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COVID-19 PANDEMIC AND STOCK MARKET VALUE OF INTERNATIONAL SERVICE COMPANIES

Kwarbai J. Danjuma, Dasauki M. Caleb, Edy-Ewoh Uduakabong, and Lawal, Esther Omotola

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Abstract

The paper examined whether a rise in COVID-19 cases in China, the USA, Germany, and Italy impacts the market value of international airlines. The paper further examined the relationship between the COVID19 Pandemic and selected stock market prices of the airline, telecommunications, and energy service companies listed on various stock exchange markets using the telecommunications and energy service companies. The Ordinary Least Squares (OLS) approach was employed in the study. The correlation matrix indicates a negative correlation between the COVID-19 pandemic and market value in most cases. The results revealed large deviations in the market value. The study concludes that the relationship between the COVID-19 pandemic and the selected market variables differs across industries and countries. COVID-19 has changed the way we live, work, and do business. The paper suggests that there is a need for businesses and institutions to adjust to this new change to sustain cash flow and avert the risk of losses that may arise from future pandemics and economic lockdowns.

Keywords: COVID 19, Market Value, Pandemic, Stock Price, Airlines, telecommunication,

1. Introduction

Coronavirus also known as Covid-19 is an infectious disease caused by a severe acute respiratory syndrome Coronavirus, was first discovered in Wuhan, China in December 2019. The World Health Organization (WHO) officially declared COVID-19 a public health international concern on January 2020, and a Pandemic on March 21, 2020. Health experts assert that one can be infected by breathing in the virus when in proximity with a covid-19 infected person or by touching a contaminated surface. The Pandemic showed no regard for international borders or Jurisdiction with a significant negative impact on local and international business. According to the WHO situation report, more than 500,000 cases of Covid-19 cases were recorded globally, with over 40,000 new cases as at 27th March 2020. On a regional basis, there were 2, 419 Covid-19 cases in Africa, 81, 137 in America, 35, 249 in Eastern Mediterranean, 2,932 in Southeast Asia, 286, 618 in Europe, and 100,018 in Western Pacific, with over 2,501 cases of Covid-19 induced deaths globally. WHO further documents that r 4.5 million people were infected by the COVID-19 disease as at May 2020 and as at 14th November 2020, the total number of deaths due to Covid-19 exceeds 1.3 million people globally (Dong, Ensheng, Du, Hongru, Gardner, and Lauren, 2020)

Governments across the globe have accepted a non-medical measure, to place restriction on movement and a mandatory shutdown of businesses globally as an effective means to combat the pandemic. The increased number of Confirmed Covid-19 cases implies that the pandemic is getting worst and stricter government restriction on the movement of people, goods and services

is imposed. Consequently, this decisions have blighted many industries and sectors, causing upheaval in stock markets accompanied with disruptions in the flow of transaction in the businesses globally (Albulescu, 2020; Zhang, 2020). Hence, the study examined whether increase in the cases of infection has impacted negatively on the value International Service Companies.

The study is related to so many works, but distinct from prior studies that documented the effect of several events affecting stock price of companies, some of these studies includes Kowalewski & Śpiewanowski, (2020) disasters, sports (Buhagiar, Cortis, & Newall, 2018), news (Li, 2018), environmental (Al-Awadhi, Alsaifi, Al-Awadhi, & Alhammadi, 2020); (Guo, Kuai, & Liu, 2020), political events (Bash & Alsaifi, 2019); (Shanaev & Ghimire, 2019); Severe Acute Respiratory Syndrome (SARS) outbreak (Chen, Jang, & Kim, 2007; Chun-Da Chen, Chin-Chun Chen, Wan-Wei Tang, & Bor-Yi Huang, 2009), and Ebola Virus Disease (EVD) outbreak (Ichev & Marinč, 2018) cited in (Al-Awadhi et al., 2020). Although most studied examined the effect of similar events to the various international stock markets very few literatures examined the relationship between COVID-19 Pandemic and companies in airline, telecommunication industry and other energy variables. This paper specifically examined how the market value of listed Airlines, Tele-Communications and energy service companies responded to the impact of Covid-19 Pandemic. The selection of these sectors is based on its essential service globally that will be needed before, during and after the pandemic.

To assess the impact of Covid 19 on the market value of international service companies, the paper applied daily share prices for Verizon, AT&T, China Mobile, American Airline, Delta Airline, Brent Oil price and Natural Gas on one side and data for COVID-19 daily infections and dead on another side. Specifically, findings from the study indicates a sharp decline in passenger patronage which led to cancellation of flights or in some cases, several Airplanes travelling empty across the globe **(See figure 1)**. In a similar fashion the pandemic also had a negative effect on Telecommunication stock prices **(See figure 1).** This result is findings are important as international government officials, policy makers and international bodies can now take on a spot decision that will reduce the exposure of the stock market to economy-wide shocks.

Following this introduction, the rest of this paper is organized as follows: Section 2 provides the research methodology. Section 3 presents the data and Descriptive tests. Section 4 Result and Discussion. Section 5 concludes the paper.

2. Literature Review and theoretical underpinning for the study

The Arbitrage pricing theory (APT) set the platform from which this paper is developed. The Arbitrage pricing theory was developed by Ross, (1978) and the Capital Asset Pricing Model (CAPM) developed by (William F. Sharpe, 1964; Sullivan, 2006; Sharpe, 1966; and Mossin, 1966). The APT have been widely applied to link the stock market to macroeconomic variables. The Efficient Market Hypothesis (EMH) of Samuelson (1965) proposed that a market is weak form efficient when asset prices reflect all current and previous information. Predictor variables such as dividend, yield and interest rate, stock returns among other have been widely used (Narayan & Liu, 2015). When publicly available information is included, the market is said to be Semi-Strong form efficient but when both public and privately available information are

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incorporated, the market is strong form efficient (Fama, 1995; Fama & French, 2015, 2017) (see Fama, 1970, 1991).

Recent studies have linked instability in the stock market to political, socio-economic events, Natural disasters and Pandemics. Historically, International Corporations have responded to several global events that have significantly impacted on their share prices. According to Salisu, Ebuh, & Usman, (2020), announcement of an event or a pandemic may produce a short-term economic impact and this shock could adversely affect the oil price-stock. Albulescu (2020) opined that global financial market risks have increased with a financial market becoming highly volatile in response to the pandemic. Furthermore, Ashraf (2020) posited that stock market returns decline as the number of cases increases in countries. This implies that captain of industries and policy makers will be confronted with the choice of fighting the virus and sustaining the economy. Hence knowing the impact of the Pandemic will set the platform for discuss amongst local and international government officials, policy makers and international bodies on the appropriate decision to take that will reduce the exposure of the stock market to economy-wide shocks. Hence, the paper hypothesized that:

Hypothesis: Covid-19 pandemic does have any significant effect on stock value of international Service Corporation.

An assumption underlying this hypothesis is that the announcement of covid 19 as a pandemic, the number of infected persons and the number of death persons will significantly affect the stock value of international service companies.

3. Methodology

The Ordinary Least Squares (OLS) approach is applied to examine the relationship between COVID19 Pandemic and selected Stock market variables Airlines and Telecommunications and energy companies.

$$S_t = \beta_0 + \beta_1 COVID19_t + \varepsilon_t \qquad 1$$

Where s is the share prices of individual Airline, Tele-Communication and Energy Service Company. These variables as dependent variables while COVID19 represents number of publicly declared cases of COVID-19 infections In China, the USA, Germany, Italy and Global total number of cases. COVID-19 variables are the independent variables while ε is random stochastic error term.

3.1   Data

The paper applied daily share prices for Verizon, AT&T, China Mobile, American Airline, Delta Airline, Brent Oil price and Natural Gas gathered from yahoo finance at www.finance.yahoo.com while data for COVID-19 daily infections were obtained from World Health Organization (WHO) and covering the First 68 days i.e. the first quarter of the outbreak of COVID-19 Pandemic from January 2, 2020 to April 6 2020.

Figure 1:

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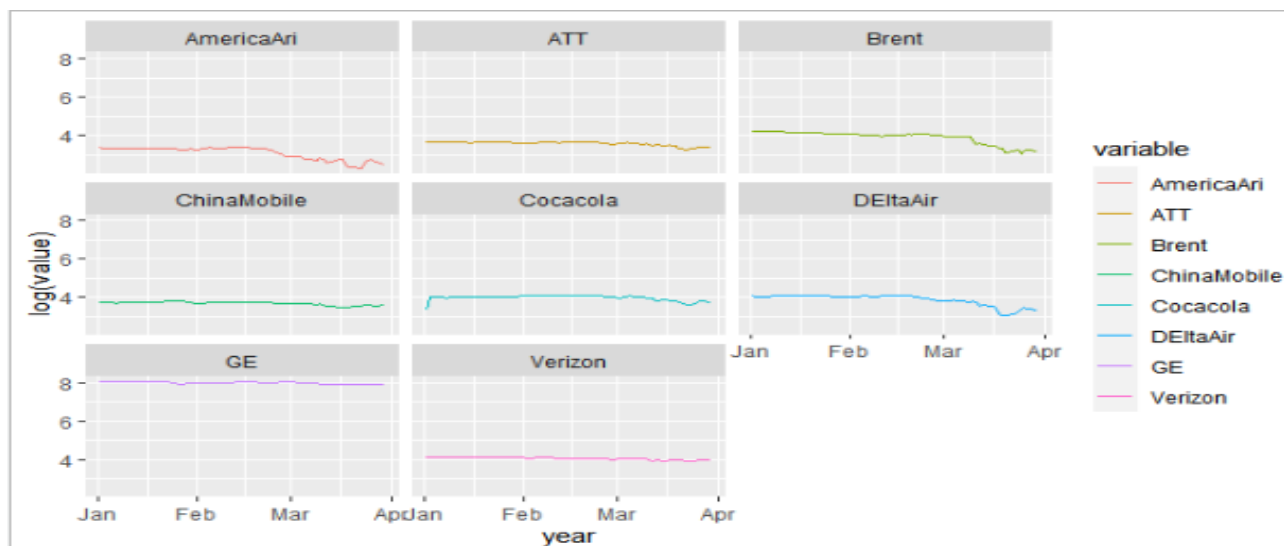
4. Result and Discussion

4.1 Descriptive Result

Figure 1 provides a summary of the descriptive statistic of the analysis. The purpose of the analysis is to show the pattern or behavior of the explanatory variables as the result of the covid 19 pandemic. The figure clearly demonstrates decline in the share price of American Airline, AT&T, Brent Oil price, China Mobile, Coca-Cola, Delta Airline, and Natural Gas. This is an indication that there was a decline in passengers patronage cancellation of flights or in some cases, several Airplanes travelling empty across the globe. The implication on revenue and profitability is massive in addition to lay off employees while other airlines declared bankruptcy (Josephs, & Leslie 2020; Jolly & Jasper 2020; Boston Herald 2020). The International Air Transport Association (IATA) estimated a revenue loss of $314 billion (55%) due to declined Patronage and a drop in traffic by 48% (Financial Times 2020; Doherty, Ben 2020). In a similar fashion the pandemic also had a negative effect on Telecommunication stock prices.

The pandemic led to a reduction in industrial and economic activities which led to declining consumer spending power and a drastic drop in the traditional demand for the company's data services. Also, Global Telecomm revenue also declined to 427Billion (5.4% fall) in the second quarter of the year 2020 from 2019 quarter 2 level as a result of low phone sales, supply disruption in the supply chain, and reduction in roaming revenue due to restrictions on international movement. On a regional basis, the industry saw a year on year notable revenue loss of 8% (America), and then in Europe (5%), Middle East and Africa (4%) and Asia (2%) (GlobeNewswire, 2020). This suggest that the impact of the pandemic on the telecom industry in not uniform but varies across different regions. Like Verizon America's biggest telecommunication company lost over 65, 000 annual phone subscribers and revenue loss of over 1.6% in the first quarter of the year 2020 to Covid19 pandemic (Forbes, 2020).

A similar impact of the pandemic is observed on AT&T. According to Spangler (2020), AT&T recorded a revenue and earnings loss of 4.7%. In the first quarter of 2020. This loss was driven by declining revenue to its multinational mass media and entertainment conglomerate, Warnermedia in addition to an ongoing loss of over 1 million subscribers in its PayTV Biz (Variety, 2020). The COVID-19 pandemic reduced AT&T earnings by $433 million (5% share) and depressed revenue generated from sport related advertising and declined proceeds from the sale of wireless facilities, a revenue decline of over $600 million in the first quarter.

4.2   Ordinary Least Square Result

The result of the study presented in Table 2 showed a statistically significant positive unconditional correlation between COVID cases in different countries. The correlation between global cases of COVID 19 and that of China is significantly high at about 0.99, while 0.49 and 0.68 for Spain and USA respectively. COVID-19 cases in Nigeria have the lowest correlation coefficient with China (0.28). COVID19 confirmed cases in Nigeria are positively correlated with COVID 19 cases in Spain, USA. Also, Table 2 further present a correlation matrix between COVID19 confirmed cases and 7 different individual stocks from 3 Tele-Communication (AT&T, China Mobile, and Verizon) and 2 Airline companies (Delta and American Airlines), Gold and Brent oil price.

[INSERT TABLE 1 AND 2 AROUND HERE]

The correlation matrix in Table 2 shows evidence of positive and negative correlation between COVID-19 and different selected stocks. The return of AT&T is positively correlated with returns of other stocks like Verizon, American Airline, Delta Airline, Gold and Brent oil price. AT&T is negatively correlated with Italy, Spain, USA, Global total COVID19 cases. While COVID19 cases in Nigeria is positively correlated with AT&T, China Mobile, Verizon, American Airline, Delta Airline Brent Oil Price and Gold price.

In China, Covid19 pandemic is negatively and weakly correlated with AT&T, China mobile, Verizon, American airline, Delta airline, Brent oil price and Gold price. Although a weak correlation, Global Covid-19 cases are negatively correlated with all the Airlines and Telecommunication companies considered and oil price, but positively correlated with Gold price returns. Similarly, Gold returns is positive correlated with COVID19 cases in China, Italy, Nigeria, Spain, USA and Global total COVID19 cases. The correlation is weak between gold returns and Nigeria and Spain.

China mobile is negatively correlated with Covid-19 cases in China, Global total, Italy, but the correlation is positive for Nigeria, Spain and USA. There is a negative correlation between Verizon and Coivid19 cases in China and Global total while a positive correlation in Nigeria, Spain and USA. American Airline is negatively correlated with China, Italy, Spain, USA and Global total. There is a negative correlation between COVID-19 cases in Italy, Spain, USA, Global total, and Delta Airline while a positive correlation between Delta airline and Nigerian Covid19 cases. There is negative correlation between Brent oil price and Covid19 cases in China, Global total, Italy, Spain, and USA. Only Nigerian Covid-19 cases are positively correlated with Brent oil price

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[INSERT TABLE 3 AROUND HERE]

The paper further examined the relationship between the variable of interest, i.e., stock market value of international airline companies, Telecommunications companies, Energy prices (Brent oil price, natural gas price, General Electric company) and Covid-19 data from USA, China, Italy, Germany and global. The results are presented in Table 3, 4 and 5. The result in Table 3 shows the relationship between Covid19 number of confirmed cases in the USA, China, Germany, Italy, the Global total number of confirmed cases, and the stock market value of selected Telecommunication companies (i.e., China Mobile, AT&T, and Verizon).

The first result in Table 3 shows the relationship between covid-19 death cases and China Mobile share price. China mobile stock value is positively related to Covid-19 cases in China (0.04) and USA (0.02), indicating that a 1% increase (decrease) in Covid-19 death cases in China and USA will bring about an increase (decrease) of 0.04 and 0.02 in China and USA respectively. This result indicates that the market value of China mobile improves as the convid-19 pandemic worsens (ie the number of confirmed cases increases). As at time of writing this paper, China is the most impacted country by covid-19. Increased cases of Covid-19 generate panic and confusion, which was accompanied by an economic lock down in China. Due to the restriction of movement, families, Businesses and Governments could only communicate with loved ones' phone calls, video calls and other electronic means and this tends to improve the market value of China Mobile Telecommunication company among others.

On the other hand, Covid19 death cases is negatively related to the market value of China Mobile is negative in Germany (-0.03), Italy (-0.01), and the Global total confirmed cases of Covid-19 (-0.00). This implies that an increase (decrease) in COVID 19 death cases in Germany, Italy, and Global cases will lead to a fall (increase) in the value of China Mobile company by -0.03, -0.01, and -0.00 respectively. The impact of China and global covid19 cases on the China mobile is not statistically significant. The F-statistics indicates that covid19 death cases in China, USA, Germany, Italy, and Global total cases have a joint statistically significant impact on China Mobile.

[INSERT TABLE 4 and 5 AROUND HERE]

The result shows a negative relationship between Covid19 cases in the USA, Italy, Global total cases, and the market value of Verizon Company. An increase (decrease) in covid19 cases by 1% will lead to a decrease (increase) of -0.01, -0.01, and -0.03 in the USA, Italy, and Global total cases respectively. On the other hand, covid19 death cases are positively related to Verizon. Covid19 Death cases in China, and Germany will increase (decrease) with the market value of Verizon by 0.03 and 0.01 respectively. The impact of COVID 19 cases on Verizon is statistically significant except for the USA and Germany.

The relationship between AT&T Company and COVID 19 cases is positive in China, Germany, and Italy, but Negative in the USA, and the Global total cases. The result implies that an increase (decrease) in Covid19 cases in China, Germany, and Italy will lead to an increase (decrease) of 0.06, 0.01, and 0.00% respectively on AT&T market value, vice versa. While an increase in Covid19 cases in USA, and Global total will lead to a decrease (increase) of -0.04 and -0.04% in

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AT&T market value respectively. The impact of Covid 19 cases is statistically significant at least at 5% significant level except for Germany on AT&T. the F-statistics is statistically significant at 1% level, indicating that covid19 death cases in China, USA, Germany, Italy and Global cases have a joint statistically significant impact on AT&T.

Table 4 shows the relationship between COVID 19 death cases, Airline companies (American Airline and Delta Airline), while the regression result of Covid-19 and Oil price relationship is reported in Table 5. The result indicates a positive relationship between Global, China, USA COVID 19 cases, and American Airline. An increase (decrease) in COVID 19 death cases globally, in China, and the USA will lead to a statistically insignificant increase (decrease) of 0.05, 0.01, and 0.02 on the value of American Airline respectively. On the other hand, the relationship is negative for Germany and Italy, indicating that an increase (decrease) of 1% in COVID 19 death cases globally, in Germany and Italy will bring about a decrease (increase) of -0.05 and -0.07 respectively.

The relationship between Covid19 death cases in China on Delta Airline, is positive, indicating that a 1% increase in COVID 19 cases in China will bring about an increase of 0.11% while the relationship is negative in the USA, Germany, Italy, and globally. The result shows that a 1% increase in global COVID 19 cases, USA, Germany, and Italy will reduce the market value of Delta Airline by -0.05, -0.06, -0.01, and -0.02 respectively. The statistics also confirm that Covid19 cases in China, USA, Germany, Italy, and Global total cases jointly impact the market value of Delta Airlines.

The relationship between COVID 19 cases in Italy and China is positive. The result indicates that a 1% increase (decrease) in Covid19 cases in Italy and China will bring about an increase (decrease) of 0.024% and 0.10% respectively. The relationship is negative for the USA, Germany, Italy, and Global Total Cases. Thus a 1% increase (decrease) in Covid19 death cases in the USA, Germany, Italy, and Global Total cases will bring about a decrease (increase) of -0.09, -0.05, and -0.04 respectively. The F-statistics indicates strong evidence of the joint statistically significant impact of Covid19 death cases on the Oil price.

5. Summary and Conclusion

The study provides some preliminary result on the relationship between the COVID-19 Pandemic and Market value of Airline, Tele-Communication and energy service industry. The paper begins the analyses by examining the pattern in the variables. The paper revealed signs of distortion in the flow pattern of all variables of interest, which indicates the presence of shocks in the system as the result of the Covid-19 pandemic. Furthermore, the paper examined the relationship among the market value of Telecommunication companies (China Mobile, AT&T, Verizon), Airline Companies (Delta Airline, American Airline), selected energy variables (General Electric, Natural gas price, Brent oil price, the market value of General Electric and Covid-19 Pandemic in China, USA, Italy, Germany, Spain and Global Covid-19 number of confirmed cases (Global henceforth)

The paper evidenced a positive relationship between China mobile and Covid19 cases in China, and USA while the relationship is negative in Germany, Italy and Global total Covid-19 cases. Relationship between Verizon market value and Covid 19 pandemic is positive in China, and Germany but Negative in USA, Italy and Global Total. The relationship is positive in between AT&T and Covid 19 pandemic in China, Germany, Italy while a negative relationship is found in USA and the global total Covid 19 cases.

The study also found a positive relationship between Covid-19 Pandemic in USA, China, Global total cases and market value of Airline companies (American Airline and Delta Airline). On the other hand, the relationship is negative between American Airline, Covid19 cases in Germany, Italy. There is also a negative relationship between market value of Delta Airline and Covid-19 cases in USA, Germany, Italy and Global Total. Between Covid-19, and Energy. There is a positive relationship between the pandemic in USA and China and market value of General Electric; Covid-19 cases in China, USA, Global total and Natural gas price. On the other hand, a negative relationship is found between Covid-19 cases in Germany, Italy and global total and the market value of General Electric. There is a negative relationship between pandemic in Germany, Italy and Natural Gas price. Oil price is positively related with Covid-19 cases in China and Italy but negatively related to covid-19 cases in Germany, USA and Global total cases of Covid-19.

