design in multiple panel regression model. The result found economic sustainability reporting negative significance influence on firm value measured in Tobin-q while social and environmental were having positive significance and insignificance effect on firm value respectively. The finding of negative influence of economic on firm value could be due to lack of clientele attention by management; to take care of every stakeholder, low level of signaling tool of dividend pay-out and poor disclosure of stakeholders' welfare.

Loh et al. (2017) investigated the relationship between sustainability reporting, assessment and quality on firm value based on listed Singapore companies SGX Mainboard with total sample size of 502, the data were further analysed with Ohlson model. The study results suggested that sustainability reporting is positively related to firm market value and this finding is independent of sectors or firm status such as government–linked and family business. This result position that the status of firm does not usually influence sustainability effect on firm value but it is the practice and quality of practice and disclosure of sustainability that influence firm value. The above study did not emphasize the individual influence of 3ps on firm value, which would be emphasized in this study.

Hamdah et al. (2025) Studied effect of sustainability report disclosure on firm value in 16 energy sector companies out of 25 listed on Indonesia stock exchange during the period of 2020-2024 using purposive sampling technique. The GR1 principles were used in the data collection, with quantitative research design and the data were analysed with descriptive, simple linear regression with the aid of SPSS to determine effect of environment, social and economic sustainability disclosure on firm value. The result showed significant positive influence sustainability reporting on firm value. This finding indicated that ethical practice, transparency in sustainability related information can enhance market perception build corporate reputation and contribute to increase firm values especially in current global clamour and demand for environmental accountability.

Kumari et al. (2025) investigated sustainability reporting on firm value from leading 10 Indian public banks for the study period of 2017 to 2023. The study employed descriptive analysis causal research method to evaluate the impact of the voluntary disclosure scores on Tobin-q value. The study found positive significance relationship between sustainability reporting and firm value of banks. This implies that sustainability reporting enhances company reputation and market share.

Theoretical Review

Legitimacy Theory

Legitimacy Theory is propounded by Dowling and Pleffer (1975), to emphasize and demand that company operation should be moral and ethical and dual benefiting to company and to the environment and people in which it operates without causing harm in resource usage. The Theory is grounded in the idea of an understood agreement or mutual understanding between a firm and the community within its operational setting, coupled with a reliance on natural resources.

Organizations always strive to function within the boundaries and conventions of their particular societies and adheres to a legitimacy theory viewpoint would freely report to the community in which it is operating as there is implicit of ethical agreement between the corporation and the society that they operate in (Nuhu et al., 2024; Lawan, 2016).

Thus, Legitimacy Theory is explaining the idea and adherence to necessity of sustainability reporting to enhance stakeholders' welfare by operating ethically, remediating and disclosing environment impact faithfully. Therefore, the study is underpinned with legitimacy theory. According to this theory, businesses need to consistently adjust their operations to conform to the recognized boundaries and values upheld by Society to secure legitimacy and companies must adhere to prevailing social and environmental norms and principles (Dase, 2024; Iswati, 2024).

Legitimacy theory provides a society-oriented explanation to corporate operational behavior in a manner that satisfactorily addresses social norms, values, beliefs, and expectations of society that can be perceived as legitimate (Frostenson, 2015; Hartwig, 2018). Therefore, legitimacy theory is usually employed to explain sustainability-related disclosure. Consequently, companies may be motivated to engage in sustainability activities in order to protect their legitimacy and maintain their positive reputation and confidence among stakeholders, thereby creating an appropriate environment for investment (Salama & Farghali, 2025; Frynas et al., 2016).

Stakeholders Theory

This study is further explained by Stakeholder Theory as propounded by Edward Freeman (1984). The theory espoused that firms should give to the community from what it takes from it and every stakeholder that would positive and negative affect its operation for sustainable existence. A firm is a product and child of the community as it exists to promote sustainability of the society (ICAN, 2019). This is in line with tenet of sustainability reporting to promote going concern of firm and society.