The study concludes that the impact of the pandemic varies across industry and Countries since the Pandemic and the economic lock down was impose in different countries not at the same time. COVID-19 has changed the way businesses operate and people work. There is need for businesses to switch to electronic way of doing business in order to maintain corporate cashflow even in the presence of economic lockdown, and restriction on movement of people, goods and services and social distancing. Telecommunication companies should increase investment in data services and create more services to small service businesses. The airline businesses should diversify their business operations to other areas of business to retain company value in the presence of any future pandemic or decline in passenger's patronage. Countries that rely on oil for revenue should equally diversify to avert the effect of negative shocks on

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Appendix

Table 1: Descriptive statistics

	CHINA MOBILE	DELTA AIRLINE	GE	VERIZON	BRENT	AMERICAN AIRLINE
Mean	40.31429	50.24635	10.79286	57.33762	52.05794	23.14889
Median	41.56000	57.48000	11.77000	58.23000	56.34000	27.20000

Maximum	44.79000	62.03000	13.16000	61.05000	70.25000	30.47000
Minimum	31.30000	21.35000	6.110000	49.94000	21.85000	10.25000
Std. Dev.	3.473684	12.26055	2.164989	3.004394	14.03268	6.482796
Skewness	-1.076958	-1.104594	-0.917298	-1.019507	-0.984557	-0.674546
Kurtosis	3.181102	2.874839	2.341717	3.018312	2.688212	1.840318

COVID-19 Confirmed Cases

	NGAS	SPAIN	ITALY	GERMANY	GLOBAL
Mean	1.919508	5589.238	10715.13	4252.429	85197.54
Median	1.930000	2.000000	3.000000	16.00000	49053.00
Maximum	2.170000	78797.00	97689.00	57298.00	509164.0
Minimum	1.680000	0.000000	0.000000	0.000000	0.000000
Std. Dev.	0.117706	14983.41	22969.06	11387.10	115510.4
Skewness	-0.085020	3.201940	2.317243	3.073742	2.088611

Table 2: Correlation Matrix
Table 3: Relationship between Covid-19 and Telecommunication Companies

Correlation	RATT	RCHINMO	RVERIZON	RAMERIC	RDELTA	RBRENT	LCHIN	LGLOBA	LITALY	LNIGERIA	LSPAIN	LUSA
RATT	1.00											
RCHINMOB	0.42	1.00										
RVERIZON	0.87	0.42	1.00									
RAMERICA	0.41	0.50	0.17	1.00								
RDELTA	0.51	0.57	0.30	0.84	1.00							
RBRENT	0.29	0.12	0.23	0.06	0.13	1.00						
LCHINA	-0.06	-0.08	-0.02	-0.09	-0.12	-0.13	1.00					
LGLOBAL	-0.06	-0.07	-0.00	-0.09	-0.11	-0.14	0.99	1.00				
LITALY	-0.10	-0.02	0.02	-0.09	-0.13	-0.27	0.59	0.64	1.00			
LNIGERIA	0.09	0.13	0.18	0.05	0.13	0.009	0.28	0.36	0.67	1.00		
LSPAIN	-0.09	0.023	0.05	-0.06	-0.10	-0.24	0.50	0.56	0.95	0.78	1.00	
LUSA	-0.05	0.03	0.07	-0.06	-0.06	-0.17	0.68	0.74	0.93	0.80	0.94	1.00

	Variable	Coefficient	Std. Error	t-Stats	Prob.
CHINA MOBILE	LGLOBAL	-0.00	0.03	-0.37	0.71
	LCHINA	0.04	0.03	1.23	0.23
	LUSA	0.02**	0.01	1.78	0.09
	LGERMANY	-0.03**	0.01	-2.25	0.03
	LITALY	-0.01***	0.01	-2.76	0.00
	C	3.48***	0.23	16.1	0.00
	R-squared	0.78			
	Adjd R-sqd	0.75			.
	F-statistic	25.9***			
	Prob(F-stats)	0.00			
	Variable	Coefficient	Std. Error	t-stats	Prob.
VERIZONE	LGLOBAL	-0.03**	0.01	-2.49	0.02
	LCHINA	0.03*	0.02	1.77	0.09
	LUSA	-0.01	0.01	-1.30	0.20
	LGERMANY	0.01	0.01	0.85	0.40
	LITALY	-0.01**	0.00	-1.92	0.06
	C	4.13***	0.11	36.54	0.00
	AdjD R-sqd	0.78			
	F-statistic	30.22***			
	Variable	Coefficient	Std. Error	t-stats	Prob.
AT&T	LGLOBAL	-0.04**	0.02	-1.93	0.06
	LCHINA	0.06**	0.02	2.66	0.01
	LUSA	-0.04***	0.01	-3.96	0.00
	LGERMANY	0.01	0.01	0.91	0.37

LITALY	0.00	0.00	-0.27	0.79
C	3.44***	0.16	21.44	0.00
R-sqd	0.90			
Adjd R-sqd	0.89			
F-statS	67.59***			

Where *, **, *** represents 10%, 5% and 1% statistical significance respectively

Table 4: Relationship between COVID-19 Death cases, Airlines and Energy

	Variable	Coefficient	Std. Error	t-Stats	Prob.
	LGLOBAL	0.05	0.06	0.91	0.37
	LCHINA	0.01	0.07	0.12	0.90
AMERICAN AIRLINE	LUSA	0.02	0.03	0.71	0.48
	LGERMANY	-0.05	0.03	-1.64	0.11
	LITALY	-0.07***	0.01	-5.60	0.00
	C	2.84***	0.49	5.82	0.00
	R-squared	0.91			
	Adjusted R-squared	0.90			
	F-statistic	80.7***			
	Prob(F-statistic)	0.00			
	Variable	Coefficient	Std. Error	t-Statistic	Prob.
	LGLOBAL	-0.05	0.07	-0.73	0.47
DELTA AIRLINE	LCHINA	0.11	0.08	1.28	0.20
	LUSA	-0.06	0.03	-1.71	0.10
	LGERMANY	-0.01	0.04	-0.28	0.78
	LITALY	-0.02	0.01	-1.59	0.12
	C	3.65***	0.57	6.38	0.00
	Adjusted R-squared	0.85			
	F-statistic	47.2***			
	Prob(F-statistic)	0.00			

Where *, **, *** represents 10%, 5% and 1% statistical significance respectively

Table 5: Covid 19 Pandemic and Energy variables

	Variable	Coefficient	Std. Error	t-Statistic	Prob.
Energy:	LGLOBAL	-0.044466	0.047132	-0.943438	0.3517
	LCHINA	0.077633	0.057264	1.355713	0.1836
General Electric	LUSA	0.022659	0.022447	1.009432	0.3195
	LGERMANY	-0.058451	0.023938	-2.441737	0.0197
	LITALY	-0.030145	0.009810	-3.072774	0.0040
	C	2.319144	0.389400	5.955679	0.0000
	R-squared	0.903213			
	Adjusted R-squared	0.889770			
	Log likelihood	46.85105			

	F-stat	67.2***			
	Variable	Coefficient	Std. Error	t-statistic	Prob.
	LGLOBAL	0.000512	0.021263	0.024058	0.9809
	LCHINA	0.021780	0.026255	0.829550	0.4124
Natural Gas	LUSA	0.004248	0.010128	0.419491	0.6774
	LGERMANY	-0.013371	0.010841	-1.233320	0.2257
	LITALY	-0.002993	0.004592	-0.651738	0.5188
	C	0.444433	0.182468	2.435675	0.0201
	R-squared	0.477495			
	F-statistic	6.397013			
	Adjusted R-squared	0.402852			
	Prob(F-statistic)	0.000256			
	Variable	Coefficient	Std. Error	t-Statistic	Prob.
	LGLOBAL	-0.04	0.04	-0.87	0.39
	LCHINA	0.10**	0.05	1.93	0.06
BRENT	LUSA	-0.09***	0.02	-4.25	0.00
	LGERMANY	-0.05**	0.02	-2.42	0.02
	LITALY	0.024**	0.00	2.68	0.01
	C	3.70***	0.35	10.58	0.00
	Adjusted R-squared	0.95			
	F-statistic	155.9***			
	Prob(F-statistic)	0.00			

Where *, **, *** represents 10%, 5% and 1% statistical significance respectively

LEVERAGE AND SUSTAINABILITY REPORTING: MODERATING ROLES OF FIRM SIZE OF NIGERIAN INDUSTRIAL GOODS COMPANIES

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Abstract

Climate change and other environmental disaster which has been linked to organizational activities necessitated organizations to embark on sustainable activities and report same. In view of the foregoing, this study examined the effect of leverage on sustainability reporting, with moderating effect of firm size in the Industrial goods sector in Nigeria. The period of study was 11 years (2009 – 2019). The population of study consisted of the 14 listed industrial firms in Nigeria of which 2 companies were filtered out due to lack of comprehensive data for the period of study indicating 12 listed companies as the sample size. The study adopted ex post facto research design and used panel data collected from the annual and sustainability reports of the sampled firms. One hundred and thirty-two (132) set of reports were analyzed using multiple regression analysis and content analysis of the Global reporting initiative, GRI G4 index. Results of data analysis revealed a significant positive effect of Leverage on sustainability reporting. A further analysis revealed that the direction of the effect of LEV on SR was increased or strengthened with firm size as the moderating variable. The policy implication of this study is that organizations should strengthen their policies geared towards more sustainability disclosures especially if they are levered and are big in size in order to induce trust among the stakeholders and especially, their creditors. This study recommended that stakeholder should continue to pressure organizations to be more socially and environmentally responsible and the government through the Nigerian Group Exchange (NGX) should ensure measures for more and better sustainability disclosures are put in place and ensure strict compliance.

***Keywords:** Firm Size, Global Reporting Initiative (GRI), Leverage, Nigerian Industrial Goods Firms, Sustainability reporting.*

1. Introduction

The major aim of organizations all over the world is to make profit in addition to the target to keep on increasing shareholders' wealth. But this fact is gradually being overtaken by some other facts which have expanded the scope of organizational aims to include engaging in social and environmental activities. Organizational target has therefore been expanded to include all stakeholders such as creditors, employees, community, and the government.

The reasons for this are not far-fetched. Organizations' activities have been linked with climate change, depletion of biodiversity, overexploitation of species, pollution, energy overuse and waste management and the recent covid-19 pandemic (Stanislavska, Margarisova & Stanstna, 2010).

These front burning issues (all over the world, including Nigeria) and many more are evidence of unsustainability. Organizations are said to be sustainable when they try as much as possible to maintain ecological balance by avoiding the depletion of human and natural resources, increasing their attention to community-wellness and development, promoting the development of local economy (specially to mitigate the effect of the pandemic) and making frantic contributions towards the insecurity that currently plagues the country.

A very good means through which the stakeholders will really know that organizations are maintaining ecological balance is by reporting their activities towards the society and the environment via sustainability reports. Sustainability reports as explained by Global reporting Initiative (GRI) (2016), is an open report of organizations as it relates to economic, social and environmental activities of organizations whether positive or negative. This means that organizations should make open their contributions economically, socially and environmentally to the stakeholders by reporting it through sustainability reports. It also means that sustainability reporting will help greatly in reducing information asymmetry/gap between stakeholders and the management of organizations. Complementing this, Onyema (2018) stressed that information disclosure will help build trust among the stakeholders and management. According to literature, leverage is one of the firm characteristics that affects or determines sustainability reporting (Nwobu, 2017).

Leverage is the use of debt capital (instead of equity capital) to finance corporate investment or acquisition of assets of an organization in order to make more profit and increase their shareholders' value (Hayes & James, 2021). An organization is said to be highly leveraged when its debt is more/higher than its equity. Ashmarina et al (2016) argued that organizations that use borrowed funds are at higher risk than those working without borrowed funds. In support of this assertion, Lucia and Panggabean (2018) added that a higher level of leverage or financial debt puts the organization at high financial risks which invariably make them engage in and disclose more sustainability actions in order to douse the fears of their creditors and other stakeholders. Although, the claim of Lucia and Panggabean (2018) above was refuted by Sonia and Khafid (2020) who said that levered companies seek to cut costs and one of such costs is the cost of sustainability disclosures.

Despite the importance of sustainability disclosures at addressing the increasing spate of social and environmental challenges which plagued the nations of the world, including Nigeria, sustainability reporting is still voluntary. The environment's vulnerability has been linked to human and organizations' activities which do not give regard to social and environmental laws in a bid to achieve economic success. A good example is the dumping of 18,000 drums of toxic and hazardous industrial wastes in Koko, a small village in Nigeria in 1988 which made many Itsekiri to suffer nausea, paralysis and premature births. Thirty years later, in 2017, there was another report of an international oil company engaged in a massive dump in the same village (Koko) which the Nigerian lab tests allegedly prove that the waste is toxic (Buck, 2017). In order to stem the increasing infraction against the society and the environment, it is high time that organizations

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became responsible by reporting the impact of their activities on the society and the environment through sustainability reports.

Not only that, the debate on the effect of leverage on sustainability reporting has been a contentious issue empirically overtime having both empirical support and oppositions. The varying results are evidence of research gap (Khafid, et al, 2019). The studies of Ariyani and Hartomo (2018); Antara et al (2020); Fahad and Nidheesh (2021) revealed a significant positive effect of leverage on sustainability reporting, while the studies of Sonia and Khafid (2020), revealed significant negative results. The studies of Lucia and Panggabean (2018) and Onyinye and Amakor (2019) revealed an insignificant effect of leverage on sustainability reporting whereas the study of Wardhani, et al (2019) revealed no effect of leverage on sustainability reporting. None of these studies moderates the effect of leverage on sustainability reporting with any variable, hence the importance of this study to fill this gap.

The varying results of these empirical studies are actuated by some other variables which also affect sustainability disclosure. In order to add to the body of knowledge on this research area, this study moderates the relationship between leverage and sustainability with firm size. The adequacy of firm size as the moderating variable is premised on the fact that firm size has relationship with leverage, and it also influences sustainability report because an organization with large chunk of assets could access loan more easily than those with little or none and larger firms are considered to be prone to more and better sustainability disclosures than smaller firms. Besides the foregoing, there is dearth of studies that considered the effect of leverage on sustainability reporting in Nigeria except for a very known few (Onyinye & Amakor, 2019; Abdulsalam & Babangida, 2020) and neither of them moderate the effect of the independent variable on the dependent variable. It is on this premise that this study investigated the effect of leverage on sustainability reporting, moderating effect of firm size in the Nigerian Industrial goods sector.

The Industrial Goods Sector is the sector that produces goods used in construction and manufacturing such as companies involved with industrial machinery, waste management, tools, lumber production, construction, manufactured housing and cement and metal fabrication. This sector was noticed to have revved up activities on the Nigerian Stock Exchange by a margin of 0.17 percent in 2018. This follows that the sector is an active sector in Nigeria, and it is highly environmentally sensitive, that is, it uses natural resources significantly as its raw materials and the machines and plants used in the process of production usually pollutes the environment. Other sustainability issues that affect this sector include waste management, the use of water, recycling of used materials etc. It is therefore required that organizations in this industry sector are not only economically responsible but are also socially and environmentally responsible by giving adequate disclosure of their sustainability actions towards the society and the immediate environment.

This study covered the period between 2009 and 2019 because an 11year trend analysis is considered sufficient to aid better results and conclusion. Not only that, but these period also (2009

– 2019) are the periods when Nigeria suffered greatly as a result of infraction against the society and the environment such as the shocking unabated oil spills in the Niger Delta by Shell since 2009, the river burst of 2012 in about 27 states of the country and the dumping in Koko village in 2017 which calls for swift attention.

This study will have practical implication for regulators and policy makers in the formulation and updating of local policies on sustainability disclosures guidelines. The study will also benefit organizations in the industrial sector as it will help them to pay more attention to sustainability disclosure and the type of information to disclose. Not only that, stakeholders (especially, creditors) will also know what to look out for before giving out loans. The remaining part of the study is organized as follows: literature review, methodology, data analysis, conclusion and recommendations.

2. Literature Review

In this section, relevant literatures, theories, concepts and empirical studies were reviewed.

2.1 Conceptual framework

The conceptual framework of the study is as shown in figure 1.

Moderator

```
                    ┌─────────────────┐
                    │    Firm Size    │
                    └─────────────────┘
                             │
   Independent                            Dependent
    Variable                               Variable
┌─────────────────┐              ┌─────────────────┐
│    Leverage     │─────────────▶│  Sustainability │
└─────────────────┘              │    Reporting    │
                                 └─────────────────┘
                                          ▲
                                 ┌─────────────────┐
                                 │  Corporate Age  │
                                 │    Liquidity    │
                                 └─────────────────┘
                                 Control Variables
```
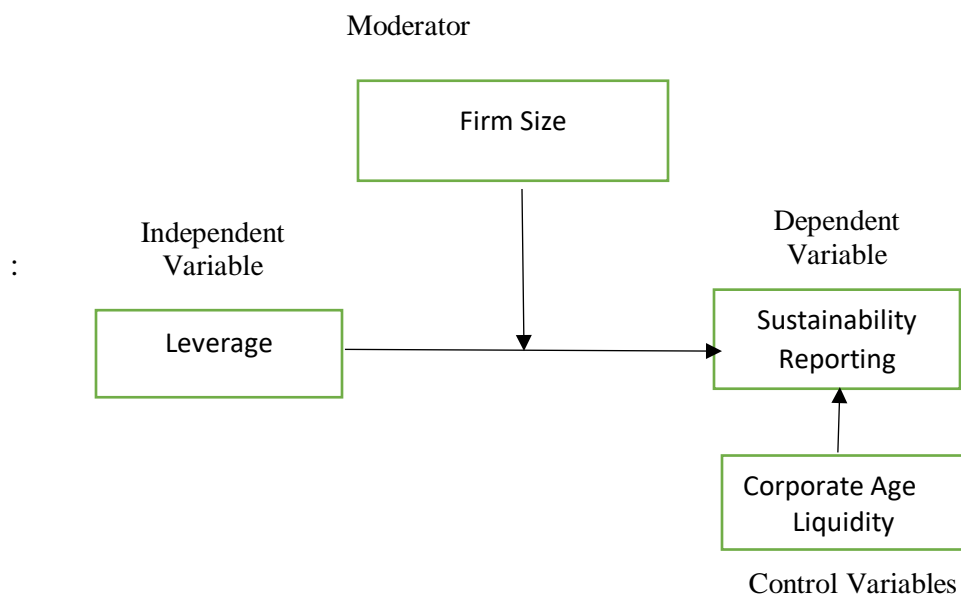
Figure 1: *Schematic representation of the conceptual framework*

Source: Author's compilation.

Figure 1 shows the independent variable (Leverage) and its relationship with the dependent variable (Sustainability Reporting), in that levered organizations are tended to disclose more sustainability information to signal their responsibility and ability to repay their indebtedness. This relationship is moderated by firm size to either strengthen or weaken the relationship. This will

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confirm the role firm size plays in the relationship between leverage and sustainability reporting. While corporate age and liquidity are the control variables because from literatures (Sonia & Abdelwaheed, 2021), they are variables that affect sustainability reporting.

2.1.1 Sustainability reporting

In order to achieve a sustainable economy, it is important and equally fundamental to build and maintain trust in businesses. This trust is however, enshrined in the daily decisions made by businesses which impacts directly or indirectly on the stakeholders. Sustainability reporting becomes valuable because it makes sure that organizations put into consideration their impacts (whether directly or indirectly) and help them to be transparent about reporting these impacts. From literature, sustainability reporting has been used interchangeably with terms such as Corporate Social Responsibility (CSR), Social Responsibility (SR), Integrated Reporting (IR) Corporate Reporting (CR), Environmental, Social and Governance (ESG) disclosure, and Triple Bottom Line (TBL) reporting (AICPA, 2018).

Sustainability reporting in the context of World Business Council for Sustainable Development (WBCSD, 2002) is a company's public reports that provide internal and external stakeholders with a picture of corporate position and activities on economic, environmental and social dimensions". Thus, sustainability reporting is expected to disclose the social, economic and environmental impacts of its activities whether positive or negative. Whereas GRI (2006) defined sustainability reporting as "the practice of measuring, disclosing, and being accountable to internal and external stakeholders for organizational performance towards the goal of sustainable development". Summarily, sustainability disclosure is a report geared towards internalizing and improving the commitment of organizations to sustainable developmental goals in such a way that can be demonstrated to both their external and internal stakeholders.

This means that sustainability reporting is the medium or platform through which organizations communicate their sustainability actions and performances and impacts (whether good or bad) transparently, for stakeholders' consumption. To add the above, Herzig and Schaltegger, (2011) opined that sustainability reporting is the communication of an organization's social and environmental issues which contributes to a better relationship with their stakeholders and help organizations build reputation and consumer confidence. In line with this thought is the assertion of Rukaiya (2021) that sustainability reporting brings about organizational longevity which creates value that is shared among the various stakeholders which also includes future generation. All of these definitions are united in the line of thought that sustainability reporting should communicate transparently, its economic, social and environmental activities to its various stakeholders. And all of these buttresses the triple bottom line reporting of people (social – people wellness and development, insecurity, local economic development), planet (environment- pollution control, climate change, waste management, clean water,) and prosperity (economic – sustainable finance, sustainable production and consumption, responsible investment) concept.

2.1.2 Leverage and Sustainability Reporting

Leverage is the measurement of a company's level of loan capital or debt to the value of its common stock or equity. Leverage gives an accurate description of the financial structure of an organization, measuring the implied risk of that structure in the long run (Watson, et al, 2002). Leverage is the use of debt capital (instead of equity capital) to finance the project or assets of an organization in order to make more profit and increase their shareholders' value (Hayes & James, 2021). In support of this assertion, Salawu, et al (2021) defined leverage as using debt to purchase assets for the organization. Disclosure of information on an organization's leverage by management usually helps to assure debt holders of the company's ability to pay its obligations.

The views on financial leverage are two-ways, it could signal either a company's potential growth or risk. It signals a positive sign because it is an indication that an organization can fulfill its obligations to her creditors thereby legitimizing their financial position using borrowing which increases disclosure. On the other hand, it could also signal risks especially when an organization's interest on loan is greater than its Return on Asset (ROA), it can greatly result in diminishing organization's Return on Equity (ROE) which tends to limit disclosure. Purnasiwi (2011), Faudah, et al, (2019), Salawu et al (2021) is of the opinion that the level of financial leverage has significant effects on sustainability disclosure, while Andrikopoulos and Kriklani (2013) and Antara et al (2020) asserted that organizations with high leverage level are tended towards reducing the extent of sustainability disclosure in order to reduce the cost of voluntary disclosure. Literature had revealed the importance of leverage in the content of sustainability disclosure, hence, its relevance to this study. In this study, leverage is measured by total debt to equity ratio as used in the work of Oyelere and Kuruppu (2016), Salawu et al (2021) and Ezejiofor and Emeneka (2022). In line with the above and the stakeholders' theory which states that businesses exist not only to make profit and satisfy the shareholders but to also care for the stakeholders as well, this study therefore hypothesized that:

H_{O1}:   Leverage has no significant effect on sustainability reporting in the Nigeria Industrial Goods sector.