Nurudeen et al. (2024) and Iswati (2024) stated that company is not only responsible to the owners (Shareholders) as their operations create negative externalities to the whole community resulting social inequalities attracting community agitation for fair attention. Stakeholder Theory advocates for a more inclusive approach, suggesting that firms should create value for all stakeholders to ensure long-term sustainability. In agreement, firm's operations affect the benefits of both firms and other stakeholders, consequently, a firm's actions and decision making should be based on the needs of all stakeholders (Falipe, 2025; Nguyen, 2024).

3. Methodology

The study adopted after the events of Ex-Post Facto research design. This is for the fact that the research work is quantitative in nature with secondary data that their events of study had already taken place. The study population is the Ten listed Oil and Gas on Nigerian Exchange Group (NGX) as at 31st December, 2025. Purposive sampling technique was used to select Eight of the listed companies with complete data for Thirteen years (2013 to 2025) study period, this meets the statistical law of Regularity of large number.

The secondary data were extracted from the financial statement and Annual accounts of the companies and the share price were collected from both Annual of the banks and Nigeria Exchange Group website while the sustainability reporting independent variables of environment, social and economic were collected by content analysis of Annual Report of companies using the Global Reporting Initiative (GRI, 2020) Framework. The study included firm size, Leverage and Sales volume as control variables. This is to avoid omitting any variables that would have direct

influence on the dependent variable. The data of the variable were further proxied into ratios and logarithms number of same metric as indicated in the table below.

Variables Measurement

This study used the approximation of Tobin-Q-Ratio as a proxy of market value. Thus, the study adapted the formula as used in the works of Aruwa et. al. (2026) and Alsmady et al. (2023) and as modified to reflect the tenet of the Proponent idea:

$$\text{MFV/Tobin's-Q} = \frac{\text{MVE+ Total Debts}}{\text{Book Value of Fixed Assets (1+R) + Current Assets}}$$

Where: 1, is one unit of number; R= national annual rate of inflation.

Table 1

Measurement

Variable Name	Proxy	Measurement	Sources
Market Value	FVQ	Modified Tobins-Q formula of market value of shares over gross up value of fixed assets plus current assets	Tahir & Razali (2011) Aruwa, et. Al. (2026)
Environmental Sustainability	Env.	Report items of environmental footprints, impacts, emissions, remediation, resources usage etc.	Ibrahim, et. al (2024)
Social Sustainability	Soc.	Report of social impacts, items, employee, community etc welfare, quality of initiatives and benefits disclosed	Igbinovia & Agbadua (2023)
Economic Sustainability	Eco.	Items of report on firm financial growth, new investment and product, dividend, liquidity level, profit and sales increase etc.	Kumari, et. Al (2025)
Firm Size	TA	Logarithms number of total assets	Maureen & Syarif (2025)
Leverage	Lev	Logarithms number of total liabilities	Nguyen (2020)
Sales	Sal.	Logarithms number of gross sales	Nurudeen (2025)

Source: Authors' Compilation (2026)

Model Specification

In order to empirically examine the effect of sustainability reporting on firm value of listed Nigerian oil and gas firms, the study adapted multiple linear regression models of Nurudeen (2024) as they are formulated as follows:

$$\mathbf{FVQ_{it} = B_0 + B_1, ENV_{it} + B_2SOC_{it} + B_3ECO_{it} + B_4TA_{it} + B_5LEV_{it} + B_6SAL_{it} + e_i ;}$$

Where: FVQ= Tobins-q modified market value of firm; $B_{0=}$ the constant or intercept; $B_{1=}$ is the regression coefficient or slope of the independent variables; B_1- B_3 = Regression coefficient; It= is panel data effect function; i- unit of bank time and $e_{it=}$ the error term.

The time series cross-sectional data were analysed using Ordinary Least Multiple Regression (OLS) in a Panel regression model with the aid of E-View. This for fact that the variables of the study were many therefore it fit into this model or

analytical tool with its BLUE character for efficient result. The study carried out pre and post diagnosis tests as explained herein.