2.1.3 Firm Size (Moderating Variable)

Firm size is the strength, power, prowess or wherewithal of an organization. Firm size is measured by either its asset base, its net worth, the capital employed, labor employed, raw material consumed or volume and value of output. According to Mangroove (2021), the size of a business is very important because it significantly affects the efficiency and profitability of the firm. An organization with a strong asset base is therefore seen to be financially strong. Organizations vary in sizes, they are either small, medium or large.

Evidence from prior research (Faudah et al, 2019; Nguyen, 2020) have found firm size proxied by log of assets of the organization to be positively associated with sustainability reporting. Several reasons have been identified for the association of company size and sustainability reporting by

prior literatures. According to Frost (2007), larger corporations are expected to possess greater capabilities and resources to engage in a greater and quality information disclosure, more so, they are usually under greater publicity and greater scrutiny which compels them to produce quality reports. Ebiringa, et al (2013) opine that large firms are more willing to disclose information so as to reduce political costs, litigation cost and government intervention. Whereas, Kansal, et al (2014) state that because larger organizations receive more public attention, they need to disclose more information by exhibiting their social and environmental responsibility activities for the improvement of their corporate image. Complimenting their statement, Faudah et al (2019) said that large companies are more visible than smaller firms therefore, they attract more attention from the stakeholders and the general public. Skinner (1994) suggests that larger firms disclose more sustainability information in order to minimize possible litigation costs while Maryana and Yenni (2021) opined that large firms disclose more information on sustainability because they have more stakeholders than the smaller firms and would therefore in a bid to get legitimacy will disclose more sustainability information. Although Wallace and Naser (1995) are of the opinion that smaller firms are more likely to feel that greater disclosure will be detrimental to their competitive state than larger firms. Siregar and Bachtiar, (2010), are of the opinion that larger organizations disclose more sustainability information than smaller organizations while these claims have been refuted by Jhumani, (2014) and Isa, (2014) who claimed that smaller companies in a bid to gain legitimacy produce more sustainability information than larger companies.

In addition, company size has been argued to affect the willingness of lenders to give them loan to finance their business (Leverage) which is why it is considered a relevant moderator in this study. From prior literatures, it is usually operationalized by the number of employees, market capitalization, balance sheet total, total assets, net sales, total revenue, etc. In this study, firm size is measured in terms of log of total asset value as used in the work of Clarkson et al, (2008), Comyns, (2013), Paul, Isaac, Hellen and Andrew (2019) and Maryana and Yenni (2021). Based on the foregoing, this study hypothesized that:

H_{O2}: *Firm Size does not significantly moderate the effect of leverage on sustainability reporting in the Nigerian Industrial Goods sector.*

2.1.4 Liquidity (Control Variable)

Liquidity is the ability to quickly convert an asset to cash in order to meet financial obligation. It is the ability of organizations to easily sell their assets, their securities, their interests, etc., while maintaining their prices. This ability according to Sari and Marsono (2013) is used to measure the organization's financial condition. Lucia and Panggabean (2018) opines that corporate strength is measured through high liquidity ratios and is also associated with a high level of sustainability disclosures. Thus, linking liquidity of an organization to increased sustainability disclosures or reporting.

Liquidity is the cash generating ability of an organization. It is the ability of an organization to meet their financial obligations as they fall due. It is the level of ease by which assets are quickly converted into cash to meet the organization's immediate financial obligations. Thus, liquidity indicates the strength or otherwise of the financial position of an organization especially when current assets is compared with its current liabilities, so it is expected that a highly liquid entity is most likely to produce more sustainability information. Rahajeng (2010) stated that "organizations with high liquidity or higher current assets than current liabilities have the ability to pay their obligations" on time due to their liquid state therefore, aids sustainability disclosure. Whereas Hapsoro and Sulystyarini (2019) opined companies that have high liquidity usually engage in more social activities so that the investors and the stakeholders can see that the company is performing better than other companies. It is, therefore, imperative for organizations current assets to adequately cover their current liabilities, that is, short term debt obligations because it is a form of security to the creditors in case of organizational bankruptcy or failure.

Organizations with high liquidity receive positive impression from stakeholders such as investors, lenders, and regulatory authorities hence they make efforts at greater sustainability disclosure in order to strengthen the organization's reputation. While Sonia and Khafid (2020) offered that the positive image and trust that stakeholders have for an organization will continue to improve as the companies continue to provide sustainability disclosure. Watson, et al (2002) opined that highly liquid organizations are most likely to provide more sustainability information than the less liquid organizations. Almilia and Ikka (2007) also added that companies whose liquidity level is high do a more extensive sustainability disclosure in order to show outsiders their credibility. From literature, liquidity is a major characteristic that determines how much or how little is revealed in sustainability reports hence its relevance to the study. Liquidity is therefore measured by current asset to current liabilities in this study as used in Hapsoro and Sulystyarini (2019).

2.1.5 Corporate Age (Control Variable)

Corporate age is the number of years of which an organization has been in existence either by incorporation or by listing on the stock exchange. Company age has been argued to have effect on sustainability reporting because older firms have the capability financially and otherwise to engage in sustainability actions unlike the younger firms that are still struggling to survive as such do not have social responsibility in their agenda (Waluyo, 2017). In support of the foregoing, Han and Kim (2020) offered that older companies are tended towards paying more attention to sustainability activities than younger firms. Moreover, Iron Law of Responsibility posits that firm age should impact positively on CSR (Jo & Haroto, 2011).

Corporate age has been used to measure sustainability and social performance issues in several studies and have proxied it as years of companies since incorporation (Adeniyi, 2018; Suneerat, 2017) while some have proxied corporate age as years of company since the time of listing (Haykir & Celik, 2018; Elif, 2016). This study therefore proxied corporate age as natural log of age since incorporation.

2.2 Theoretical Perspective

A lot of theories in the field of sustainability have been identified in prior literatures such as Agency theory, Political Economy theory, Institutional theory, Stakeholders theory, Legitimacy theory, and Resource Dependence theory. This study is however, hinged on the stakeholders' theory.

Stakeholders' Theory that was first developed by Dr. Freeman Edward in 1984 states that business organizations are not only answerable to their shareholders rather, but they are also answerable to all their stakeholders such as the government, their creditors, their customers, their employees, their suppliers, their competitors, the financiers, the political groups, the trade unions, the community and environment in which they operate. This is hinged on the fact that business organizations do not only exist for their own benefits, but for the benefits of their stakeholders as well.

Stakeholders' theory emphasized the need for business organizations to be actively involved in the community and environment in which they operate since business sustenance is dependent on the society in which they operate (Ojo, 2012). Therefore, for organizations to become successful and sustainable, they need to consider all stakeholders in their business decisions. Benioff (2017) added that the duty of business is not limited to making profits for shareholders, but it also included driving stakeholders' value and improving the state of the world. Also, Cook (2015) posited that it is of importance to consider those who can affect or be affected by business decisions and policies when planning business programmes and projects. In essence, businesses are expected to effectively engage their stakeholders, to avoid potential cost that may arise from legal actions and boycotts. According to Wang (2017), stakeholders can effectively be engaged when they are provided relevant information which include social and environmental information through sustainability reporting. The creditors, being one of the critical stakeholders of the firm would look forward to transparent and credible disclosure from the organizations they have borrowed their funds. In that light, organizations too will want to give adequate disclosure so as to continue to get a positive image and trust of their creditors (for better access to more loans if need be) and other stakeholders (Maryana & Yenni, 2021).

2.3 Empirical Review

Ariyani and Hartomo (2018) investigated the key factors affecting sustainability reporting in Indonesia. They used a sample of 26 companies listed on the Indonesia stock exchange between 2014 – 2016. The multiple linear regression analysis result revealed that leverage significantly affect sustainability reporting positively. Their result indicates that the higher the leverage of Indonesian companies, the higher their sustainability reporting. They therefore inferred from their result that companies can use sustainability reporting to obtain loans from stakeholders. The study only considered three years whose results may not be as robust as this current study that considered 11 years.

Fahad and Nidheesh (2021) also examined the effect of financial leverage, foreign ownership, export performance, firm age, firm size, firm popularity and innovation on CSR disclosures in India using a sample of companies listed on BSE 500 index between 2007 and 2016. The results of panel data regression method revealed a significant positive effect of financial leverage on CSR.

In contrast to the study of Ariyani and Hatomo (2018), the study of Sonia and Khafid (2020) that examined the effect of leverage, and liquidity on sustainability reporting with profitability as a mediating variable. The population of the study are 465 non- financial firms listed on the Indonesian Stock Exchange (IDX) and used a sample of 25 companies between 2015 and 2017. Results of multiple linear regression analysis revealed that leverage has a significant but negative effect on sustainability reporting. The result indicates that levered companies are high risk companies, and in order not to fail, they try to cut additional costs such as sustainability reporting disclosure. The results further shows that profitability successfully mediated the effect of leverage on sustainability reporting disclosure which was adduced to the fact that when organization generate more funds it helps them to be able to engage in social activities and present additional information to their stakeholders. However, besides the fact that their study is limited to only three years, their sample size (25) is unimaginably too small for a population of 465 companies which could limit the generalization of their results.

Abdulsalam and Babangida (2020) examined the effect of leverage and sales on sustainability reporting practice in six (6) firms in the Nigerian oil and gas sector from 2004 -2018. The study used panel regression technique and the result revealed a significant negative effect of leverage on sustainability reporting. They concluded that highly indebted companies would certainly discourage investment in sustainability actions/activities. Their study considered only six firms in the oil and gas sector, while the current study considered all the companies in the industrial goods sector except for the two without adequate data.

Lucia and Panggabean (2018) examined the effect of corporate governance and firm's characteristics on sustainability reporting of 262 manufacturing companies listed on Malaysia exchange and 105 manufacturing companies listed on the Indonesian Stock Exchange between 2013 and 2015. The results of logistic regression analysis revealed an insignificant negative effect of leverage on sustainability reports both in Indonesia and in Malaysia. They concluded that highly levered companies are tended towards reducing costs which included the cost of disclosing social information. Although, the study failed to measure the dependent variable (sustainability reporting) against any known international standards such as GRI, ISO, or any local standard which would have authenticated their results.

The study of Onyinye and Amakor (2019) examined firm attributes and Sustainability reporting in Nigeria. Thirty-five (35) manufacturing companies were the sample of the study, and it covered a period of seven years 2011 – 2017. The results of generalized least squares and moving forward fractional regression analysis revealed that of the four (4) firm attributes considered, only size has a significant positive effect on Sustainability disclosure. Leverage, however, has a statistically

insignificant negative effect on sustainability disclosure. Derived from their study is the fact that high indebtedness of the organization could serve as impediment or could reduce their ability to engage in cost intensive activities such as sustainability actions/reporting. The study failed to identify its total population and equally failed to enumerate the yardstick for sample selection like we have it enumerated in the current study,

Mulia, Nadirsyah, Fadli and Hamdani (2018) examined the influence of corporate liquidity and corporate profitability on CSR disclosure. The study used the Slovin formula to define the minimum sample of sixty (60) manufacturing firms listed on the Indonesian Stock Exchange (IDX) within 2011 and 2015. The result of multiple linear regression analysis shows that liquidity has a significant effect on CSR disclosure even though the coefficient of its significance is negative. The major limitation of this study was that if failed to identify the classification and coding rules for the content analysis of GRI disclosure index usable for the study.

Yunita and Willy (2020) examined the effect of liquidity, profitability and solvency on corporate social responsibility of a sample of 15 financial companies listed on the Sri-Kehati Index between 2015 and 2018. Eviews 10 was used to analyze the data and the result of panel data regression revealed a significant effect of liquidity on corporate social responsibility. The study concludes that the higher the liquidity (operationalized by current ratio), the higher the corporate social responsibility. This implies that companies with higher liquidity ratio are tended towards doing more social and environmental activities and disclosing same so as to signal its creditors of their goodwill and ability to meet its obligation as at when due. Although the study identified the use of local based standard (Sri-Kehati index) as a measuring yardstick for the dependent variable, it however, failed to identify the coding method of the standard whether dichotomous or otherwise as clearly identified in the current study.

Whereas, in the study conducted by Ariyani and Hartomo (2018) on the key factors affecting sustainability reporting in 26 listed companies on the Indonesian Stock exchange from 2014 – 2016, results of multiple regression showed that liquidity has no effect on Sustainability reporting. They concluded that the lack of effect could be since lenders/creditors of an organization are more interested in the organization's financial performance than their social and environmental performance.

Hapsoro and Sulystyarini (2019) examined the effect of Liquidity and Profitability on CSR disclosures of a sample of 62 companies listed on the Indonesian Stock Exchange (IDX) in the year 2017. The results of regression analysis revealed an insignificant effect of Liquidity on CSR disclosures. The study concludes that despite that the companies revealed a high liquidity ratio, that does not make them to be socially responsible rather, they are more concerned in repaying debt. The major pitfall of this study is that it considered only a year (2017) which may affect the robustness of the result.

Sun (2021) examined the effect of firm age on corporate social responsibility in the Technology Sector of the United States of America. 2610 firms were the sample of the study and for the period

1992-2016. The result of regression analysis revealed a significantly positive effect of firm age on corporate social responsibility.

Alina, Daniel Tomina and Roxana (2018) examined the effect of firm size and age on social responsibility actions in Romania. They used a sample of 84 SMEs from Oradea, Bihor County between 2014 and 2016. The result of linear regression model revealed that age has no effect on social responsibility actions. The researcher noted however that the years of studies were just 3 years (2014-2016) and is of the opinion that a better result might be possible if more years were considered.

Gunawan, Puntoro and Pakolo (2018) also examined the effect of profitability, company age and public ownership on corporate social responsibility disclosure of a sample of 120 manufacturing companies listed on the Indonesia Stock Exchange between 2015 and 2017. The result of multiple linear regression analysis revealed that company age does not affect corporate social responsibility disclosure significantly. The researcher believes that this outcome/result might be due to the limited number of years considered (2015-2017) which may be better off should more years be considered like in the current study.

This study observed that majority of the studies on leverage and sustainability were done in countries like Indonesia, USA, Malaysia and India whose level of development (both in finance and others) cannot be compared with Nigeria as such may not be reliable for generalization in Nigeria. The few studies in Nigeria (Onyinye & Amakor, 2019; Abdusalam & Bangida, 2020) do not consider the moderating effect to determine the direction or strength of the relationship between leverage and sustainability reporting which this study intends to explore.

3. Methodology

This section dealt with the population of the study, sample size, sources of data collection, methods of data analysis, variables and their operationalization, the models for the study and statistical techniques.

This study adopted the ex post facto research design and analyzed the financial statements and sustainability reports of all the 14 firms (based on NGX fact book, 2018) on the Industrial Goods sector in Nigeria between 2010 and 2019. The industrial goods firms were chosen because the sector was noticed to have revved up activities on the Nigerian Stock Exchange by a margin of 0.17 percent in 2018. This follows that the sector is an active sector in Nigeria, and it is highly environmentally sensitive. Using purposive sampling method, twelve (12) out of the fourteen (14) firms (which is 93% of the total population) were selected as the sample size because only these twelve have their financial statements and sustainability reports hosted for all the years under consideration in this study (2009 -2019). This is depicted in Table 1.

Table 1.

Sample Size: Listed Industrial firms on the Nigerian Exchange Group (NEG)

S/N	COMPANY	TICKER	Year of Listing	Year of Inc
1.	Austin Laz & C PLC	AUSTINLAZ	2012	1982
2.	Berger Paints Plc	BERGER	1973	1959
3.	Beta Glass Plc	BETAGLAS	1986	1974
4.	Cap Plc	CAP	1979	1965
5.	Cement Co. of North Nig. Plc	CCNN	1993	1962
6.	Cutix Plc	CUTIX	1987	1982
7.	Dangote Cement Plc	DANGCEM	2010	1992
8.	Grief Nigeria Plc	VANLEER	1979	1940
9.	Lafarge Africa Plc	WAPCO	2001	1961
10.	Meyer Plc	MEYER	1979	1960
11.	Portland Paints & Products plc	PORTPAINT	2009	1985
12.	Premier Paints Plc	PREMPAINT	1995	1982

Source: Extract from Nigerian Exchange Group (NEG) Website, 2021.

Secondary data was used for this study, and it was obtained from sustainability reports and annual reports of the companies in the Nigerian industrial goods sector within the period 2010 – 2019. The method chosen for the collection of data for the dependent variable is content analysis, as it is a scientific research technique. This study uses the three (3) indicators of sustainability reporting as derived from the GRI G4 indexes which are economic, environmental, and social reporting.

The dependent variable (Sustainability Reporting) was calculated based on the number of indicators that are disclosed (occurrence) or not disclosed (non-occurrence) on the GRI 4 sustainability index. The GRI 4 was considered appropriate because it is a recognized international standard world over. According to the GRI G4 performance index, there are 4 items to be reported on the economic performance (economic performance, market presence, indirect economic impact, and procurement practices), while there are twelve (12) categories to be reported on environmental performance (material, energy, water, biodiversity, emissions, effluents and waste, product & services, compliance, transport, overall, supplier environmental assessment, environmental grievances mechanism) and there are four broad aspects to be disclosed on the social performance (labour practices & decent work, human rights, society and product responsibility). If an item was reported, a score of one (1) was awarded and if an item was not reported, a score of zero (0) was awarded after which an average of the scores is taken (sustainability disclosure for each company is divided by the total number of GRI disclosure) to arrive at the disclosure scores as used in the work of Hapsoro and Sulystiarini (2019). The independent and moderating variables and their measuring variables are as listed in Table 2.

Table 2.
Variable Measurement and Sources

Variable	Symbol	Variable Measurement	Source
Independent variable			
Leverage	LEV	Debt to Equity Ratio	Ariyani & Hartomo (2018)

Moderating Variable			
Firm Size	FS	Log of Assets	Ingrid (2017),
			Paul, etal (2019)
Control Variable			
Corporate AGE	AGE	Log (No. of years since incorporation)	Adeniyi, 2020
Liquidity	LIQ	Current asset to Current Liability	Hapsoro & Sulystiarini (2019)

Source: *Field Survey, 2022*

The study employed pooled multiple regression model to test the functional relationships between dependent variable and the independent variables. Normality test, Linearity test, homoscedasticity, and multicollinearity tests were conducted to test the critical assumptions of the regression.

3.1   Model

The model for this study is in two steps which was adapted from Zyed and Sonia (2021) and it is presented as follows:

$$SR_{it} = \alpha + \beta_1 LEV_{it} + \beta_2 LIQ_{it} + \beta_3 AGE_{it} + \varepsilon\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots \quad (1)$$
$$SR_{it} = \alpha + \beta_1 LEV_{it} + \beta_2 FS + \beta_3 (FS*LEV) + \beta_4 LIQ_{it} + \beta_5 AGE_{it} + \varepsilon\ldots\ldots\ldots \quad (2)$$

Model1 tests the effect of LEV on SR and two control variables LIQ and AGE while in model2 a moderator (FZ) was introduced into the previous model to determine the direction or strength of the relationship between the dependent and independent variable whether the relationship is strengthened or weakened as a result of the moderator.

Where: SR_{it} = the dependent variable (which represent sustainability reporting); LEV = Leverage; FS = Firm Size; LIQ = Liquidity; AGE = Log of No. of years since incorporation; α = intercept of the regression; β_1, β_2, β_3, $\beta_{4\ldots\ldots}$ = the slope or the co-efficient of the regression ε = Regression residual or error term which captures the other explanatory variables that are not included in the model explicitly

In equation (2), FS*LEV is the interaction variables, moderating the relationship between the dependent and the independent variable. If β_3 is significant at 5% critical level, the FS is said to be a significant moderator on the relationship between LEV and SR.

4. Results and Discussion of findings

This section focused on, analysis and discussion of the results. The analysis carried out include stationarity test, Normality test, Outlier test, pooled Multiple Regression, hausman test and Generalized Linear Model (random and fixed effect model). Some diagnostics test such as residual normality test, Autocorrelation test and Heteroskedasticity test, etc. were also conducted.

4.1   Descriptive Statistics

Descriptive statistic of mean, standard deviation, minimum and maximum mean values of the variables used in the study were analyzed for the dependent and independent variables and are presented in Table 3.

Table 3: *Descriptive Statistics*

Variables	Observations	Mean	Std. Dev.	Minimum	Maximum
SR	132	0.093	0.0608	0.033	0.593
LEV	132	0.425	0.8513	-1.948	2.626
LIQ	132	0.999	0.8302	0.001	5.693
AGE	132	1.629	0.1561	1.230	1.898
FS	132	6.805	0.9864	5.478	9.701

Source: STATA 16 Output (2022)

Table 3 shows the details of the descriptive analysis of the independent and dependent variables of the study. The average sustainability report for the 132 observations made from twelve companies from the year 2009 to 2019 is 9.3% with a low standard deviation of 6.1%, with minimum and maximum value of 3.3% and 59.3% respectively. This implies that on average, 9.3% of sustainability reporting index are being disclosed by the Nigerian Industrial goods firms. The maximum sustainability disclosure by the industrial goods firms is 59.3% which is above average reporting, however, there are companies in the industrial goods sector who discloses as low as 3.3% sustainability activities in their reports.

Correspondingly, the average of the ratio of debt to total assets (leverage) from the observations is 0.425, which implies that 42.5% of debt was used to finance the total assets. Leverage has a minimum of 1.95 debt level and a maximum of 263% debt level at 0.8513 standard deviation was used in financing the total assets.

Furthermore, the mean Liquidity of the companies from the observations in Table 3 is .9992. This implies that there is 0.992 Naira of current assets to settle for every one Naira of current liability when it falls due. It has a standard deviation of 0.8302 and a minimum 0.001 naira and a maximum of 5.69 naira of current assets to settle every one Naira of current liability.

Table 3 also shows an average age of 1.6290, standard deviation of 0.1561, with minimum and maximum value of 1 year and 79 years respectively. This means that variation of age amongst the Nigerian industrial goods firms is huge.

Finally, Table 3 also present the moderating variable (firm size, proxied by the natural logarithm of total assets) having an average of N680M, with a standard deviation of N98.6M and a minimum and maximum value of N547M and N970M respectively. This indicates that there is large dispersion of mean of size from the standard deviation and this wide dispersion could be owing to the differences in the assets owned by each firm in the industrial goods sector. Some are extremely large while some are extremely small.

4.2 Diagnostics and Robustness Checks

In order to ensure that all the regression assumptions were met, both the pre-estimation and post-estimation tests were carried out. The normality test was carried out using Shapiro wilk test as shown in table 4.

Table 4: *Data Normality Test*

Variables	Observations	W	V	Z	Prob>z
SR	132	0.551	46.862	8.663	0.00000
LIQ	132	0.816	19.199	6.654	0.00000
LEV	132	0.877	12.758	5.734	0.00000
AGE	132	0.968	3.374	2.739	0.00308
FS	132	0.917	8.626	4.852	0.00000

Source: STATA 16 Output (2022)

The results on Table 4 shows that the data does not follow normal distribution, this is due to the fact that the P-values of the Z-statistics are statistically significant at 0% confidence interval (1% level of significance). The normality assumption failure of the data means that the models require a more generalized estimator as suggested by Guassian theorem (1929) which say that the problem of normality (data that are not normally distributed) in a data will not affect the Best Linear Unbiased Estimators (BLUE).

The Variance Inflation Factor (VIF) test was done to confirm the existence of multicollinearity among the independent variables and the result is as shown in Table 5.

Table 5: *Test for Multicollinearity*

Variable	VIF	1/VIF
LEV	1.69	0.590366
LIQ	1.39	0.720009
AGE	1.23	0.813873
FS	1.40	0.715647

Source: STATA 16 Outputs (2022)

The results from Table 5 show that the VIF are less than 5 which invariably means that the variables are not suffering from multicollinearity (no correlation between predictors). Not only that, but the tolerance level is also within the acceptable range of 1 which means that the independent variables are appropriate and well fitted to the models.

The Ramsey RESET test using powers of the fitted values of the predicted variable test the null hypothesis that the model has no omitted variable against the alternative hypothesis that the inclusion of other predictors (independent variables) will improve the predictive power of the predicted variable. The result (see appendix B) revealed that there are other exogenous variables that describe sustainability reporting (SR) which are not included in model1 and model2.

The result (see appendix B) for Cameron & Trivedi's IM-test for Heteroskedasticity for model1 and model2 revealed that they are Heteroskedastic with P-values 0.0000 and 0.0000 respectively

which are less than 0.05 at 95% confidence interval for accepting the null hypothesis. This then means than a more robust regression will be used.

The Breusch and Pagan Lagrangian Multiplier test whether there is panel effect or not. The results (see appendix B) in the models shows that there is panel effect among the variables in the two (2) Models with the P-values of 0.000 and 0.0133 respectively, which are less than 0.05 level of significance at 95% confidence interval for accepting the null hypothesis of no panel effect.

Therefore, Hausman Specification Test was used to specify the actual model that best explains the study (whether fixed effect model or random effect model). The null hypothesis states that the preferred model is random effect while the alternative hypothesis states that fixed effect is the preferred model. The result (see appendix B) shows that the model1 and model2 are statistically not significant with probability 0.0594 and 0.2343, which implies that a random effect model (GLS) will be run on the model1 and model2 respectively. Since model1 and model2 are heteroskedastic, a robust random effect model (GLS) was run for the two models.

This section presents the regression results of one dependent variable namely sustainability Reporting (SR), one independent variable (Lev) and two control variables (AGE and LIQ) and one moderator, Firm Size (FS). Analysis of effect follows, between dependent variables and the independent variable cumulatively.

Table 6: *Regression Result*

	Model 1			Model 2		
	Coef.	Z	p>|z|	Coef.	Z	p>|z|
LEV	0.0163	2.03	0.042	0.0981	2.72	0.006
LIQ	0.0304	2.16	0.031	0.0230	1.74	0.081
AGE	0.1036	2.10	0.036	0.0805	2.14	0.033
FS	-	-	-	0.0082	1.77	0.077
c.FS#c.LEV	-	-	-	0.0167	3.16	0.002
Constant	-0.1132	-1.26	-0.208	-0.1293	-1.47	0.142
R^2		0.3434			0.5406	
Wald Chi^2		66.04			168.14	
Prob > Chi^2		0.000			0.000	
Observations	132			132		
No. of group	12			12		

Source: STATA 16 Output (2022)

The result of the regression analysis (Generalized Least Squared Regression) of the listed industrial goods firms in Nigeria as shown in Table 6 reveals that the R-squared which is often referred to as coefficient of determination of the variables for models 1 and 2 are 0.3434 and 0.5406 respectively. This implies that 34.34% of the changes in sustainability reporting can be explained by the independent variable (LEV) and two control variables number of years since incorporation (AGE) and LIQ from model1, 54.06% of the changes in sustainability reporting can be explained by the independent variable (LEV), two control variables, number of years since incorporation (AGE) and LIQ and one moderator; Firm Size (FS)) from model2 respectively. The probabilities

for model1 and model2 (0.0000, 0.0000) implies that the independent variable for model1 and model2 are good predictor of sustainability information.

In addition, the result also shows that LEV has a positive effect on sustainability reporting in model 1 and is statistically significant with probability of 0.042 which is less than 0.05 significant level at 95% confidence interval of accepting the null hypothesis of no statistically significant effect. Therefore, based on the result on Table 6, the study concludes that LEV has a statistically significant effect on sustainability reporting therefore we reject the null hypothesis (H_0) that LEV does not have significant effect on sustainability reporting and accept the alternative hypothesis ($H0_1$). The findings of this study have empirical support for significant effect of LEV on sustainability reporting from the studies of Ariyani and Hartomo (2018) and Fahad and Nidheesh (2021). However, it does not have support from the studies of Sonia and Khafid (2020), Lucia and Panggabean (2018) and Onyinye and Amakor (2019). From theoretical angle, the result of this study tends to prove that the stakeholders' theory holds true because managerial behavior is motivated by stakeholders to disclosure of sustainability activities.

Also, the result from Table 6 shows that the control variable LIQ has a positive effect on sustainability reporting in model1 and is statistically significant with probability of 0.031 which is less than the 0.05 significant level. Not only that, AGE also has a significantly positive effect on sustainability reporting (0.031) which is less than the 0.05 significant level.

Model2 examined whether Firm Size (FS) moderates the effect of LEV on sustainability reporting (SR) in order to validate $H0_2$. The result from Table 6 shows that the introduction of the moderator (Firm Size) significantly moderates the effect of the independent variable (LEV) on the dependent variable (Sustainability Reporting). In essence, there is a positive and significant moderating effect of firm size on the relationship between leverage and sustainability reporting in the Nigerian industrial goods firms with a $P > 0.002$ which is less than the 5% significant level.

Not only that, (even though the p-values for both models are significant) the coefficient gives us the direction of the strength of the moderation in that, in model1 the coefficient is 0.0163 which means that sustainability reporting (SR) will increase by 1.63% when Leverage increases by one. But the introduction of the moderation increases the direction of effect to 9.81%. This means that the effect of Leverage on sustainability reporting is increased with the introduction of firm size as the moderator from 1,63% to 9.81%. We, therefore, reject the null hypothesis $H0_2$ that firm size does not significantly moderate the effect of Leverage on sustainability reporting in the Nigerian Industrial Goods firms

5. Conclusion and Recommendation

The focus of this study is the effect of Leverage on sustainability reporting moderating effect of firm size in the Nigerian Industrial Goods firms. The study found that Leverage has a positive and significant effect on sustainability reporting. In addition, the study found that the introduction of firm size as a moderating variable not only affect the relationship significantly, but also, the strength of the direction. The study therefore concludes that there is a positive and significant effect of Leverage on sustainability reporting and that the strength of the relationship is increased with the introduction of firm size as the moderator. In essence, the more an organization is levered, the more they engage in sustainability disclosures in the Nigerian Industrial Goods Sector because of the desire to continually signal their goodwill to the stakeholders especially the creditors. Not only that, but larger firms will also continue to have access to loans and credit facilities as they engage in more sustainability disclosures.

This study, therefore, recommends that stakeholders should continue to pressure organizations to be more socially and environmentally responsible and the Nigerian Government should adapt the GRI index into Nigerian Exchange Index and ensure measures for compliance are strictly put in place so that organizations can become more socially and environmentally responsible and should report the same. Likewise, erring organizations should be made to face some measures of penalty otherwise, our eco system will continually be at peril.

From the findings, organizations as a policy option need to strengthen their policies geared towards more sustainability disclosure, especially if they are levered as this will reduce information asymmetry, signal strength and responsibility, induce trust among their creditors and give them access to more loans and other credit facilities in the future. In addition, from the findings, firm size is key to the relationship between leverage and sustainability disclosure, hence larger firms should as a policy make their disclosure at par with international standards otherwise, they will face more scrutiny from stakeholders and put them in bad light, thus affecting their credibility to access loan and credit facility.

Despite how relevant this study is, it has its limitations. For example, not all the companies released their sustainability reports (which gives broader outlook on the disclosure guidelines) for the researcher to access so had to rely of the information released on the annual account. Not only that, this study did not go beyond 2019 because as of 2020 two of the firms were taken over to form a bigger company. Future studies can consider the effect of this merger in the industry on sustainability disclosure. Not only that, but the diagnostic test also revealed that there are other exogenous variables that explains sustainability reporting which are not included in this study. These other variables could be explored by other researchers.

6. Contribution to Future Research

Leverage of an organization speaks volume about the organization. This study will add to the existing literatures in this area and has extended prior research in Nigeria by exploring the perspective of the effect of a moderator (firm size) on the relationship between leverage and sustainability reporting. This improvement will serve as a source of data for future research.

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PRODUCTIVITY OF LABOUR IN AN EMERGING MARKET ECONOMY: DETERMINANTS AND DYNAMIC RESPONSES IN NIGERIA

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Abstract

This study appraised the productivity of labour in an emerging market economy by looking at the effect of the determinants of labour productivity on real economic output and by analyzing the dynamic responses of labour productivity to its determinants in Nigeria. Determinants of labour productivity were represented by human capital development index, capital intensity, wage rate, per capita income, globalization index, governance and usage of information and communication technology (ICT). Time series data (1990 – 2020) were sourced from World Development Indicators (WDI) and International Labour Organization Statistics (ILOSTAT) database and were analysed using Vector Auto Regressive (VAR) model. Results of VAR estimates showed that human capital development index, capital intensity, wages, globalization index and governance had positive effect on labour productivity, while per capita income and ICT usage had negative effects on labour productivity. The dynamic behaviour of real economic output revealed that productivity of labour responded positively to changes in human capital development index and ICT but its response to capital intensity varied with time but responded negatively to wage rate, governance and per capita income. The study recommended that the government should utilize international economic integration and globalization opportunities and create conducive environment for foreign direct investments inflow. Furthermore, the study recommended that the government should focus on improving public infrastructure, public administration, reform and innovation in institutional framework and the formulation of appropriate policies and regulations that will enhance workers skill, improve employee motivation and ensure accountability of public funds.

Key words: Governance, human capital, ICT, impulse responses, labour productivity, wages
JEL classification: D24, E24, J24

1.0 Introduction

The level and growth of economic output is one of the important measures of wellbeing of an economy. The factors of production that are used in generating such economic output, as well as the level of efficiency associated with the inputs are important indicators of the overall economy productivity. The efficiency of inputs is the total quantity of input required to produce an output. It is calculated as a ratio by dividing total output by the input employed in generating the output. While total factor productivity can be calculated this way, it is relatively difficult, and a more commonly used measure of real economic output is productivity of labour measured as the quantity

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of input of labour required in producing one unit of output (Elham, 2020). Labour productivity is therefore the output value each person creates from a given input in the production process. It is the monetary value contributed per worker to the total economic output.

Nigeria is well-known for its vast economy, natural resources endowment and large population as well as large workforce which explains' why it is branded "the giant of Africa" (UNDP, 2019). During the past years, actions aimed at improving the productivity of labour have been included in various national development plans in the country since the ability to harness its rich-resource endowment depends on the capacity of its labour force. This clearly shows that sustainable economic development in the long run cannot be achieved if available labour is not employed in the production process to add value to the natural resources at its disposal. Human resource has a strategic role for productivity increase of any economy, and this makes labour superior in the industrial competition (Razak, Osman, Yusof, Naseri and Ali, 2014). With effective and optimum use of labour, all the merits supplied by the productivity growth can be obtained.

1.1 Stylized Facts on Labour Productivity in Nigeria

Notwithstanding the level of abundant resources in terms of labour and raw materials, labour productivity in Nigeria have been unsatisfactory, falling below those of some developing countries with smaller resources and low labour force. To give a glimpse of labour productivity in Nigeria, data sourced from the World Bank (2021) reveals that the rate of growth of labour productivity (Gross domestic product to labour force ratio) ranged from -3.13% to 3.93% between 1991 and 2001, hit 10.55% in 2002 and persistently declined, reaching negative values from 2013 to 2018. This scenario negates the term "giant of Africa" often used to describe Nigeria. Figure 1 presents the trend of labour productivity in Nigeria (1990-2020). The trend reveals that from 1991 to 1992 labour productivity marginally increase from 0.06 % to 0.07% and by 1993 there was an astronomical increase to 0.12%, and then in 1994 it dropped to 0.10% and since then the trend has shown persistent decline in labour productivity in Nigeria ranging from 0.08% in 1995, 0.06% in 2000, 0.03% in 2005 and 0.01% in 2020. This trend is worrisome since the decline implies that real economic output per worker is reducing every year. This could be as a result of underemployment, poor worker skill, poor motivation and inconsistency in government policies.
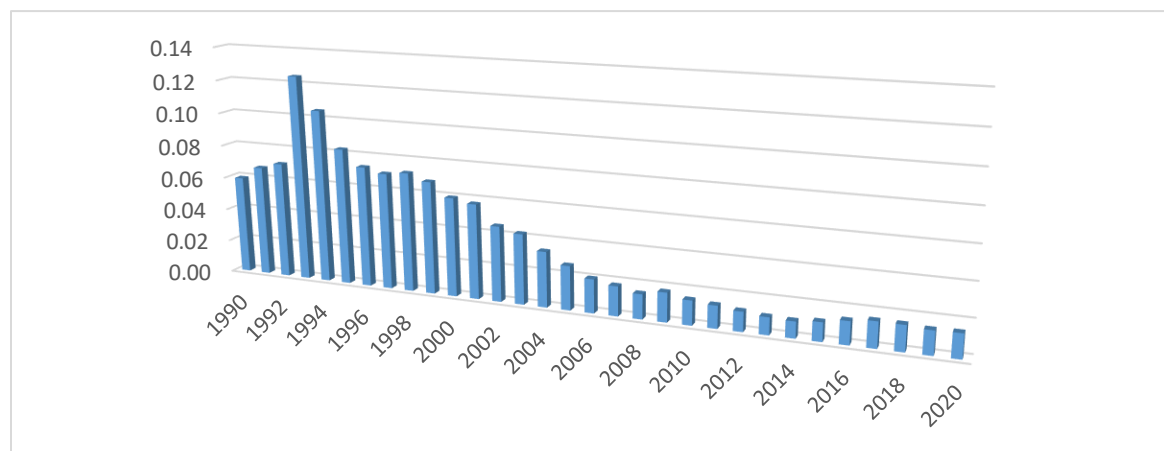
Figure 1: Labour Productivity in Nigeria (1990 - 2020); Source: Authors computation

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Figure 2 presents the growth rate of labour productivity in Nigeria (1991-2018).
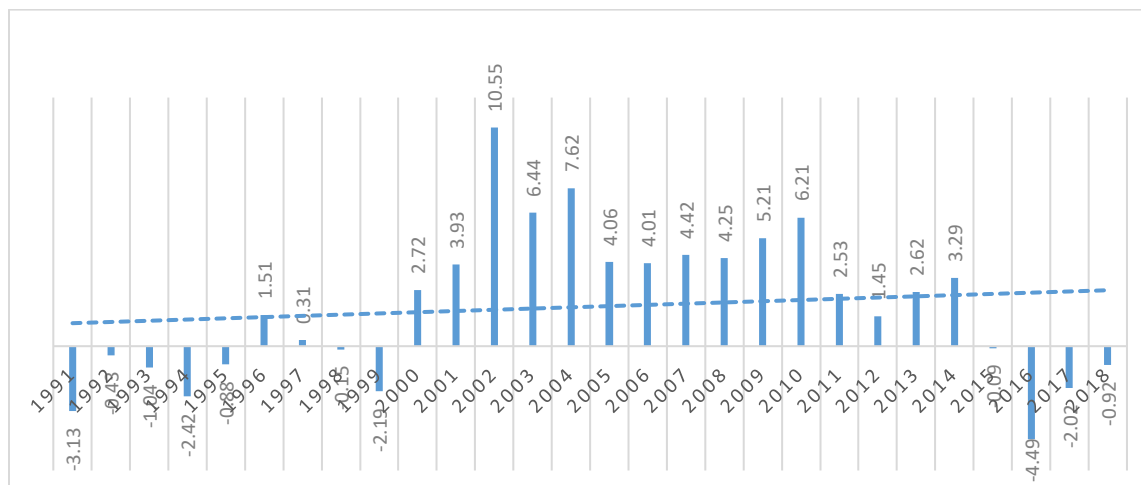
Figure 2: Growth Rate of Labour Productivity in Nigeria (1991-2018); Source: Authors computation

The growth rate of labour productivity presented in figure 2 revealed that from 1991 to 1995 labour productivity growth ranged from -3.13% to -0.88%, became positive (1.51% and 0.31%) in 1996 and 1997, was negative in 1998 and 1999 (-0.15% and -2.19%). From 2000, it became positive ranging from 2.72% in 2000, 10.55% in 2002, 4.25% in 2008 and 3.29% in 2014. From 2015, the growth rate of labour productivity became negative again with figures ranging from -0.09% in 2015 to -0.92% in 2018. The variability in gross domestic product to labour force ratio, especially the negative figures is an indication that output per worker in Nigeria is poor and not sustainable.

The Nigerian labour market has experienced problems ranging from unemployment, downsizing by employers of labour, inconsistent government policies, low employment generation capacity and imbalance between demand and supply of labour. As at 2019, it was estimated that the Nigerian labour force was about 62.47 million which qualified it as the largest workforce within the African continent (NBS, 2019). However, the large proportion of Nigeria's labour force appears to have been consistently underperformed in terms of real economic output.

Figure 3 shows that between 2011 and 2020 productivity of labour increased marginally notwithstanding the rapid increase in population and labour force in the country. The marginal increase in productivity of labour could be due to the rising unemployment, underemployment and
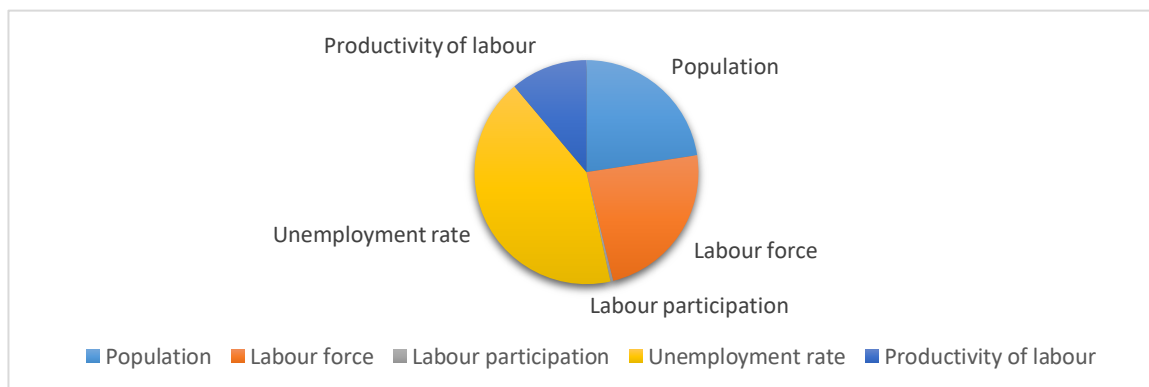
low labour participation rates. The National Bureau of Statistics report (NBS) shows that out of an average population of 176.73 million people, only 55.25 million constituted the entire labour force out of which 55.12% (about 30.45 million) were economically active between 2010 and 2020. This implies that labour has been underemployed in Nigeria and productivity of labour is low.

Figure 3: Profile of Nigeria's Labour Force (2010-2020); Source: National Bureau of Statistics

Bloom and Humair (2010) cited in Umoru and Yaqub (2013), predicted that the problem of unsatisfactory productivity of labour might persist over a long period if government fails to employ policies that will accelerate domestic production and direct the course of the country towards greater economic prosperity. Data and projections (Table 1) present a reliable guide and forecast on employment problems and manpower needs in Nigeria up to year 2030. Looking at policies aimed at addressing low labour productivity in Nigeria is a difficult task because approximately 1.8 million Nigerians enter the labour market each year (NBS, 2019). Over the years Nigerian government has tried to engage youths in programs such as the Operation Feed the Nation (OFN) and Directorate of Food, Road and Rural Infrastructure (DIFRRI) aimed at creating employment for youths interested in farming and allied business activities which automatically increased output in the agricultural sector in mid-1980s (Falusi, 2014). Afterwards, better planned and coordinated approaches followed in three major categories, namely, labour demand, labour supply and labour market interventions. Strategies for labour demand hinged on creation of immediate jobs via public works in the private sector towards enhancement of skills as well as entrepreneurship. Strategies for labour supply focused on training and education of potential workforce while the labour intervention strategy was bent on enhancing labour market activities by striking a balance between demand and supply of labour (Falusi, 2014).