4. Results and Discussion

Table 2

Descriptive Statistics

	FVQ	ENV	SOC	ECO	FS	LEV	SAL
Mean	1.08390	0.31549	0.34556	0.74569	11.11898	10.9761	10.9071
Median	0.98505	0.32222	0.30384	0.75862	10.8629	10.7737	11.0907
Maximum	2.99410	0.65555	0.78571	0.96724	13.0204	12.8446	12.6165
Minimum	0.34021	0.0044	0.05263	0.36206	10.1168	10.0062	1.96409
Std.Dev.	0.38848	0.20592	0.17530	0.13497	0.69012	0.69053	1.18518
Skewness	2.01182	-0.8805	0.59342	-0.5841	0.98140	0.96660	-4.31871
Kurtosis	9.10245	1.65429	2.45908	2.88213	3.14096	3.11081	32.5005
Jarque-Bera	231.528	7.98166	7.37189	5.97465	16.7808	16.2481	4094.52
Prob.	0.00000	0.01848	0.02507	0.05042	0.00022	0.00029	0.00000
Sum	112.725	32.8111	35.9388	35.9388	77.5525	1156.37	1134.34
Sum Sq	15.5448	4.36782	3.16538	1.87639	49.0560	49.1138	144.680
Observation	104	104	104	104	104	104	104

Source: STATA Output, 2025

The table 2 revealed mean value of 1.08390, 0.31549, 0.34556, 0.74569, 11.1189, 10.9761 and 10.9071 respectively for FVQ, ENV, SOC, FS, LEV and SAL with their corresponding standard deviation value of 0.38848, 0.20592, 0.17530, 0.13497, 0.69012, 0.69053 and 0.1.185185 respectively. The figures of the standards deviations are not higher than mean of each variable or not widely dispersed from the position of the mean; (as they are all less than one, showing that the data are normally distributed also considering minimum and maximum values. This also reflect that the maximum and minimum values are normally distributed.

Correlation Result

Table 3

Correlation Matrix

	FVQ	ENV	SOC	ECO	FS	LEV	SAL
FVQ	1	0.145779	-0.1451	-0.17203	-0.10087	-0.00401	0.043158
ENV	0.145779	1	-0.07894	-0.15128	-0.25214	-0.24788	-0.10298
SOC	-0.1451	-0.07894	1	-0.13266	-0.24661	-0.259	0.048105
ECO	-0.17203	-0.15128	-0.13266	1	0.196588	0.182488	-0.03742
FS	-0.10087	-0.25214	-0.24661	0.196588	1	0.764105	0.549924
LEV	-0.00401	-0.24788	-0.259	0.182488	0.764105	1	0.537636
SAL	0.043158	-0.10298	0.048105	-0.03742	0.549924	0.537636	1

Source: STATA Output, 2025

The table 3 presents the correlations matrix of the independent variables. It could observe that correlations among variables is between 0.764105 and 0.00401 which is not up to 1, that is no presence of correlation coefficient more than .76 as a result there is no problem of multicollinearity.

Correlation Random Effects- Hausman Test

H_0: Random effect is appropriate; **H_1:** Fixed effect is appropriate

Table 4

Hausman (1978) Specification Test

	Coefficient
Chi-square test value	2.395697
P-value	0.0966

Source: STATA Output, 2025

The Hausman table reveals P-vale coefficient of 0.0966, which is higher than 0.05 implying that Random effect is more appropriate.

Multicollinearity Test

Table 5

Variance Inflation Factor (VIF)

Variable	**Cofficient Variance**	**Uncentered VIF**	**Centered VIF**
Constant	0.453232	368.5509	NA
ENV	0.032659	3.758723	1.115354
SOC	0.047311	5.764996	1.170925
ECO	0.074384	34.72555	1.091306
FS	0.038253	386.0295	4.672250
LEV	0.037382	367.6546	4.355191
SAL	0.001381	135.1923	1.562618
Mean			2.327

Source: STATA Output, 2025

The Variance Inflation Factor (VIF) of (ENV, SOC, ECO, FS, LEV & SAL) variables; showed VIF values ranged from 1.0913 to 4.6722, with mean VIF of 2.327 which is less than 10 the general benchmark for multicollinearity. This indicated that multicollinearity is absence or not significant in this model. Also, the 1/VIF which represents the tolerance level showed similar values pattern ranged from 0.001381 to 0.453232 which are far lesser than 1. This means, the variables are less correlated but higher than 0 meaning no severe multicollinearity among variables.

Heteroskedasticity Test

Table 6

Heteroskedasticity Test: Breusch-Pagan-Godfrey

Prob. Chi-Square (6)	0.2564
Prob. (6)	0.2631

Source: STATA Output, 2025

The table 6 also shows Breush-Pagan-Godfrey test for Heteroskedasticity test performed on the residuals and the results showed prob. 0.2564 which are in excess of 5% or 0.05 which reject the presence of heteroskedasticity in the residual.

Panel Regression Result Analysis and Discussions:

Based on the result of the Hausman test, this study accepts null hypotheses which states that Random effect is more appropriate (see table 4 for the result of Hausman) test and Descriptive Statistics. This showed that the firms' general level effects are having more dominant factors of sustainability reporting influencing firm

value of listed oil and gas companies in Nigeria as measured in Modified Tobin-Q formula of 1969.

Period included: 13; Cross-Section included: 8; Total panel (balanced) observations: 104

Table 7

Direct Random Effect Regression Results

Variable	Coef.	St. Err.	t-Statistics	Prob	Sig.
Constant	4.230839	1.167457	3.623979	0.0005	***
ENV	0.067521	0.234963	0.287368	0.7745	*
SOC	-0.516153	0.230121	-2.242958	0.0275	**
ECO	-0.785376	0.337749	-2.325323	0.0224	**
FS	-0.796336	0.226442	-3.516730	0.0007	***
LEV	0.558608	0.207812	2.688044	0.0086	***
SAL	0.029232	0.037629	0.776847	0.4394	*
Weighted Statistics/ Cross-section Random (dummy variables)					
Root MSE	0.276859		R-squared	0.634336	
Mean dependent var	1.083902		Adjusted R-squared	0.529724	
S.D. dependent var	0.348934		S.E. of regression	0.306243	
Sum squared resid	7.971706		F-statistic	2.706576	
Durbin-Watson stat	1.398247		Prob(F-statistic)	0.001129	

Source: E-view Output, 2025

Notes: Effects Specification ***, ** and *; indicate significant at 1%, 5% and not significant, respectively.

Table 7 presents the results of Random Effects model. The result showed that the P-value of F- statistics is 0.001129 which is far less than 5%, this showed that the model is 100% fit and that the model is statistically significant as it implied that all the independent variables are statistically significant.

The R-square value of 0.63 means the independent variables contributed 63% to the outcome of the dependent variable. It also indicated that 63 percent of the variation in firm value of listed oil and gas companies measured in adjusted Tobin-Q formula (FV) was caused by the direct sustainability reporting components effect of environmental (ENV), social (SOC), economic (ECO) and including control variables of firm size measured in log of total assets, totals liabilities (leverage) and sales volume. The adjusted R square of 0.52 /52% implied that any variations that could have occurred as a result of the introduction of additional independent variable would have taken care of as could only influence the R square to the down point of .52%.

As revealed in the table 5 above the Variance Inflation Factor (VIF) which give insight whether there is correlation among variables (ENV, SOC, ECO, FS, LEV & SAL); showed VIF values ranged from 1.0913 to 4.6722, with mean VIF of 2.327 which is less than 10 the general benchmark for multicollinearity. This indicated multicollinearity is absence or not significant in this model.

Also, the 1/VIF which represents the tolerance level showed similar values pattern ranged from 0.001381 to 0.453232 which are lower than 1 in value. It means variables are less correlated but higher than 0, indicating no severe multicollinearity among variables. The Breush-Pagan-Godfrey test for Heteroskedasticity as shown above in table above was performed on the residuals and the results showed observed

Chi2, 0.2564 and prob., 0.2631, which are in excess of 5% or 0.05 which led us to reject the presence of heteroskedasticity in the residual.