Table 1: Projected Nigeria's Labour Force Requirements, 2010-2030

Year	Population (Working Age)	Unemployment rate (%)	Labour Force Needed	Between Years	Labour Force to be Added
2010	85,525,401	20.00	52,358,719		
2015	97,731,223	15.00	63,570,579	2010-2015	11,211,860
2020	111,088,8501	10.00	76,509,768	2015-2020	12,939,189
2025	125,325,513	8.00	88,233,036	2020-2025	11,723,268
2030	140,036,212	7.00	99,661,452	2025-2030	11,428,415

Source: NBS, 2019

1.2 Statement of the Problem

Reports on labour productivity in Nigeria are lower than those of South Africa and Ghana (UNDP, 2019). This implies that a large proportion of Nigeria's labour force is not fully engaged in economically productive activities, which could account for the persistent increase in unemployment and underemployment in the country. The question is what factors are undermining productivity of labour in a wealthy nation like Nigeria? Recent studies (Awotunde, 2018; Onwuchekwa and Ohachosim, 2017; Umoru and Yaqub, 2013) had identified level of human capital development, availability of capital, ability to acquire and apply technology,

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standard of living of employees, state of governance and globalization as critical factors strongly influencing labour productivity in Nigeria. Human capital development which entails accumulation of knowledge, skills as well as expertise generates greater labour productivity amidst motivations through the desired wage level (Heshmati and Rashidghalam, 2016; Kaimbo, 2015). Nuttee, Thamma-Apiroam and Santipolvut (2019) averred that availability of the necessary capital required to facilitate a production process accelerates productivity of labour. Labour productivity is a function of the standard of living measured by GDP per capita, as one with insufficient income would lack essential commodities like food, clothing, shelter, health services and even entertainment which are essential to higher productive capacity of labour (Sengupta, 2017). On the other hand, Mallick (2013) advocated that through globalization, there is enhanced labour productivity through acquisition and/or spillover effect of advanced and new information, communication and technology (ICT) system usually in the form of direct foreign investments from developed to developing countries. It is also stated that there exists greater labour productivity in well-governed countries than countries where governance is poor (Elham, 2020).

There are scanty studies on determinants and responses dynamics of productivity of labour in Nigeria**.** Few studies that have discussed factors that influence labour productivity in Nigeria concentrated on construction and production companies. Adagba, Ati and Ibrahim (2021) carried out an assessment of the factors influencing labour productivity in construction companies in Zaria. The research discovered that external influences determine productivity of labour more than internal and human factors. It further revealed that disagreement between the company and stakeholders, rainfall, skills of workers and financial crisis were the major factors that influences labour output in Nigeria. Akpan (2021) researched on waterleaf production in Uyo farm zone of Akwa Ibom state in Nigeria by modeling labour productivity equation for farmers. Results of the study showed that size of farmers' household, availability of extension services, farmers' marital status, experience in farming, quantity of input of materials planted, level of education, credit availability and amount collected were positive and most dominant factors that determine labour output. Non-farm income, farm size and quantity of organic manure applied in the production process were observed to have negative effect on labour output. Onwuchekwa and Ohachosim (2017) examined labour efficiency in Nigeria by analyzing its determinants. The estimation result revealed that wage and level of education are the main determinants of labour efficiency in Nigeria.

Similarly in Jordan, Elham (2020) analyzed the determinants of labour productivity during the period 1980 to 2017 and found that high wage rate would enhance productivity labour automatically through workers motivation which will eventually lead to labour efficiency. Fallahi, Sakineh and Mehin (2010) examined the determinants of labour productivity in Iran's manufacturing firms, with emphasis on labour education and training. They found that human capital and labour productivity were negatively related due to inadequate and improper training by firms, hence workers lacked the ability to effectively exhibit the required skills needed to adopt and put modern technology to work. In another research Heshmati and Rashidghalam, (2016) investigated labour productivity in Kenyan manufacturing and service industry and discovered that adequate investments in research, human capital development and infrastructure increases labour productivity. Kang and Na (2018) appraised the determinants of labour productivity in an emerging market economy – Mexico and observed that capital flows to resource scarce economies

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can revive and accelerate economic activities which will lead to high level of efficiency of labour and hence higher output per worker.

The argument in the literature on the improvement of real economic output as a result of improvement and innovation on the determinants of labour productivity though scanty is yet to be reconciled. The differences in theoretical literature and empirical investigations created a vacuum which this research seeks to fill. The specific objectives that guided this study therefore are to analyze how human capital development index; capital intensity; average wage rate; natural logarithm of GDP per capita; globalization index; governance; information and communication technology usage influence real economic output per worker (productivity of labour).

2.0 Review of Literature and Theoretical Framework

2.1   Concept and Theory

Theoretically, the endogenous growth model (EGM) postulates that through adequate investments in research, human capital development and infrastructures sustainable economic output will be achieved without relying on exogenous factors (Romer, 1990). Many empirical studies share the view of the EGM (Nuttee, Thamma-Apiroam and Santipolvut, 2019; Awotunde, 2018; Heshmati and Rashidghalam, 2016; Micallef, 2016). However, Nurudeen and Usman (2010) discovered that the relationship between human capital development and productivity labour is negative due to poor financing of the Nigerian education sector. Similarly, Fallahi, Sakineh and Mehin (2010) found that human capital and labour productivity were negatively related due to inadequate and improper training by firms, hence workers lacked the ability to effectively exhibit the required skills needed to adopt and put modern technology to work. Nevertheless, it might take a long-term for human capital development to positively influence labour productivity which could be a plausible reason for the contradictory results obtained in some prior empirical studies. Also, in the short-term, training could meet other purposes like career prospects, salary and even working condition rather than labour productivity.

Another strand of theory explaining the determinants of labour productivity is the efficiency wages theory which avers that high wage rate would create opportunity cost for loss of job and would enhance productivity automatically through workers motivation (Kumar, Webber and Perry, 2009; Gordon, 1997). In this light, myriads of research work have observed significant link between wages and labour output (Elham, 2020; Onwuchekwa and Ohachosim, 2017). On the other hand, Powell, Montgomery and Cosgrove (1994); Krueger and Summers' (1987) found that wage rate that is above the general wage level is not likely going to produce the desired labour output. Under the assumptions of perfect competition, Classical economists believe that marginal productivity of labour is a function of wage rates in an economy. However, following the 2008 financial crisis, both demand for labour and employment level declined, which automatically forced people to stick to their jobs with lower wage rate (Romei, 2017; Trpeski, Eftimov and Cvetanoska, 2016). Similarly, Tsoku and Matarise (2014) found that labour output is a function of wage rate especially in the short-run but strongly dependent on capital/labour ratio in the long-run.

Another school of thought believes that due to globalization, there is rapid achievement in technology diffusion through foreign direct investment (Barrel and Pain, 1997; Barro, 1990). Trade liberalization would trigger foreign competition, improved domestic production and increased capital mobilization as well as human transfer of modern technology which will encourage efficiency in the process of resource allocation and economic productivity (Mallick, 2013). Furthermore, Lam (2015) argued, that the classical Ricardian theory, the theory of comparative advantage centers on differences in technology among countries, while the Hecksher-Ohlin model theorized that comparative advantage may be generated through differences in resource abundance. However, the classical Ricardian and Hecksher-Ohlin models reached a consensus that globalization has a prominent role to play when it comes to productivity of labour. The neoclassical growth model had considered capital mobilization as a crucial factor towards enhancing productivity. Likewise, Awotunde (2018) asserted that greater capital formation could improve and stimulate higher productivity. Similarly, Kang and Na (2018) showed that capital flows to resource scarce economies can revive the productivity of labour.

From another perspective, Smith (1776) emphasized the importance role government play in advancing economic prosperity in an economy using the instrumentality of institutions, policies and regulations. The study stated that some policies and regulations made by the government might not drive or increase domestic output. Barro (1990) stressed that government policies and institutions play crucial role in enhancing productivity in the long run. Additionally, Barro (1990) stated that maintenance of rule of law and improvement in government policies could exert significant positive influence on economic output. Likewise, Khan and Ajmal (2015) affirmed that unsound policies that give unrestricted authority to government for resource allocation could lead to low productivity of labour.

2.2   Review of Related Empirical Literature

Studies have discussed factors that influence labour productivity especially in construction and production organizations. Adagba, Ati and Ibrahim (2021) assessed the determinants of labour productivity in construction companies in Zaria, Nigeria. The research aimed at identifying the factors that influenced labour productivity and rank them according to their severity in order to provide information that will guide site managers and the construction professionals in decision making concerning time over runs on construction projects, efficiency and effectiveness of the labour force, wastage of materials and cost minimization. The study employed quantitative method of data analyses and made use of questionnaires as instrument for data collection. The questionnaires were administered to site managers. The research findings revealed not within the organization tend to undermine construction labour output more than internal factors. The study explained this observation by stating that site managers can control internal factors while the external influences are outside the control of the engineers on site. The investigation further indicated that disagreement with stakeholders, workers level of education and skills, financial crisis and rainfall significantly influenced labour productivity in construction companies.

In another study Akpan (2021) appraised labour productivity by modeling an equation for waterleaf producers in Uyo farm zone in Akwa Ibom state of Nigeria. The researcher randomly

selected four hundred and twenty (420) waterleaf producers. Primary data was collected using structured questionnaire. The questionnaires were administered, and data obtained were analysed using ordinary least squares estimation technique. The structured questionnaires were generated from the characteristics of the respondents observed by the researchers and related literature reviewed. Results of the study showed that the size of farmers' household, availability of extension services, marital status of the farmer, farming experience, quantity and viability of input of materials, level of education, amount of credit and sources of credit were the positive factors that influences labour productivity. Income from non-farm activities, farm size and quantity of organic manure applied in the production process were observed to be the negative factors that influences labour productivity.

Similarly, Grassetti, Mammana and Michetti (2018) examined how labour productivity directs economic growth process by looking at the endogenous fluctuations and complex dynamics. The study relied on sigmoidal production model that looked at the possibility of producing output from a single input- labour. The study further incorporated long-run behaviour of an economy in which technology is considered as described by the neoclassical Solow growth model. The study discovered that the efficiency and effectiveness of labour productivity determines the boom-and-bust periods which distort the state of equilibrium of income per capita.

In examining the factors that influences labour efficiency in Nigeria, Onwuchekwa and Ohachosim (2017) employed multiple regression technique to estimate the research model variables. Dynamic panel data were collected from annual reports and statement of accounts of sampled companies. Personnel managers of the selected manufacturing companies were interviewed to ensure robustness of information. The estimation results indicated that wage and level of education were the main factors that influence labour efficiency in Nigeria. Based on research findings, the study recommended that manufacturing companies should train their workers to improve their skills and that wages commensurate with workers labour output in the production process should be paid to motivate workers.

3.0 Methodology

3.1   Sources of Data

Time series data covering the period under investigation from 1990 to 2020 were sourced from World Development Indicators (WDI) and International Labour Organization Statistics (ILOSTAT) database.

3.2   Specification of the Research Model

Research model for this study is anchored on Cobb Douglas production model as denoted by equation (1).

$$Y = f(K, L) \tag{1}$$

Where, Y = total domestic output; K = amount of capital; and L = labour

Using equation 1 to derive the function for productivity of labour, both sides of the equation was divided by "L" to give equation (2).

$$Y/L = f(K/L, L/L) = f(K/L) \qquad (2)$$

Hence, productivity of labour (Y/L) is the value of output (measured by real GDP) produced per worker. Hence, equation 2 implies that productivity of labour (Y/L) is a function of capital intensity per labour (K/L). Adding other factors affecting productivity of labour as captured in Elham (2020); Kang and Na (2018); Mallick (2013), the study developed a model based on the function presented in equation (2) as stated in equation (3).

$$LBP = F(HCI, CAP, AWR, LNPCI, GLB, GOV \text{ and } ICT) \qquad (3)$$

Where, LBP = labour productivity (Y/L); HCI = human capital development index; CAP = capital intensity (K/L); AWR = Average wage rate; LNPCI = Natural logarithm of GDP per capita; GLB = Globalization index; GOV = Governance; ICT = Information and communication technology usage.

The econometric form of equation (3) is presented in equation (4).

$$LBP_t = \beta_0 + \beta_1 HCI_t + \beta_2 CAP_t + \beta_3 AWR_t + \beta_4 LNPCI_t + \beta_5 GLB_t + \beta_6 GOV_t + \beta_7 ICT_7 + \mu_t \qquad (4)$$

Where, β_0 = denotes the constant, β_1 - β_7 = coefficients of the independent variables, and μ_t = Error term

Table 2 contains the descriptions of the model variables:

Table 2: Description of Variables and Sources of Data

Variables	Description of Variables	Sources of Data
Labour productivity (LBP)	Labour productivity is a measure of real economic output per labour. It entails the value of output per worker.	World Development Indicator (WDI)
Human capital development index (HCI)	HCI represents a composite index that measures average achievements in three aspects of human capital development – health, education and standard of living which are necessary for greater productivity of labour.	World Development Indicator (WDI)
Capital intensity (CAP)	Capital intensity refers to the amount of available fixed or real capital in relation to labour. Higher ratio entails real capital availability for productivity.	World Development Indicator (WDI)
Average wage rate (AWR)	Labour productivity to a large depends on wages paid to workers. A worker who receives sufficiently high wages will ensure an	International Labour Organization (ILO), ILOSTAT database.

	adequate standard of living would be more productivity.	
Per capita income (PCI)	PCI measures the standard of living of a country. It is measured as GDP-to-total population ratio. Natural logarithm of GDP per capita (LNCPI) was used in this study.	World Development Indicator (WDI)
Globalization index (GLB)	The globalization index covers three aspects: economic, social, and political. High values imply greater globalization. Globalization makes it easier to transfer resources from resource-abundant countries to resource-scarce countries.	World Development Indicator (WDI)
Governance (GOV)	Governance was measured by the civil liberty index. It shows the level that people can express themselves, belief and association with others. It also shows individual and organization rights; rule of law; and personal autonomy. In a scale, 1 means strong liberties and 7 denotes no liberties.	The global economy database:
Information and communication technology (ICT)	ICT was measured by growth in the number of internet users. Internet users refer to individuals who use internet facilities in Nigeria.	The global economy database: https://www.theglobaleconomy.com/ Nigeria/Internet_users/

Source: Authors compilation

3.3   Analytical Technique

The study applied the multivariate regression technique in a Vector Autoregressive (VAR) model which shows linear interdependencies among variables. It has been proven that VAR model is useful in describing the dynamic behaviour of economic time series data and for forecasting events. The impact of VAR models are often summarized with impulse response function and forecast error variance decomposition. VAR method of data analysis places a theoretical emphasis on the structural relationship, but simply connotes the specification of a set of variables that are seen to have logical relationship and considered as part of an economic system. VAR model is used for estimating systems that contain related time series data and for analyzing dynamic impact of random disturbances in the system. Equation (5) shows restricted standard form of VAR model with lag order k:

$$\begin{bmatrix} LBP_t \\ HCI_t \\ CAP_t \\ AWR_t \\ LNPCI_t \\ GLB_t \\ GOV_t \\ ICT_t \end{bmatrix} = \sum_{i-1}^{k} \begin{bmatrix} a_{1i}\ b_{1i}\ c_{1i}\ d_{1i}\ e_{1i}\ f_{1i}\ g_{1i}\ h_{1i} \\ a_{2i}\ b_{2i}\ c_{2i}\ d_{2i}\ e_{2i}\ f_{2i}\ g_{2i}\ h_{2i} \\ a_{3i}\ b_{3i}\ c_{3i}\ d_{3i}\ e_{3i}\ f_{3i}\ g_{3i}\ h_{3i} \\ a_{4i}\ b_{4i}\ c_{4i}\ d_{4i}\ e_{4i}\ f_{4i}\ g_{4i}\ h_{4i} \\ a_{5i}\ b_{5i}\ c_{5i}\ d_{5i}\ e_{5i}\ f_{5i}\ g_{5i}\ h_{5i} \\ a_{6i}\ b_{6i}\ c_{6i}\ d_{6i}\ e_{6i}\ f_{6i}\ g_{6i}\ h_{6i} \\ a_{7i}\ b_{7i}\ c_{7i}\ d_{7i}\ e_{7i}\ f_{7i}\ g_{7i}\ h_{7i} \\ a_{8i}\ b_{8i}\ c_{8i}\ d_{8i}\ e_{8i}\ f_{8i}\ g_{8i}\ h_{8i} \end{bmatrix} \begin{bmatrix} LBP_{t-1} \\ HCI_{t-1} \\ CAP_{t-1} \\ AWR_{t-1} \\ LNPCI_{t-1} \\ GLB_{t-1} \\ GOV_{t-1} \\ ICT_{t-1} \end{bmatrix} + \begin{bmatrix} \varepsilon_{1t} \\ \varepsilon_{2t} \\ \varepsilon_{3t} \\ \varepsilon_{4t} \\ \varepsilon_{5t} \\ \varepsilon_{6t} \\ \varepsilon_{7t} \\ \varepsilon_{8t} \end{bmatrix} \qquad (5)$$

Where, $a_{ij}\ b_{ij} \dots g_{ij}\ h_{ij}$ = Coefficients of $LBP_t, HCI_t, CAP_t, AWR_t, LNPCI_t, GLB_t, GOV_t, ICT_t$
ε_t = are stochastic terms; $t - i$ = lagged values of the series

Before the VAR estimation, unit root test was carried out based on Augmented Dickey Fuller (ADF) and Philip-Perron (PP) techniques (Dickey and Fuller, 1979; Phillip-Perron, 1988). This very stage is crucial because most time series data contain unit root and any regression analysis involving such data will likely yield spurious output. The general model for the ADF test is represented by equation (6).

$$\Delta y_t = \beta_0 + \beta_1 t + \beta\lambda y_{t-1} + \sum_{j-1}^{p} \delta_j \Delta y_{t-j} + \mu_t \qquad (6)$$

Where, y_{t-1} = lagged values of y_t at first difference; Δy_{t-j} = change in lagged values of y_t
δ = lag length; Δy_t = First difference of y_t μ_t = error term

4.0 Results and Discussions

4.1   Stationarity Tests

This study ascertained the order of integration of the series using Augmented Dickey Fuller (ADF) and Phillip-Peron (PP) tests. The results of ADF and PP tests are presented in Table 3.

Table 3: ADF and PP Unit Root Test Results

Variables	ADF test @ Level	ADF test @ First difference	ADF test @ Second difference	PP test @ Level	PP test @ First difference	PP test @ Second difference	Order of integration
LBP	-2.0015 {0.5743}	-1.8871 {0.6333}	-5.0722 {0.0023}	-2.0088 {0.5715}	-1.9072 {0.6231}	-6.3772 {0.0001}	I(2)
HCI	-2.2938 {0.4244}	-5.1787 {0.0014}		-2.3901 {0.3762}	-5.2048 {0.0014}		I(1)
CAP	-2.5545 {0.3019}	-4.1621 {0.0148}		-2.6631 {0.2579}	-4.0584 {0.0186}		I(1)
AWR	-1.5290 {0.7938}	-3.9689 {0.0226}		-1.3668 {0.8486}	-4.0261 {0.0200}		I(1)
LNPCI	-2.0388 {0.5557}	-4.5610 {0.0060}		-2.2100 {0.4661}	-4.5559 {0.0061}		I(1)
GLB	-0.6548 {0.9676}	-4.3386 {0.0100}		-0.6548 {0.9670}	-4.3386 {0.0100}		I(1)

GOV	-2.2474	-4.1116		-2.2474	-4.3386	I(1)
	{0.4469}	{0.0196}		{0.4469}	{0.0100}	
ICT	-2.5753	-4.8543		-0.7151	-14.854	I(1)
	{0.1930}	{0.0011}		{0.9994}	{0.0000}	

Source: Authors computation

The result in table 3 shows that ADF and PP tests were consistent. Both tests suggest that LBP was integrated at order 2, that is, second difference while HCI, CAP, AWR, LNPCI, GLB, GOV and ICT were all stationary at first difference. As the series contains a mix order of I(1) and I(2), it excludes the presence of co-integration (Johansen and Juselius, 1990). Since there was no evidence of long-run equilibrium relationship amongst the variables, the study proceeded with the Vector Autoregressive (VAR) estimation.

4.2   Lag Order Selection Criteria

VAR lag order selection criteria were employed in selecting the best lag interval. An Akaike information criterion has the lowest value of the lag selection criteria and was selected. Hence, the selected lag period is 1, which is the best fit as shown in Table 4.

Table 4: Lag Length Selection Criteria

Lag	LogL	LR	FPE	AIC	SC	HQ
0	-102.0395	NA	3.58e-07	7.859967	8.240597	7.976330
1	89.96560	260.5784*	4.62e-11*	-1.283257*	2.142412*	-0.235996*

Source: Authors computation

Note: * indicates lag order selected by each criterion (each was tested at 5% level); LR-sequential modified LR test statistic; FPE-Final prediction error; AIC-Akaike information criterion; SC-Schwarz information criterion; HQ-Hannan-Quinn information criterion.

4.3   Granger Causality/Block Exogeneity Wald Tests

Having ascertained the optimal lag length, VAR Granger causality/block exogeneity Wald test was carried out and the results are presented in Table 5.

Table 5: VAR Granger Causality/Block Exogeneity Wald Test Results

VARIABLES	LBP	HCI	CAP	AWR	LNPCI	GLB	GOV	ICT
LBP	--	0.8610	0.5878	0.6250	0.1273	0.4709	0.2376	3.0998
		{0.3535}	{0.4432}	{0.4292}	{0.7211}	{0.4926}	{0.6259}	{0.0783}
HCI	0.6647	--	2.9954	*14.3949*	0.3549	0.5136	0.3876	0.4811
	{0.4149}		{0.0835}	*{0.0000}*	{0.5514}	{04736}	{0.5335}	{0.4879}
CAP	2.7629	0.1386	--	4.2941	0.5341	1.6896	0.1972	1.3763
	{0.0965}	{0.7096}		{0.0382}	(0.4649)	{0.1936}	{0.6569}	{0.2407}
AWR	1.4447	0.9594	0.0052	--	2.4717	1.6169	0.1213	0.4692
	{0.2294}	{0.3273}	{0.9421}		{0.1159}	{0.2035}	(0.7276)	{0.4933}

LNPCI	*4.3115* *{0.0379}*	0.7611 {0.3830}	0.1525 {0.6961}	*7.5812* *{0.0059}*	--	1.4837 {0.2232}	1.9771 {0.1597}	0.0501 {0.8228}
GLB	3.0685 {0.0798}	0.0694 {0.7922}	0.0038 {0.9505}	0.0087 {0.9255}	0.0004 {0.9828}	--	1.9927 {0.1581}	0.0738 {0.7859}
GOV	3.8071 {0.0510}	1.8180 {0.1775}	0.1919 {0.6613}	0.6494 {0.4203}	*25.1058* *{0.0000}*	3.6310 {0.0567}	--	0.0002 {0.9873}
ICT	3.1325 {0.0767}	0.9010 {0.3425}	*4.6830* *{0.0305}*	0.1011 {0.7504}	3.1311 {0.0768}	0.1381 {0.7102}	0.0030 {0.9563}	--
All	*46.0953* *{0.0000}*	*5.9196* *{0.5492}*	*18.3890* *{0.0103}*	*22.6487* *{0.0020}*	*39.2828* *{0.0000}*	*21.2170* *{0.0035}*	*10.0774* *{0.1842}*	*5.4444* *{0.6059}*

Source: Authors computation

VAR Granger Causality/Block Exogeneity Wald test was used to ascertain the nature of causal linkages that exist between the variables. With the productivity of labour (LBP) as the dependent variable, there was a causal relationship between the natural logarithm of per capita income (LNPCI) and the dependent variable and the combined effect of all the independent variables Granger caused changes in the dependent variable. Having human capital development index (HCI) as the dependent variable, there was no causal relationship between the independent variables and the dependent variable. Similarly, the combined effect of all the endogenous variables did not Granger cause changes in the dependent variable. Using capital intensity (CAP) as the dependent variable, only ICT usage Granger caused changes in the dependent variable, but the combined effect of the explanatory variables Granger caused changes in CAP. With average wage rate (AWR) as the dependent variable, HCI and LNPCI Granger caused changes in AWR, and the combined effect of the independent variables Granger caused changes in AWR. Also, with LNPCI as the dependent variable, only governance (GOV) Granger caused changes in LNPCI, the combination of the entire endogenous variable contributed to the changes in LNPCI. None of the independent variables Granger caused changes in globalization (GLB) but a combination of the explanatory variables Granger caused changes in GLB. It was also observed that GOV and ICT was not Granger caused by any of the endogenous variables even a combination of the variables did not contribute to the variation.

4.4 Impulse Response Functions (IRF)

IRF was applied to trace the response of LBP to shock in relation to one endogenous variable in the VAR model. This analysis was based on Cholesky approach in which the inverse of the Cholesky factor of the residual covariance matrix was used to orthogonalize impulse and the outcome of the analyses are reported in Figures 4a – 4g. The Figures focused on responses of LBP to its determinants: human capital development index (HCI), capital intensity (CAP), average wage rate (AWR), natural log of per capita income (LNPCI), globalization (GLB), governance (GOV) and ICT usage. Hence, the graphs were used to show how LBP responded to unexpected innovation or changes in the explanatory variables.

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Response of LBP to HCI Innovation using Cholesky (d.f. adjusted) Factors

Response of LBP to CAP Innovation using Cholesky (d.f. adjusted) Factors
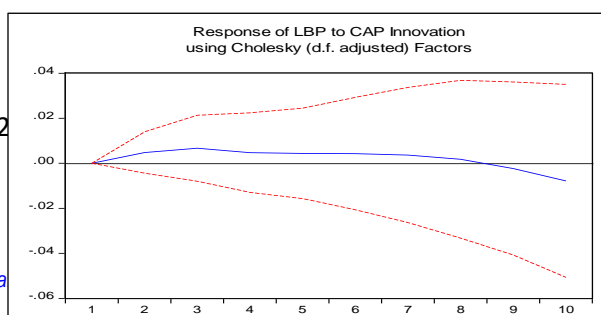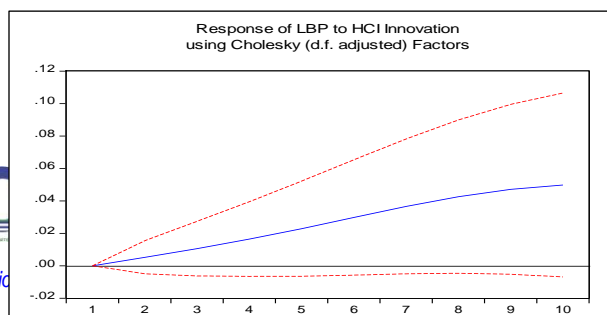
Figure 4(a)   **Figure 4(b)**

Source: Authors computation

Figure 4(a) indicates that LBP responded positively to a change in HCI. In line with Awotunde (2018); Heshmati and Rashidghalam (2016) it implies that human capital development will encourage higher productivity of labour. From Figure 4(b), it is seen that LBP responded positively to CAP within the first eight periods, but this response turned negative in the last two periods which suggests that changes in capital intensity might cause low productivity of labour at some point. This lends credence to Elham (2020); Nuttee, Thamma-Apiroam and Santipolvut (2019); Micallef (2016) availability of capital spurs productivity of labour.
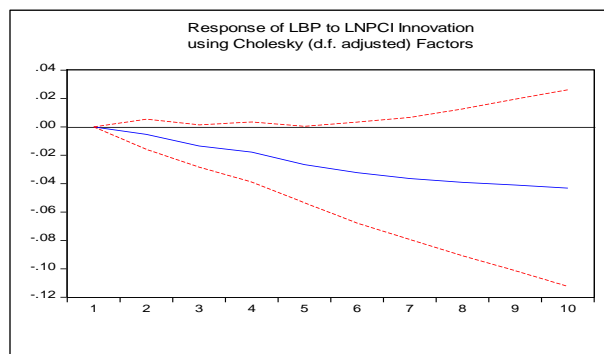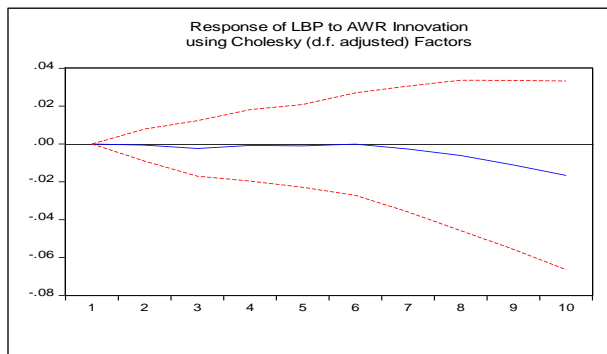
Figure 4(c)   **Figure 4(d)**

Source: Authors computation

Figure 4(c) indicates that change in AWR led to a persistent decline in LBP. The findings are in consonance with *a priori* expectation of the study which posit that unexpected shock to wages could lower productivity. In consonance with Romei, (2017); Trpeski, Eftimov and Cvetanoska (2016) as well as Tsoku and Matarise (2014), this implies that a negative change in wages could discourage supply of labour, hence low productivity of labour. On the other hand, Figure 4(d) indicates that the response of LBP to changes in LNPCI was negative throughout the time horizon. This could be attributed to low GDP amidst exponential increase in Nigeria's population, leading to lower standard of living which has disrupted productivity of labour in the country.


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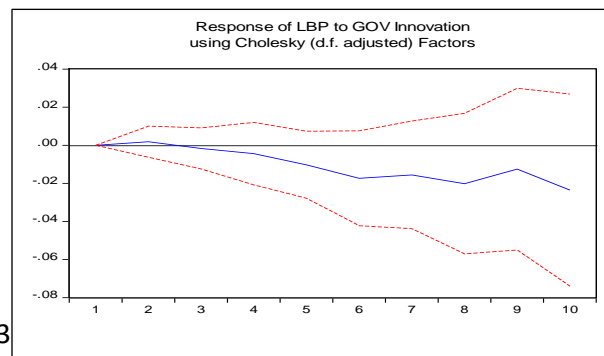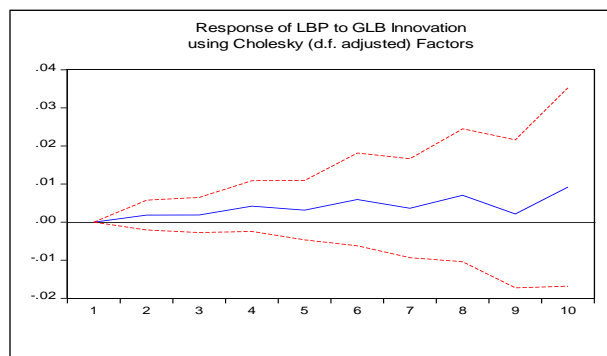
Figure 4(e)   **Figure 4(f)**
Source: Authors computation

Figure 4(e) indicated that LBP responded positively to changes in GLB. However, the positive response of LBP varied within the time horizon but remained positive. As stated by Lipovina-Božović and Ivanović (2018), these fluctuations could be due to contagion effects of global economic crisis such as the 2008 global financial crisis. Likewise, this view is supported by Mallick (2013) who affirmed that globalization improves domestic productivity as modern technologies are transferred from developed countries to developing countries. On the other hand, LBP persistently responded negatively to GOV probably due to the height of bad governance inherent in Nigeria. This is in consonance with Khan and Ajmal (2015) who stated that unsound policies which gave unrestricted authority to the government to allocate resources could create opportunity for corrupt practices, which consequently results to low productivity of labour.
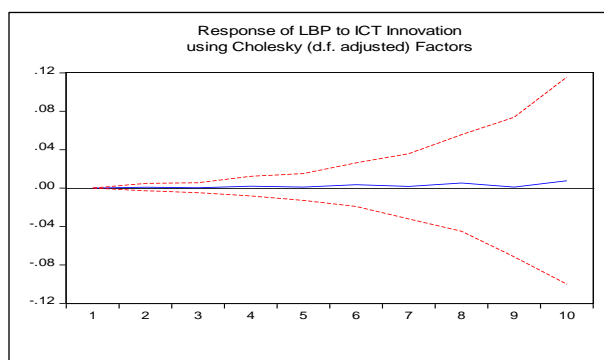
Figure 4(g)
Source: Authors computation

In Figure 4(g), the response of LBP to change in ICT was slightly positive. This could be plausibly due to the lack of well-trained and educated labour force that possibly lacked the ability and technical knowledge to apply such ICT system in economic production.

4.5   Summary of VAR Estimation

VAR estimation results are presented in Table 6. The VAR model shows a very good statistical fitness judged by the high adjusted R-squared and F-statistic values. High adjusted R^2 and F-statistics observed implied that the relationship among the variables was well explained by the VAR model.

Table 6: VAR Estimation Results (Standard errors in ( ) and t-statistics in [ ])

	LBP	HCI	CAP	AWR	LNPCI	GLB	GOV	ICT
LBP(-1)	0.795512	0.093075	0.570059	-0.748973	0.377403	-4.743808	1.605543	43.25184
	(0.10615)	(0.10031)	(0.74349)	(0.94735)	(1.05736)	(6.91285)	(3.29348)	(24.5661)
	[7.49400]	[0.92791]	[0.76673]	[-0.79060]	[0.35693]	[-0.68623]	[0.48749]	[1.76063]
HCI(-1)	0.172776	0.704570	2.568788	7.175224	1.257470	-9.890061	-4.093447	34.01693
	(0.21191)	(0.20024)	(1.48422)	(1.89117)	(2.11078)	(13.7999)	(6.57468)	(49.0405)
	[0.81532]	[3.51865]	[1.73074]	[3.79407]	[0.59574]	[-0.71667]	[-0.62261]	[0.69365]

CAP(-1)	0.053067	-0.011233	0.437400	0.590410	0.232403	2.702451	-0.439922	-8.667562
	(0.03193)	(0.03017)	(0.22360)	(0.28491)	(0.31800)	(2.07903)	(0.99051)	(7.38819)
	[1.66222]	[-0.37237]	[1.95613]	[2.07224]	[0.73083]	[1.29986]	[-0.44414]	[-1.17316]
AWR(-1)	0.018842	0.014509	0.007981	0.723415	0.245488	1.298132	-0.169415	-2.485143
	(0.01568)	(0.01481)	(0.10980)	(0.13990)	(0.15615)	(1.02086)	(0.48637)	(3.62781)
	[1.20197]	[0.97952]	[0.07269]	[5.17092]	[1.57216]	[1.27160]	[-0.34833]	[-0.68502]
LNPCI(-1)	-0.030837	-0.012242	-0.040626	-0.364916	0.172600	1.177996	-0.647878	-0.769661
	(0.01485)	(0.01403)	(0.10401)	(0.13253)	(0.14792)	(0.96710)	(0.46075)	(3.43676)
	[-2.07644]	[-0.87242]	[-0.39059]	[-2.75340]	[1.16682]	[1.21807]	[-1.40613]	[-0.22395]
GLB(-1)	0.005291	-0.000752	0.001313	-0.002525	0.000649	0.544355	0.132277	-0.189888
	(0.00302)	(0.00285)	(0.02115)	(0.02695)	(0.03008)	(0.19668)	(0.09370)	(0.69894)
	[1.75173]	[-0.26344]	[0.06207]	[-0.09367]	[0.02159]	[2.76773]	[1.41165]	[-0.27168]
GOV(-1)	0.013499	0.008815	0.021233	0.049757	0.345297	-0.858536	0.790582	-0.025534
	(0.00692)	(0.00654)	(0.04846)	(0.06174)	(0.06891)	(0.45055)	(0.21465)	(1.60110)
	[1.95118]	[1.34835]	[0.43817]	[0.80587]	[5.01058]	[-1.90554]	[3.68307]	[-0.01595]
ICT(-1)	-0.001973	-0.001000	-0.016900	-0.003165	-0.019652	0.026984	0.001895	0.566164
	(0.00112)	(0.00105)	(0.00781)	(0.00995)	(0.01111)	(0.07261)	(0.03459)	(0.25804)
	[-1.76990]	[-0.94925]	[-2.16403]	[-0.31809]	[-1.76950]	[0.37162]	[0.05477]	[2.19414]
C	-0.342827	-0.088212	-0.931825	4.355386	-0.751813	2.594736	2.569127	17.79947
	(0.13963)	(0.13194)	(0.97794)	(1.24607)	(1.39077)	(9.09266)	(4.33200)	(32.3124)
	[-2.45531]	[-0.66860]	[-0.95285]	[3.49529]	[-0.54057]	[0.28537]	[0.59306]	[0.55086]
R^2	0.954135	0.937031	0.905981	0.948907	0.913824	0.931276	0.628918	0.883229
Adj. R^2	0.932087	0.918938	0.866394	0.934236	0.881750	0.910760	0.472673	0.834062
F-statistic	485.8210	52.89702	22.88587	211.7248	28.80292	46.36861	4.025209	17.96389

Source: Authors computation

5.0 Conclusion and Recommendations

5.1   Conclusion

In this research, vector auto-regressive (VAR) model was used to appraise the factors that influence the productivity of labour and to analyze the dynamic response of labour productivity to its determinants in Nigeria. Results showed that productivity of labour was more responsive to the combinations of the endogenous variables than the individual variables as shown by VAR Granger Causality/Block Exogeneity Wald test results and impulse response functions analysis respectively. However, productive of labour responded positively to changes in human capital development index and ICT but its response to capital intensity varied with time but responded negatively to wage rate, governance and per capita income (measure of standard of living) in Nigeria. Based on the results, this study concludes that interactions between several variables such as human capital development index, capital intensity, standard of living, wages, globalization index, governance and ICT are relevant in determining the productivity of labour in Nigeria.

5.2   Recommendations

The findings from the research are useful in resolving the problems of labour productivity in Nigeria based on the following recommendations:

1) Nigerian government should investment in human capital development by ensuring that the labour force is well-educated and trained in order to enhance its productivity which would further boost the overall economy.

2) Financial institutions in Nigeria especially the banks should ensure adequate capital mobilization. This will ensure sufficient capital accumulation through public-private partnership, build capacity and trigger higher labour productivity.

3) Policy makers should develop policies that would ensure that wages paid to workers are commensurate with the work done as this would motivate workers to do better. This may imply an upward review of the minimum wage of ₦30,000 currently paid by the Nigeria government.

4) The government should ensure equitable distribution of productive resources that would engage the growing Nigerian population in economically productive activities.

5) Nigerian government should invest in security to improve the security architecture of the country to enable her take advantage of economic integration and globalization to attract foreign resources and knowledge to enhance labour productivity as well as compete in the international labour market. The government should therefore fully liberalize trade to permit new technology and innovation transfer needed for the upgrade of workers skills.

6) The government should improve public infrastructure, reform institutional framework and apply appropriate policy measures to enhance national productivity of labour as well as ensure efficient and effective utilization of resources.

7) Policy makers should make policies that will ensure that captains of industries make use of modern technology and educate their labour force on how to apply such technology and innovations in ICT and other areas of production to facilitate high labour productivity.

5.3   Contribution to Knowledge

Studies reviewed such as Nuttee, Thamma-Apiroam and Santipolvut, (2019); Awotunde, (2018); Heshmati and Rashidghalam, (2016); Micallef, (2016); Fallahi, Sakineh and Mehin (2010); Elham, (2020); Onwuchekwa and Ohachosim, (2017); Romei, (2017); Trpeski, Eftimov and Cvetanoska, (2016); Adagba, Ati and Ibrahim (2021) and Akpan, (2021) used factors such as workers motivation, delay in payment, job satisfaction, work environment, firm policies, leave allowances, obsolete equipment and job security as determinants of labour productivity, these variables are characterized by subjective and non-precise indicators or proxies. Hence, this study used more precise and objective variables such as human capital development index, capital intensity (total capital-to-labour ratio), average wage rate, per capita income (a measure of standard of living), globalization index, governance and ICT usage as proxies for determinants of labour productivity. Secondly, this study is comprehensive. Other studies centered on sectors such as manufacturing, agriculture, mining and telecommunication, but this study captured the economy thereby making it relevant to all sectors.

Thirdly, to the best of the researchers' knowledge, this is the only study that captured governance as a determinant of labour productivity. It shows the level that people can express themselves, belief and association with others. It also shows individual and organization rights, rule of law, accountability in governance and personal autonomy.

5.4   Suggestions for Future Research

This study focused on labour productivity and its determinants and provided a systematic framework for the government and other stakeholders like captains of industries to improve real economic output per worker. There is a link between labour productivity and labour efficiency, and this was not covered in this research. This study therefore suggests that future research should focus on labour efficiency and its effects on output per worker. It further suggests that future research work should compare productivity of labour in different emerging market economies.

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EFFECT OF POLLUTION AND HEALTH SAFETY COSTS ON THE FINANCIAL PERFORMANCE OF LISTED OIL AND GAS FIRMS IN NIGERIA

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Abstract

Oil and gas corporations have ramped up production without frequently turning to sustainable production methods in their pursuit for profits as a measure of financial performance. Nigeria is a developing country with significant oil and gas reserves and environmental damage. This has resulted in health risks and environmental harm. This serves as the foundation for the current study, which looks at how pollution and health safety costs affect the financial performance of Nigeria's listed oil and gas companies. The research design used in this study is ex post facto. Data from the annual financial statements of 8 out of 11 listed Oil and Gas firms on the Nigerian Exchange Group from 2011 to 2020 were analyzed using descriptive statistics as well as the Panel

simple regression approach. The study used a purposive sampling method. Based on the results of the three hypotheses that were investigated, the study concludes that the cost of pollution and health safety has a significant positive effect on financial performance (Revenue, Profit after tax & Cash flow from operation) of listed oil and gas companies in Nigeria. Considering the study's findings, it is recommended that, Nigeria's listed oil and gas companies continue their current efforts to address the costs associated with pollution remediation, as well as the health and safety concerns of both the host community and their personnel. As environmental responsiveness is at the center of what business ethics practice requires of firm stakeholders, this will enhance the firms' perception of themselves in the marketplace. By doing this, it will promote harmony between businesses and the local community, inspire employees to work harder and produce more, raising production levels, bringing in more income, increasing businesses' profits, and increasing the amount of cash they have on hand to finish projects.

Keywords: *Pollution and Health safety cost, Revenue, Profit After Tax, and Cash Flow from operations.*

1.0 Introduction

Wealth creation has caused several environmental problems, including the exhaustion of nonrenewable resources, degradation of the environment, global warming, and potential risks to the staff's and the host community's health and safety (Singh, Murty, Gupta & Dikshit, 2007). Numerous industries, governments, and non-governmental organizations (NGOs) have engaged in sustainability discussions and developed strategies for addressing the difficulties of sustainable business performance as a result of environmental abuses and degradation. The cost of remediating the environmental impacts of businesses' economic activities is the way and means by which corporations are anticipated to become environmentally responsible (Herbert, Nwaorgu, Onyilo & Iormbagah, 2020). Costs associated with pollution control equipment, health safety, and environmental remediation are some of these environmental costs. These expenses are incurred by businesses in order to stop environmental degradation, reverse it, clean up pollution, restore the depleted environment to its original condition, and maintain the health of both their workers and the local population (Okafor, 2018). According to Okoye and Ezejiofor (2013), environmental costs frequently have an impact on a company's financial performance, which in turn affects the interest of various stakeholders in the company, particularly for businesses in the oil and gas sector (Okezie, Ibe & Kanu, 2019).

The need for oil and gas products is typically what characterizes operations of businesses in the oil and gas zone, which are also expected to generate enormous profits from operations (Eltaib, 2012; Okafor, 2018). Despite the capital-intensive nature of the oil and gas industries, income is often substantial compared to other activities in any country where there is oil availability (Chiamogu & Okoye, 2020). Despite the significant profits earned by oil companies operating in the Niger Delta, Chiamogu and Okoye (2020) clearly describe the current scenario in the Nigerian Niger delta by pointing out that host communities are still at risk for poor health due to pollution. Armed protests have been organized as a result by community-based organizations seeking to

highlight the situation of the local population around the world. However, in the past, both national and international nonprofit organizations have launched campaigns to address the issues, but little has been carried out because it is improbable that the oil firms will respond to the region's pollution and health safety (Ifurueze et al. 2013).

Oil and gas corporations have ramped up production without frequently turning to sustainable production methods in their pursuit for profits as a measure of financial performance (Iheduru & Chukwuma, 2019). Nigeria is a developing country with significant oil and gas reserves and environmental damage. This has resulted in health risks and environmental harm (Oraka, 2021). In Nigeria, there aren't many definite, strong rules in place to control how these oil and gas firms operate in terms of protecting public health and the environment (Azomahou, Van & Wagner, 2017; Amahalu, Okoye & Obi, 2018). Due to authorities' subpar execution, this enables businesses to disregard current environmental legal requirements (Falope, Offor & Ofurum, 2019). However, over the past ten years, there has been an increase in the litigation and application of environmental laws against oil and gas companies whose economic activities raise concerns about pollution and health safety (Bessong and Tapang, 2012; Okezie et al. 2019; Herbert et al. 2020). This has caused oil and gas companies to be more responsive to environmental issues by investing in pollution and health safety issues. The financial performance of the corporations is believed to be impacted by the additional costs oil and gas companies incur to remediate pollution and ensure public health (Rokhmawati, Sathye & Sathye, 2015), albeit the scope of this influence is multifaceted. This serves as the foundation for the current study, which looks at how pollution and health safety costs affect the financial performance of Nigeria's listed oil and gas companies. The study's precise goals are to:

i. Ascertain the effect of pollution & health safety costs on revenue of listed oil and gas firms in Nigeria.
ii. Assess the effect of pollution & health safety costs on profit after tax of listed oil and gas firms in Nigeria.
iii. Determine the effect of pollution & health safety costs on the cash flow of listed oil and gas firms in Nigeria.