Environmental Reporting and Firm Value

H_1: The null hypothesis is accepted that environmental sustainability has no direct significant effect on market value of listed oil and gas companies in Nigeria

The regression line was significant at 5% (0.0005) and it regression line also shows that firm value of FVQ = 4.230839+0.067521ENV-0.516153SOC-0.785376ECO-0.796336FS +0.558608LEV+0.029232SAL. It indicated that for every unit increase in environmental reporting, firm value (FVQ) increases by 0.067 unit or 6kobo approximately. The p - value of 0.7745 is higher than t - value of 0.05; that is, it is insignificant to firm value. This simply means that null hypothesis is accepted that environmental reporting has no significant influence on the firm value of Nigerian listed oil and gas companies.

Social Sustainability Reporting and Firm Value

H_2: The alternative hypotheses are accepted that social and economic sustainability reporting have direct significant effect on firm value of listed oil and gas companies.

The regression line was significant at 1% (0.0005) and the regression line also shows that firm value of FVQ = 4.230839+0.067521ENV-0.516153SOC-0.785376ECO-0.796336FS+0.558608LEV+0.029232SAL. Thus, the result regression line reveals that for every increase in social reporting (SOC) firm value of oil and gas decrease by 0.51 unit or 51 kobo. It also implies that the p-value of 0.0000 is far lower than t-value of 0.05; that means that social reporting has significance effect on firm value at 2% t-value as such the alternative hypothesis is accepted that social reporting influence firm value of oil and gas firms negatively in Nigeria.

Economic Sustainability Reporting and Firm Value

H_3: The alternative hypotheses are accepted that economic sustainability reporting has direct significant effect on firm value of listed oil and gas companies

The regression line was significant at 1% (0.0005) and the regression line also shows that firm value of FVQ = 4.230839+0.067521ENV-0.516153SOC-0.785376ECO-0.796336FS+0.558608LEV+0.029232SAL. This portrays that for every unit increase in economic reporting, firm value (MVQ) of listed oil and gas companies decreases by 0.078 unit or 78 kobo approximately. The p - value of 0.0022 is lower than t-value of 0.05; that is, it is significant at 2% percent. This simply means that the alternative hypothesis is accepted that economic reporting has significant negative influence on the firm value oil and gas companies in Nigeria.

All the control variables of firm size, Leverage and Sales were positively significant in influencing firm value except sales that is positive insignificant to firm value of oil and gas companies in Nigeria. This implies in aggregate that larger companies with bigger sales and ability to secure much liability; do more of responsibility activities and sustainability reporting to enhance their image and reputation. The addition of control variables to model is to avoid omitting any other variable that could have mediating/supporting influence on the independent variables.

Discussion of Findings

Environmental Sustainability Reporting and Firm Value

Environmental Reporting (Env.) measured with the framework GRI 2020 had positive insignificant effect on firm value of listed oil and gas companies, therefore,

the work aligned itself with the Nigerian work of Nurudeen, et.al. (2025); Emovon et al. (2025) and Serem et al. (2024) but contrary to the findings in the work of Ibrahim et al. (2024); Wiharjo and Ekadjaja (2021) and Akhor and Oroboh (2023).

By the finding content and context of environmental reporting on firm value, increase in environmental reporting would increase firm value of oil and gas companies positively but the environmental remediating activities and sustainability reporting level were not adequate to influence firm value of companies significantly. This result can be inferred that the society perception about sustainable and environmental and sustainability activities of oil and gas companies are low, this is due to the years of environmental degradation events and several oils spills without clean up over the decades and many have not been accounted for in terms of reporting by companies.

Secondly, the concept of environmental sustainability reporting, valuation still new to stakeholders and practices and reporting still at birth and embracing stage by the companies especially in the oil and gas most environmental inclined sector. Thus, the companies' environmental activities and sustainability reporting carried is not commensurate to the issues of environmental demand, industrial requirement and expectations of stakeholders. This is explained by Legitimacy Theory which emphasised that ethical or sustainable operation of a firm within environment would gain stakeholders approval, earn good reputation to the firm and enhance its performance.