2.0 Theoretical Literature

The fundamental tenet of the stakeholder theory is that a company's financial performance is reliant on the effective management of all of its interactions with its stakeholders, a term first used by Stanford Research Institute (SRI) to describe those groups without whose support an organization would not be able to function. In a follow-up research, Freeman (1984) examined the concept of stakeholders and redefined them as any person or group with an interest in the company who is impacted by its economic operations and has the potential to influence how well the company does financially. According to Rodriguez and Cruz's (2007) definition of a stakeholder, a stakeholder is any person or organization that can or is impacted by the decisions, activities, or objectives of the organization. This implies that everyone impacted by the economic activity of oil and gas

companies, including the host community, shareholders, managers, and employees. Additionally, business operations have an impact on the environment in the same way that their financial performance is impacted by the expenses they incur in responding to pollution and safety issues brought on by their business operations (Pariag-Maraye, Ansaram & Ramkalawon, 2017).

According to Elias, Kostas, and Dimitris (2016), these oil and gas firms' actions must be desirable, proper, or appropriate within the socially constructed system of norms, values, and definitions for there to be continued harmony between the host community and the oil and gas firms as well as other stakeholders. According to scholars like Delmas, Nairn-Birch, and Lim, this is the premise of the legitimacy theory (2015; Hossain, Islam & Andrew, 2016). They maintained that a company's financial success is valid if it is determined that its economic activities were carried out in a just, honorable, and socially acceptable manner (Udeh, & Ezejiofor, 2018). Legitimacy gaps develop when the public's expectations of a company's responsiveness to pollution and health and safety concerns diverge from the public's views of that company's actions. The company may participate in a process of legitimizing to increase or preserve its level of legitimacy, to restore or define its diminished or threatened legitimacy, or to maintain its present level of legitimacy. In cases where managers believe that a firm's operations fall short of the social contract, Utile, Tarbo, and Ikya (2017; Worae & Ngwakwe, 2017) contend that remedial procedures are implemented in accordance with legitimacy theory. The expense of addressing pollution and health and safety hazards brought on by the company's economic activity is one of these remedial measures.

2.1   Concept of Health and Pollution Cost

Environmental costs include fees for health and safety fees as well as pollution. According to Swinkels (2012), firms must pay these expenses to prevent, monitor, and report the environmental effects of their economic activities on a variety of stakeholders (Zeng, Xu, Yin & Tam, 2012). The term "pollution cost" refers to all fees and expenses associated with taking steps to clean up or remove hazardous substances from the environment, preventing or reducing future spills or movements of hazardous chemicals, and adhering to all applicable environmental laws. While health safety expenditures include, but are not limited to, costs and expenses incurred in connection with a modification or replacement of facilities or equipment used by employees for safety, as well as the proper storage, handling, and disposal of hazardous materials (Burnett & Hansen 2017). According to Caputo, Veltri, and Venturelli (2017), "pollution and health safety cost" refers to all costs associated with carrying out work to remediate contamination of real property or groundwater, including engineering and other professional fees and expenses, costs to remove, transport, and dispose of contaminated soil, costs to "cap" or otherwise contain contaminated soil, as well as costs to pump and treat water and monitor water quality (Bartolomeo, Bennett, Bouma, Heydkamp, James, & Wolters, 2012).

Due to the fact that businesses can have both positive and negative effects on the environment through their operations, health and pollution costs should be taken into account as part of regular

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accounting procedures (Okafor, 2018). The possible conflict between the pursuit of financial gain and the achievement of an environmental aim is exposed by the alternative description of major economic entities provided by health and pollution cost (Okezie et al. 2019). Iheduru and Chukwuma (2019) argued that fundamental costs related to health and pollution are the foundational aspects supporting the legitimacy of businesses' economic operations and financial performance. The goals of organizations must be consistent with any policies or environmental considerations included into their commercial operations in order to justify their financial success. It must comply with the business's environmental goals and plans, which are typically expensive. Because of this, writers like Oraka (2021) consider the cost of pollution and health as a gauge of environmental responsiveness and a way to support businesses' economic endeavors.

2.1.2 Financial Performance of Oil and Gas firms in Nigeria

Financial performance is evaluated in order to give the shareholders, through the management team, an account of stewardship. Measuring a company's profitability, sales/revenue, and cash flow is a crucial part of this. Accounting-based metrics look at the nature of the relationship between certain environmental responsiveness indicators and the businesses' overall financial success as determined by accounting data, such as audited financial reports (Zeng et al. 2012). The achievement of financial performance by a person or group of individuals within an organization in relation to its authority and obligation in reaching the objective lawfully and in accordance with the morals and ethics is highly important to management. In this study, three dimensions are used to evaluate financial performance. Companies' revenue or sales efficiency makes up the first dimension. The second is the profitability dimension, which measures how much a company makes after expenses. The third component is cash flow, or the extent to which liquidity is maintained despite spending on costs related to health and safety and pollution (Solomon & Darby, 2005).

2.1.3 Pollution & Health Safety Cost and financial Performance of Oil and Gas firms

Nigeria, a developing country with plenty of natural resources (oil and gas products), is having a difficult time keeping environmental degradation under control (Herbert et al. 2020). Oil and gas companies' exploration and production of oil may have negatively impacted the quality and utility of life through deforestation, industrial pollution, oil spills, and gas flaring (Chiamogu & Okoye, 2020). Even though a significant portion of the nation's resources are collected from these villages thanks to the economic activities of oil and gas companies, Chiamogu and Okoye (2020) note that most of the producing communities still live in utter poverty. Listed oil and gas companies that explore the crude oil and its byproducts from these communities frequently overlook the need to incur costs, pay attention to the needs of the host communities' social and environmental systems, as well as the needs of their employees, and adopt environmentally friendly practices alongside them. Because of oil spills and industrial pollution, the communities that produce oil frequently struggle to maintain a healthy environment, while the workers frequently face health and safety issues at numerous workplaces. It is impossible to overstate how negatively environmental

contamination affects the host communities. According to the stakeholder theory, one can question if these businesses are making every effort to improve the standard of living in the host communities and to implement sufficient environmental control measures that comply with international legal regulations. However, many of these oil and gas companies are extremely wealthy due to their pursuit of profitability at the expense of the environment (Bai, Pingli & Zhuang, 2014).

Unfortunately, Nigeria has no required environmental or social reporting requirements for businesses, and there are no noteworthy attempts to encourage such businesses to incur pollution and health safety costs to become environmentally responsive to the different stakeholders (Utile et al. 2017). In support of this, Udeh and Ezejiofor (2018) note in their analysis of the situation in Nigeria that environmental cost practice is not common there. The fact that the Firms and Allied Matters Act (CAMA) does not include environmental standards among the financial statements that public companies are obligated to report is also important to note. With this gap in obligatory disclosure, most businesses will take advantage of it and won't be able to accept full responsibility and obligation for the negative repercussions of their businesses' economic actions in the communities.

2.3   Empirical Review

In their 2013 study, Ifurueze et al. looked at how environmental expenses affected corporate profitability in Nigeria's Niger Delta oil businesses. Multiple regression was used to examine the collected data after they used primary data and conducted surveys in twelve oil businesses. As a stand-in for environmental cost, EHSC (Employee Health and Safety Cost), Community Development Cost, and Waste Management Cost were three indicators of sustainable company practices that were carefully chosen. The findings of their analysis showed a strong correlation between corporate profitability and sustainable business practices as measured by environmental cost.

A sample of 78 top companies listed on the Bursa Malaysia exchange were used in Tze, Boon, and Yee's (2014) analysis of the connection between environmental improvement and business performance. From 2008 to 2012, a 5-year span was covered by the study. The scope of the information supplied and reported by companies was verified by their investigation using content analysis. The findings of their analysis suggested a positive relationship between the efficiency with which natural resources are exploited and measures of financial performance like return on asset and return on equity However, it was discovered that remediation expenses related to materials, energy, and water were a poor predictor of return on equity and return on assets.

According to Dobre et al. (2015), financial performance may or may not be impacted by how environmental and social variables are reported by Romanian listed firms. The Romanian companies listed in the first category of the Bucharest Stock Exchange from 2010 to 2013 were the subject of their study, which employed a four-period panel fixed-effect model. The findings of

their analysis showed that while no effects were found on return on assets and stock market returns, boosting water, air, and soil preservation had an impact on current return on equity.

Corporate organization performance in Nigeria from 2010 to 2015 was examined by Ezejiofor, John-Akamelu, and Chigbo (2016) to determine the impact of sustainability accounting metrics. Time series data were used, together with an ex post facto research design. Using regression analysis, formulated hypothese were put to the test. According to the analysis, the study discovered that environmental costs have a favorable impact on business organizations' ability to generate profits in Nigeria but have a negative impact on their ability to generate revenue.

Corporate environmental reporting and the financial results of listed industrial enterprises in Nigeria were explored by Utile et al. in 2017. The study investigates how listed industrial companies in Nigeria fare financially after considering environmental reporting. Their research sought to ascertain the impact of air pollution reporting (API), waste management reporting (WMI), and erosion control reporting (ECI) on the monetary results of listed industrial enterprises in Nigeria. They used an ex-post facto study methodology and the main method for data analysis was random effect regression analysis. It was discovered that reporting on erosion control and air pollution has a considerable impact on the firm's financial performance (0.002) and (0.026), respectively, whereas reporting on waste management has a negligible yet significant impact (0.000) on the firm financial performance under investigation.

Nwaiwu and Oluka (2018) looked at the profitability of oil and gas in Nigeria as well as the environmental cost disclosure. The study experimentally studied the relationship between financial performance metrics and environmental cost disclosure for listed oil and gas businesses in Nigeria. The Central Bank of Nigeria's annual financial reporting and economic review were utilized to collect time-series data, which was then analyzed using Pearson product-moment coefficient of correlation and multiple linear regression. According to the econometric findings, a sufficient disclosure of environmental costs and adherence to corporate environmental standards have a favorable, considerable impact on profitability indicators.

Okezie, Ibe and Kanu's (2019) investigation on the financial performance of Nigerian quoted firms and environmental costs. They looked at the effects of environmental expenses on the mentioned companies under study in terms of earnings per share, dividend per share, net profit margin, and return on capital employed. To examine the information gathered from the companies' annual reports, the study used ex post facto research design and both descriptive and inferential statistics in addition to a multiple regression model. They found that there is very little correlation between environmental expenditures and financial performance in the organizations they analyzed. Their study's findings and results support this conclusion.

The impact of environmental costs on the financial results of Nigerian oil and gas corporations was explored by Chiamogu and Okoye in 2020. The precise goals of their research were to ascertain the impact of environmental cleanup costs and community development costs on Nigerian oil and gas companies' Tobin's returns. The Ex post facto research design was used to collect data from annual reports and accounts for the companies' periods from 2011 to 2018. Utilizing regression analysis, their study hypotheses were put to the test. According to their findings, Tobin's is positively and significantly impacted by community development and environmental remediation costs.

The impact of environmental expenditures on the financial results of oil and gas businesses listed on the Nigerian stock exchange was studied by Oraka in 2021. Their study's particular goals were to determine the impact of environmental remediation costs on the Tobin's Q scores of oil and gas businesses listed on the Nigeria Stock Exchange and to assess the impact of compliance costs on these scores. The eleven (11) oil and gas businesses' public financial statements for the eleven (12) years preceding the study were used to collect data using an ex post facto research design. According to their study's findings, environmental cleanup and compliance costs have a considerable impact on the Tobin's Q of oil and gas businesses listed on the Nigeria Exchange Group.

3.0 Methodology

The research design used in this study is ex post facto. Data from the annual financial statements of 8 out of 11 listed Oil and Gas firms on the Nigerian Exchange Group from 2011 to 2020 were analyzed using descriptive statistics as well as the Panel simple regression approach. The study used a purposive sampling methodology. The criteria for sample selection were based on the reliability and accessibility of these companies' published annual reports during the study period on the Nigerian Exchange Group.

The following describes the study's regression model:

Mathematic model:
Revenue = f (Pollution & Health safety cost) …………………. Model 1
Profit After Tax = f (Pollution & Health safety cost) …………. Model 2
Cash Flow = f (Pollution & Health safety cost) ………………. Model 3

Econometric model:
$REV_{it} = \alpha + \beta1\ PHC_{it} + U_{it}$………… Model 4
$PAT_{it} = \alpha + \beta1\ PHC_{it} + U_{it}$………… Model 5
$CFO_{it} = \alpha + \beta1\ PHC_{it} + U_{it}$………… Model 6

REV = Revenue (Log of reported total sales of the listed oil and gas firms at a time)
PAT= Profit After Tax (Log of profit after tax of the listed oil and gas firms at a time)

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CFO= Cash Flow from Operations (Log of total cash flow from operations of the listed oil and gas firms at a time).

PHC= Pollution and Health Safety Cost (Log of total Pollution and Health Safety Cost of the listed oil and gas firms at a time)

U= error term

it = cross-section & time

β = Beta coefficient of the model.

If the estimated probability value exceeds the significant probability value of 0.05, the decision should be made to reject the null hypothesis (5percent).

4.0 Data Analysis and interpretation

The panel data were collected from many firms in many years. The data were analyzed using regression analysis. The study however conducted some preliminary analysis such as descriptive statistics, correlation analysis, and variance inflator analysis to ascertain the normality and check for the presence of multi-colinearity among the variables used.

4.1 Descriptive Statistics

The descriptive statistics result shows the mean (average) for each of the variables, their maximum values, minimum values, standard deviation and the Jarque-Bera (JB) statistics (normality test). Table 4.1 below, provides the summary of the descriptive statistics of the sampled quoted companies. The detail result of the descriptive statistics is present in table 1 under the appendix. Table 4.1 provides the summary of the descriptive statistics of the data covering the period of ten years (2010 – 2019).

Table 1: Descriptive Statistics Table

	REV	PAT	CFO	PHC
Mean	7.555831	5.849251	6.124547	7.296289
Maximum	8.488534	7.256627	7.649296	8.436485
Minimum	5.712411	3.207634	2.895423	4.556881
Std. Dev.	0.803971	0.819928	0.949823	1.061046
Skewness	-0.816922	-0.704478	-0.864614	-0.863997
Observations	80	80	80	80

Source: **Authors' computation**

The descriptive statistics for each variable are shown in Table 1. There were 80 observations made for the study.

According to the outcome, revenue (REV) has a mean of 7.555831 and a standard deviation of 0.803971. A minimum value of 5.712411 and a maximum value of 8.488534 are also revealed by

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REV. The mean profit after tax (PAT) is 5.849251 with an error of 0.819928. PAT further discloses that the maximum and minimum values are, respectively, 7.256627 and 3.207634. The mean of cash flow (CFO) is 6.124547, while the standard deviation is 0.949823. A maximum and minimum value of 7.649296 and 2.895423 are also recorded by CFO. Additionally, the results of the pollution and health safety cost (PHC) study show maximum and minimum values of 8.436485 and 4.556881. Standard deviation and mean of 7.296289 and 1.061046 are also revealed by PHC.

The skewness test is utilized as an additional data stationary test to ensure that the fluctuations that have happened do not alter the outcome of the regression result of the investigation. The skewness test shows that all the variable values are between -2.5 and +2.5, which is within the permitted range.

4.1.2 Data Validity Test

Several diagnostic tests are carried out to improve the validity of the data and model given for analysis in order to guarantee that the results are reliable. The numerous validity criteria computed are displayed in the table below.

Table 2. Data Validity Table

	Hausman Test	**Wald Test**	**Regression**	**Durbin-Watson**
Model 1	Prob. 0.0033	0.000	Fixed	1.424
Model 2	Prob. 0.2470	---	Random	2.033
Model 3	Prob. 0.9286	---	Random	2.158

Source: **Authors' computation**

The test results for each regression model used in the study are displayed in the table above.

The Hausman test for model 1 (PHC versus REV) produced a Prob. Value of 0.0030.05, indicating that either the Fixed effect model or the Pooled model is favored. The study used a Wald test to decide between the Fixed and Pooled model. The Wald test result showed a Prob. Value of 0.0000.05, indicating that a Fixed effect model was selected for the panel data that were gathered. The fixed effect model yields a Durbin-Watson value of 1.424, indicating that there are no autocorrelation problems with the given set of data.

The results of the Hausman test for Model 2 (PHC versus PAT) showed that the Random effect model is preferred over the Fixed effect and Pooled models, with a Prob. Value of 0.2470>0.05. A Durbin-Watson value of 2.033, obtained from the random effect model, indicates that there are no autocorrelation problems with the set of data that was collected.

According to the Hausman test results for model 3 (PHC versus CFO), the Random effect model was chosen above the Fixed effect model and the Pooled model with a Prob. Value of 0.92860.05. The obtained data set has a Durbin-Watson score of 2.158, which indicates that there are no autocorrelation problems, according to the random effect model.

Model Analysis

Table 3: Model Summary Table

	R Square	R adjusted	Coefficient	Tau Prob.
Model 1 (REV)	0.936	0.919	0.278	0.0230
Model 2 (PAT)	0.083	0.071	0.368	0.0094
Model 3 (CFO)	0.302	0.293	0.691	0.0000

Source: **Authors' computation**

The three models' regression results are shown in Table 3. The information listed below can be deduced from the model summary table above.

The R2, which gauges the amount of variation in the dependent variable brought on by the independent variable, was 0.936 for model 1. The amount of total variation of the dependent variable (REV) that can be explained by the independent or explanatory variable is displayed by the R2, also known as the coefficient of determination (PHC). Accordingly, the R square value of 0.936 shows that 93.6 percent of the variation in the revenue of publicly traded oil and gas firms can be explained by a variation in the cost of pollution and health safety, with the remaining 6.4 percent (i.e. 100-R2) possibly being accounted for by other factors not taken into account in this model. According to the adjusted R square, which is roughly 0.919, this result will depart from the model by only 0.017 if other factors are taken into account (i.e. 0.936 – 0.919). This outcome indicates that there will be an additional deviation of the variation brought on by the factors not considered by inclusion by 1.7 percent. A fluctuation in the cost of pollution and health safety, as well as the regression result in model 1 above, indicate that there would be an increase in the REV of listed oil and gas corporations in Nigeria of up to 27.8%. (Coefficient).

In the study of model 2, the R2, which gauges the amount of variation in the dependent variable brought on by the independent variable, was 0.083. The amount of variation in the dependent variable (PAT) that can be explained by the independent or explanatory variable is shown by the R2, also known as the coefficient of determination (PHC). The variation in the cost of pollution and health safety can thus account for 8.3% of the variation in the profit after tax of listed oil and gas firms, according to the R2 value of 0.083, while other factors that were not taken into account by this model could account for the remaining 91.7 percent (i.e. 100-R2). The modified R2 of roughly 0.071 implies that this result will depart from the model by only 0.012 if other factors are taken into account (i.e. 0.083 – 0.071). This outcome indicates that there will be an additional 1.2 percent variance in the variation brought on by the factors that were not considered. Additionally, the regression result in model 2 above indicates that, given an intercept-only model and a variance in the cost of health and safety and pollution, listed oil and gas corporations in Nigeria will see an increase in PAT of up to 36.8 percent (Coefficient).

Finally, the model 3 R2, which gauges the amount of variance in the dependent variable brought on by the independent variable, was 0.302. The R2, also known as the coefficient of determination, displays the proportion of the total variation in the dependent variable (CFO) that can be explained by the independent or explanatory variable (PHC). Therefore, the R2 value of 0.302 shows that

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30.2 percent of the variation in the cash flow of listed oil and gas firms can be explained by a variation in the pollution and health safety cost, while the remaining 69.8 percent (i.e., 100-R2) could be accounted for by other factors not considered in this model. According to the adjusted R2, which is around 0.293, this result will differ from the model by only 0.009 if other factors are taken into account (i.e. 0.302 – 0.293). This outcome indicates that the variation brought on by the components not considered will vary by an additional 0.9 percent. The regression result in model 3 above also demonstrates that, given an intercept-only model and a variation in the cost of pollution and health safety, there will be a rise in the CFO of listed oil and gas corporations in Nigeria of up to 69.1 percent (Coefficient).

HO₁: Pollution and heath safety cost has no significant effect on revenue of listed oil and gas firms in Nigeria.

The null hypothesis is rejected, and the alternative accepted since the computed probability value for PHC in model 1 is 0.02300<05. As a result, the cost of pollution and health safety has a an effect on the revenue of listed oil and gas corporations in Nigeria.

HO₂: Pollution and heath safety cost has no significant effect on profit after tax of listed oil and gas firms in Nigeria.

The null hypothesis is rejected, and the alternative accepted since the computed probability value for PHC in model 2 is 0.00940<05. As a result, pollution and health safety costs significantly affect the profit after tax of listed oil and gas enterprises in Nigeria.

HO₃: Pollution and heath safety cost has no significant effect on cash flow of listed oil and gas firms in Nigeria.

The null hypothesis is rejected and the alternative accepted because pollution and health safety costs have effect on the profit after tax of listed oil and gas enterprises in Nigeria (the calculated probability value for PHC in model 3 is 0.0000<05).

5.1   Conclusion

Given the availability of the data gathered for the study, the study has demonstrated how much money oil and gas companies spend on cleaning up pollution and addressing health and safety issues in the surroundings of their main economic activity. The data were gathered, evaluated using a panel simple regression, and all diagnostic tests showed that the data were legitimate. Based on the results of the three hypotheses that were investigated, the study concludes that the cost of pollution and health safety has a substantial positive association with the financial performance of listed oil and gas companies in Nigeria.

5.2   Recommendation

Considering the study's findings, it is recommended that, Nigeria's listed oil and gas companies continue their current efforts to address the costs associated with pollution remediation, as well as the health and safety concerns of both the host community and their personnel. As environmental

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responsiveness is at the center of what business ethics practice requires of firm stakeholders, this will enhance the firms' perception of themselves in the marketplace. By doing this, it will promote harmony between businesses and the local community, inspire employees to work harder and produce more, raising production levels, bringing in more income, increasing businesses' profits, and increasing the amount of cash they have on hand to finish projects.