Social Sustainability Reporting and Firm Value

Social Sustainability reporting (Soc) was found to have negative significant value on firm value of listed oil and gas companies; thus, the study is supported by the work of Akhor and Oroboh (2023) and Nguyen (2020), but it has opposite findings with the works of Serem et al. (2024); Wiharyo and Ekadjaja (2021). The inferences of this finding imply that increase in social sustainability reporting decrease firm value of oil and gas firm in Nigeria. This is probable due to excessive spending companies' resources as it would reduce fund for operation to enhance firm value.

In the same vein, carrying social activities on one spectrum and wrong spectrum would not have positive impact on firm value more so in the oil and gas sector where host communities' demands and their primary impact on the firm also differ and significance. This is line with Legitimacy Theory and Stakeholder Theory that state, firm operation should fit into moral expectation of the people and every group of person's interest that can influence firm operation should be taken care of respectively, according to their perspective.

On other hand, low level of responsibility activities by oil companies and poor sustainability reporting would reduce companies' image, result agitations to disrupt operation consequently reducing firm value especial in the oil and gas sector with much money thereby eliciting agitation for fairness. But proper enforcement of 3% of operating profit of oil and gas companies as stipulated by the petroleum industry (PIA) Act, 2021 for social welfare infrastructural development for host communities would enhance firm value and reputation of oil and gas companies in Nigeria.

The negative effect of social sustainability reporting on firm value could be inferred to the lack of implementation of the PIA 3% operating profit of oil and gas firms and poor enforcement by Nigeria upstream petroleum regulatory commission (NUPRC). Therefore, low social responsibility activities and poor sustainability reporting reduce firm value of oil and gas companies in Nigeria.

Economic Sustainability Reporting and Firm Value

The study results revealed economic reporting having negative significance effect on firm value of listed oil and gas companies in Nigeria therefore the study align its finding with the study of Hamdah et al. (2025); Amrigan et al. (2023) and against the study of Abaa et al. (2024); Ibrahim et al. (2024). The study shows that increase in economic reporting reduces firm value of oil and gas companies.

This result can be professed that negative reporting of economic value would reduce firm value and a sectional economic reporting that favours a section of stakeholders such as existing shareholders could reduce firm value as firm value is built on stakeholders' perception and patronage. This is in line with stakeholders Theory that posit stakeholders'-oriented operation for sustainability.

Furthermore, oil and sector require huge capital for investment and seen as cash cow sector as such a disproportionate sustainability reporting of returns on investment to investors and other primary stakeholders would reduce further investment as well send signal to society that can attract negative public market perception on the firm operation, consequently reduces firm value. Therefore, negative and lack of economic sustainability reporting variables reduces firm value.

5. Conclusion and Recommendations

Companies' environmental activities and sustainability reporting carried out still at low state and is not commensurate to the issues of environmental demand, industrial requirement and expectations of stakeholders as such it does not influence value of oil and gas companies in Nigeria. Also, the poor implementation of the PIA, 2021 and low level of social responsibility activities and sectional sustainability reporting reduces firm value of oil and gas companies in Nigeria.

Similarly, a disproportionate economic sustainability reporting of returns on investment to investors and other primary stakeholders would reduce further investment, attract negative public market perception, consequently reduces firm value. Therefore, negative and lack of economic sustainability reporting variables reduces firm value as large firms favour sustainability to gains reputation and market share.

In line with the findings of the study, the following recommendations were suggested:

i) The Federal Government through the FRCN should design environmental industrial specific regulations on environmental protection, remediation and measurement indices to report in the annual account of oil and gas companies in Nigeria.

ii) The FRCN and NUPRC should enforce the reporting and specific item disclosure of 3% operating income of oil and gas companies on social sustainability expenditure as stipulated in the Petroleum Industry Act (PIA) 2021.

iii) The ministry of petroleum through its agencies should make policy to set aside minimum 2% operating profit of oil and gas companies for social and economic sustainability/responsibility reporting expenditures to stakeholders including share bonus offers to shareholders. The SEC set a policy on sustainability reporting threshold on triple bottom line (3Ps) for oil and gas companies for continues enlistment in the NGX.

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