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FIRM ATTRIBUTES AND CAPITAL STRUCTURE OF NIGERIAN EXCHANGE LOTUS ISLAMIC INDEX LII

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Abstract

Lotus capital (LC) used specific attributes to form the Nigerian Exchange NGX Index, called the Lotus Islamic Index LII. The objective of the study is to examine these attributes and capital structure of the NSE LII. A quantitative approach that is based on an ex post facto design was employed to obtain data from the annual reports and accounts of these companies for the period 2008-2017. The Fixed effect model was relied upon for interpretations. Findings show that profitability with a p-value of 0.02 significantly relates to the capital structure of NGXLII. The study recommends the maintenance of prudency that influences the achievement of such profit levels by the management team of the companies.

Keywords: Attributes, Capital, Index, Islamic, Lotus

1. Introduction

More than a decade ago, the consequence of the global financial catastrophe was indifferent to developed and developing economies. However, countries like Iran, Bangladesh, Brunei, Golf cooperation council (GCC) countries, Malaysia and Yemen, were cloistered from the financial predicament because they were not exposed to the caprices of financial transactions that were interest-based investments. They were into shari'ah compliant investments that originate from the rules dictated by the Qur'an, in which its practices and explanations (more commonly known as Sunnah) rendered by the prophet Muhammad (SAW) (Iqbal & Mirakhor, 2007). Nigeria is among the countries that were not insulated from the global financial crises; this resulted to listed companies experiencing a ray of problems, one of which was financial distress costs that hindered increase in their present value of tax savings from the use of debts. An attempt to address this particular problem influenced the need to consider seriously the principles regulating the conduct of financial transactions. According to Adeolu, 2014, these principles must be fundamentally based on ethical low-risk tactic, forming contacts between the financial sector and real sector through in-built checks and balances, risk and profit-sharing arrangement.

It is important to note here that, the principles described by Adeolu are shari'ah principles explained by Lukonga, (2015) to be founded on inherent features that potentially promotes the protection of consumers and investors. Islam prohibits transaction based on Gharar (uncertainty in transaction), Maysir (gambling or the acquisition of wealth by chance instead of effort), and Riba (interest rate). In this wise, Lukonga, further presented that, Islamic finance has great market potentials for countries with large Muslim population and low penetration such as in Egypt, Jordan, Kenya, Libya, Morocco, Nigeria, Tunisia, and the countries of the Caucasus and Central Asia (CCA).

In this regard, the interest of fund managers like Lotus Capita (LC) in Nigeria was re-directed towards having an index on the Nigerian stock exchange which included companies that were already conducting businesses (not related to alcohol, tobacco, gambling, adult entertainment, interest banking and insurance) in line with shari'ah principles. Lotus capital (LC) is a full service; ethical investment administration boutique focused in a shari'ah compliant financial service that was founded in 2004 with the specific objective of meeting the investment need of ethical individual, business and establishments across West Africa. It is dully registered with the Security and Exchange Commission (SEC) as a Capital Market Operator CMO.

In 2009, Lotus Capital (LC) developed the Lotus Islamic Index (LII) for tracking the performance of shari'ah compliant stocks listed on the floor of the Nigerian exchange NGX. Lotus Capital as an Islamic fund manager collaborated with NSE in 2012 to launch the index it developed as a publicly available index (Adeolu, 2014). The 15 companies in the index are from sectors with sturdy and regular consumer demand and returns. In this respect six companies were screened and chosen from the consumer goods, four from industrial goods and one each from agriculture, health, service, and 2 from oil & gas sectors of the Nigerian exchange (NGX).

As mentioned earlier, the problem of financial crises faced by companies in Nigeria as a result of the aftermath of global crises informed the Lotus Capital (LC)to develop the index based on attributes that include level of debt, liquidity, market capitalization. Using such attributes to make such constitution was a good decision, for example, the level of debt is part of what constitutes the capital structure of a firm and empirical evidences have shown it is significantly explained by other attributes like Profitability, liquidity, size and age (Onaolapo, Kajola, & Nwodobie, 2015; Bassey, Arene, Okpukpara; Shala, Ahmeti, Berisha, & Perjuci, 2014;Tornyeva; Kinde, 2013; Chandrasekran, 2012; Hassan; Akinlo, 2011; Alhassan & Saidu, 2008).

The study has a major objective of examining the extent to which these attributes explain the capital structure of Nigerian exchange (NGX) lotus Islamic index LII. To the best of our knowledge this study is different; this is so because there is no study in Nigeria that has carried out the objective of this study using the lotus Islamic index (LII) which is a sample of 6 sectors of the NGX and using the attributes to provide empirical evidence and contribute to the extant literature on capital structure and firm attributes on various sectors or industries.

This study presents additional proof on the effectiveness of the index in swaying prospective investors to consider ethical investment. The Nigerian exchange (NGX) and the Security and Exchange Commission (SEC) will consider the findings of the study as evidence of their support for Ethical Business and Investment (EBI) that will advance frontiers. The remaining part of this paper is divided into 5 sections. Section 1 is the introduction including this paragraph; section 2 shows the conceptual and theoretical framework; section 3 is the methodology that present the study design, variables and model specification, technique of data analysis, diagnostics and robustness tests; section 4 shows the finding and section 5 presents the conclusion, recommendation and implications.

2. Literature Review

2.1   Capital Structure: According to Kenton, (2018) Capital structure refers to the percentage of debt and equity in the capital formation of a company. Capital is how a company coffers itself. Equity is a piece of possession in the company. This usually occurs by the company allotting stock. Debt is a loan issued to the corporation by an investor. These loans usually occur in the form of a pledge issuance. The capital structure shows how much of a company's funding has been granted through the issuance of ownership shares or by taking loans. More so, it is real investments or obligations that are achieved by employing the composition of securities and finance (Masnoon & Saeed, 2014; Myers, Ross, Westerfield, & Jordan, 2001). Furthermore, it denotes the fusion of long-term debt and equity financing (Brealey, Myers, & Marcus, 2009). Also, Abor (2005) defines capital structure as a 'blend of diverse securities. This study sees capital structure as the adequate combination of equity and debt employed for maximizing firm's objectives.

2.2   Attributes: This study defined attributes as the characteristics or quality of a firm that explains its capital structure.

2.2.1   Profitability: This is one of the means that a company uses to evidence it has obtained financial performance (Kwanbo & Kwambo, 2011; Metric, Ross and Weidman, 1997; Jaggi & Considine, 1990; Burns, 1985). It entails the effectiveness of a firm to realize income from all its activities (Rahem, Qayyum, & Afza, 2011). It is also, the excess of revenue over cost of generating the revenue (Hill, Kelly, & Lockart, 2012; Qasim & Ramiz, 2011). Profitability measures the management efficiency in the use of organizational resources by adding value to the business (Kurawa & Abubakar, 2014). This study defines profitability as a test of efficiency.

Profitability has been evidenced to be significantly related to capital structure (Shala, et al, 2014; Chandrasekran, 2012) while (Onaolapo, et al, 2015; Thomas, Chenous & Biwott; Rahman, Kakakhael, & Iqbal, 2014; Tornyeva; Bassey, et al. 2013; Hassan, 2011) recorded a negative relationship. Therefore, we hypothesized that:

H0₁Profitability of Nigerian stock exchange lotus Islamic index NSELII is not related significantly to its Capital Structure CS.

2.2.2   Liquidity: Liquidity is the difference between current liabilities and current assets used to meet current obligations (Sarlija & Harc, 2012). Liquidity refers to the comfort with which assets can easily be changed to cash for the purpose of meeting firms' obligations on timely basis Udomsirikul, Jamreornvong & Jiraporn (2011). This study defines liquidity as excess of current assets over current liability that is readily available to settle immediate or current duties. Studies of Shala*et al* (2014); Kinde (2013), found a significant positive relationship. Contrarily, Thomas *et al,* (2014); Akinyomi & Olagunju (2013); Sharif, Naeem and Khan (2011); Udomsirikul, *et al*; Lipson, Mortal; Naveed, Zulfqar & Ishfaq (2010); Lesmond, O, connor & Sanbet (2008); Frieder & Martell (2006) found a significant negative relationship between liquidity and capital structure. Therefore, we hypothesized that:

H0₂ Liquidity of Nigerian stock exchange lotus Islamic index NSELII is not significantly related to its Capital Structure CS.

2.2.3   Firm Size: The size of a firm has been defined from its large production capacity and employees, increase in total sales, total assets, market shares and market capitalization (Dang, Li & Yang, 2018). This study sees firm size from the perspective of market capitalization as the value of a firm's equity at its present price. Onaolapo, *et al,* (2015); Bassey *et al*; Shala *et al* (2014); Tornyeva (2013); Akinlo (2011), documents a positive relationship between firm size and capital structure. However, Thomas, *et al,* (2014), Masnoon & Saeed, Gul, Khan, Razzag and Saif (2012) found a negative relationship between size and capital structure. Therefore, we hypothesized that:

H0₃ Firm size of Nigerian stock exchange lotus Islamic index NSELII is not related significantly to its Capital Structure CS.

2.2.4   Firm Age: Age is considered as the length of time of existence expressed in years. A firm is a legal personality whose existence is established through incorporation (Gitzmann, 2008; Pickering, 2011). We defined firm age as existence from the date of incorporation. Bassey, *et al* (2014); Hassan (2011), found a positive relationship. While, Rahman, *et al,* (2014); Mailafia & Adah (2013); Sayeed (2011), found a significantly negative relationship between age and capital structure. Therefore, we hypothesized that:

H04 Firm Age of Nigerian stock exchange lotus Islamic index NSELII is not significantly related to its Capital Structure CS.

2.3   Theory: This study chose the pecking order theory to underpin the study variables this is because one of the selecting criteria used by lotus capital (LC) in constituting the lotus Islamic index LII was the consideration of their level of debt.

Pecking Order Theory: This theory was modified by Myers and Maijluf (1984), it posits that firms follow a pecking order of incremental financing choices that places retained earnings at the top of the order followed by debt issues, and finally only when the firm reached its debt capacity new equity financing is sought. The reality is that firms prefer internal financing and until they are not sufficient to meet their investment outlay before they go for external finance, issuing the safest security first. They start with debt, then possible hybrid securities such as convertible debentures, then perhaps equity as a last resort (efinancemanager, 2019). To date the theory is used to examine capital structure (Ogieva, and Ogeimudia, (2019); Allini, Rakha and Mcmillan, 2018; Dada and Ukaegbu, 2015). This theory is used to underpin profitability, liquidity, size and age to capital structure because companies on the index followed incremental order of financing choices that priotised retained earnings than debt financing.

3. Methodology

3.1   Design and Population
The study uses a post-positivism paradigm that is based on an *expost facto* design that uses a post event multiple case studies as its research method. The paradigm was chosen because the study uses existing theories and it is a quantitative approach, the design was chosen because the study relied on historical data to examine the study variables and the method was selected because it is a single reality study that directed its question on past events documented in the financial statements of the companies that made the sample of the study. The population of the study is the fifteen companies (Ashaka; Lafarge Wapco; Nigerian Aviation Handling Company NAHCO; Cement Company of Northern Nigeria CCNN; Nestle; Glaxo Smith Kline; Cadbury; Unilever; Dangote Cement; National Salt Company of Nigeria NASCON; Okomu Oil; Patterson Zochonis PZ; Total; Mobil; and Dangote Sugar) that constitute the NSE LII. A census approach to sampling is used to obtain data from their financial statements for the period 2008 to 2017. This is done to capture the entire companies. However, Data were not extracted for Ashaka cement in 2017, because the financial statement available is unaudited; this we believe will not affect the inferential statistics of the study.

3.2   Variable and Model Specification
The table below presents how the variables of the study were measured

Table 1: Measurement

Variable	Acronym	Measurement	*Apriori*
Capital Structure	CS	Book value of Long term debt divided by capital employed	
Profitability	PR	Earnings after tax	+ Relationship

Liquidity	LQ	Total current assets less current liabilities	-Relationship
Firm Size	FS	Total number of shares multiplied by present share price	+ Relationship
Firm Age	FA	From the date of incorporation to 2017	- Relationship

Source: Authors compilation from conceptual framework, 2019

The following mathematical model: $CS_{it} = \beta_0 + \beta_1 PR_{it} + \beta_2 LQ_{it} + \beta_3 FS_{it} + \beta_4 FA_{it} + \mu_{it}$ created to test the null hypotheses formulated in section one is derived from the variables of the research which are influenced by the underpinning theory of the study explained in section two.

4. Analysis and Interpretation of Results

Presentations and Discussions

Table 2: Descriptive Statistics

variable	Obs.	Mean	Std. Dev	Min.	Max.	Skew.	Kurt.
CS	150	0.23	0.15	0.01	0.77	0.53	3.50
PR	150	-2.51	1.43	-6.92	0.19	-0.83	3.80
LQ	150	1.43	1.11	-0.67	3.97	-0.01	2.22
FS	150	2.78	0.03	2.72	2.84	-0.09	2.15
FA	150	1.12	0.14	0.75	1.40	-0.01	2.60

Source: STATA Output listing, 2019

From the table mean of CS is at 0.23 with a standard deviation of 0.15 and a minimum and maximum value of 0.01 and 0.77 respectively. This implies that on the average, LII generated only 23% of their financing needs for operation from debt sources of finance and it ranges from 1% to 77% and the deviation from both sides of the mean is at 0.15. This suggests that the dispersion of the data from the mean is not wide because the standard deviation is less than the mean. The peak of the data is indicated by a kurtosis of 3.50. The coefficient of Skewness of 0.53 implies that the data is positively skewed. Thus, the data meet the symmetrical distribution assumption.PR has a mean value of -2.51 with a standard deviation of 1.43 and a minimum and maximum of -6.92 and 0.19 respectively. This shows that the average profitability of LII is -2.51 and it ranges from -6.92 to 0.19 and the deviation is 1.43. This suggests that the data is not normal as the standard higher than the mean indicating a wide dispersion. The peak of the data is depicted by a kurtosis 3.80. The coefficient of skewness of -0.83 signifies that the data is negatively skewed. The data did not meet the symmetrical distribution assumption.

On the average LQ of LII is 1.43 and within a range of -0.67 and 3.97 while the deviation from the mean is 1.11. This suggests that the dispersion of the data from the mean is not so wide because the standard deviation is less than the mean. The peak of the data is shown by the kurtosis of 2.22. The coefficient of the skewness of -0.01 implies that the data is slightly negatively skewed. This meets the symmetrical distribution assumption. The average FS of LII is 2.78 and ranges from 2.72 to 2.84 while the deviation from the mean is 0.03. This means that the deviation from the mean is within the acceptable range. The coefficient of the skewness of -0.09 implies that the data is negatively skewed. The peak of the data is shown by a kurtosis of 2.15, implies that the data

meet the symmetrical distribution assumption. The descriptive statistics from table 4.1 shows that age has a mean of 1.12 with a standard deviation of 0.14 and the minimum and maximum values of 0.75 and 1.40. This implies that the average age of firms in LII is 11years and ranges from 7 to 14 years. This means that the deviation is within the acceptable range. The coefficient of the skewness is -0.01 implies that the data is slightly negatively skewed. The peak of the data is depicted by a kurtosis of 2.60, implies the data can be said to have meet the symmetrical distribution assumption.

Table 3: Result of Normality test

Variable	W	V	Z	P -values	Observations
CS	0.96	3.53	2.77	0.00	150
PR	0.95	3.58	2.83	0.00	150
LQ	0.98	1.98	1.52	0.05	150
FS	0.97	2.43	1.97	0.02	150
FA	0.94	4.44	3.23	0.00	150

Source: STATA Output Listing, 2019

In Table 3 it can be seen that the data for all the variables are not of a normal distribution, because the P-values are statistically significant at 1% and 5% levels. This implies that the model of the study requires more generalized estimators.

Table 4: Diagnostics Test

Variables	VIF	Tolerance Value
Age	1.12	0.89
Profitability	1.08	0.93
Firm size	1.08	0.92
Liquidity	1.05	0.95
Mean VIF	1.08	
Hettest Chi^2		0.52
Hettest sig		0.47
Hausman Chi ^{2}		58.28
Hausman Sig		0.0000

Source: STATA Output Listing, 2019

From table 4 there is no multicollinearity among the independent variables, as the smallest tolerance value is 0.89, corresponding with the highest variance inflation factor (VIF) of 1.12. This shows that all the VIF and tolerance values were consistently less than 10 and 1.0 respectively. The Breusch Pagan/Cook-Weisberg coefficient of 0.52 with Chi Square of of 0.47 indicates that there is constant variance in the residuals evidencing that the data are homoscedastic. The absence of hetoroscedasticity indicates that the variation of the error term is constant which would not affect the best linear unbiased estimators (BLUE) of the study. This shows that the original OLS regression is not suitable for the study, in this wise, the Hausman specification test for fixed and random effect to select the most appropriate model is relied upon. The test reveals that they are not highly correlated because the Chi-Square probability is significant at 1% level. This directed for the interpretation of findings with the fixed effect model.

Table 5: Regression & Correlation Results

Variables	Coefficient	t-value	P values	Correlation Results

				CS
CS				1.00
Constant	2.33	1.23	0.22	
PR	0.02	2.35	0.02	0.29 (0.00)*
LQ	0.01	0.72	0.47	-0.25 (0.01)*
FS	-0.86	-1.25	0.21	0.19 (0.85)
FA	0.28	1.44	0.15	-0.21 (0.04)*
F. Stats				2.55
F. Sig				0.04
R^2				0.25

Source: Extract STATA Output Listing, 2019

Table 5 presents the regression result. The total variation in CS as explained by PR, LQ, FS, and FA indicates 25%. The F statistics shows a coefficient of 2.55 with a significance level of 4%, this show that 96% probability relationship among the study variables is not due to chance.

The t-value of **PR** of LII is 2.35 with a coefficient of 0.02. This implies that for every 1% increase in profitability of the index, CS will increase by 0.02k. PR significantly relates to CS as revealed by a p value of 0.02. This provides evidence to reject the null hypothesis. The result meets our priori expectations because constituting the index was based on an acceptable level of debt. The implication of this finding is that the index used more of internal financing than debt. This finding supports (Chandrasekran, 2012; Shala, et al, 2014).

LQ of NGXLII has a t-value 0.72 with a coefficient of 0.01. This shows that for every 1% increases in liquidity of the index, CS will be increases by 0.01k. LQ has a negatively significant association with CS. This provides evidence to fail to reject the null hypothesis. This result is expected as the index was constituted based on acceptable liquidity level and liquidity is a measure of short-term financing. This finding is consistent with Frieder & Martell (2006), Lesmond, O, connor and Sanbet (2008), Udomsirikul, et al; Lipson, Mortal; Naveed, Zulfqar & Ishfaq (2010), Sharif, Naeem and Khan (2011), Akinyomi & Olagunju (2013), Thomas et al, 2014).

The t-value of **FS** and **FA** of NGX LII are -1.25 and 1.44 with a coefficient of -0.86 and 0.28. This implies that for every 1% increase in market capitalization and yearly transactions of the index, CS reduces by 0.86k and increases yearly by 0.28. FS and FA have a negatively significant association with CS. This provides evidence to fail to reject the null hypothesis. The result for FS is not expected but that of FA is because age is a measure of experience and companies on the index have different dates of incorporation. This finding supports Thomas, et al, Rahman, et al, (2014), Mailafia & Adah (2013); Masnoon & Saeed, Gul, Khan, Razzag & Saif (2012); Sayeed, (2011).

5. Conclusion

This study's objective of examining the extent to which profitability, liquidity, size and age influences the capital structure of the Nigerian stock exchange lotus Islamic index NGXLII was achieved by testing the hypotheses formulated for the study. Based on the findings, the study concludes that Profitability of LII relates significantly to their capital structure. The implication of

the findings is that firms in the index relied more on internal financing than debt. The study recommends that the management of these companies maintain their prudency and established methods that increase profit.

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CORPORATE ATTRIBUTES AND AUDIT REPORT LAG AMONG LISTED SERVICE SECTOR FIRMS IN NIGERIA

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Abstract

Stakeholders' quest for financial information devoid of unstable arrival time and flagrant contravention of regulatory requirements by the issuers of financial reports have made audit report lag a crucial point of concern for corporate stakeholders. Thus, this study was conducted to examine the effect of corporate attributes on audit-report lag of service industry listed on the Nigeria Exchange Group (NXG) based on agency theory. Ex-post facto research design was employed. Secondary data covering a period of six years were gotten from annual reports of the selected firms. Twenty-one (21) listed corporate entities were purposively drawn from a population

of 25 Service sector companies quoted on the NXG. The results showed statistically significant association between the corporate attributes and audit report lag among Nigerian listed Service firms (F-value= 15.94; P-value = 0.031). Based on robust test, the study established that audit report lag among listed Nigerian service firms is driven principally by firm leverage and size. This denotes that audit report delay could be worsen by any possible rise in corporate size and risk in term of leverage. It is suggested that management of the entities should not compromise timely presentation of financial report in their quest towards attaining profitable financial performance, while advanced reporting technologies should be employed to enhance prompt issuance of audit report.

Keywords: Audit report lag, corporate attributes, firm size, leverage and profitability.
JEL Classification: M41, M42

1. Introduction

One out of many strategies often employed to attract investors is timely publishing of firms' annual financial reports over a defined period. However, acceptance and reliance on these reports largely rest on certification and opinion of independent auditors, on the underlying accounting principles used in preparing such financial information. For corporate 'beings' operating in Nigeria business sphere, increasing exposure to international capital markets, and variance in their corporate attributes have made timely presentation of audited annual financial report highly imperative. Extent of importance attached to timely audit-report is high because the smaller the period amid a firm's financial year-end, and the time audited financial report is made available to members of the public or users after auditors' endorsement, the more valuable it is to various users (Aifuwa, 2020). This is because importance of financial statement's contents is weakened by delay in timeliness of audited annual financial report (Modugu, Eraghe & Ikhatua, 2012).

Global financial downfalls and claims of financial impropriety by firms have resulted in widespread calls for accounting reforms in order to enhance the quality of financial reports. Whereas a key component underpinning worth of financial report is timeliness. However, inability of some companies to make public audited annual financial reports within stipulated time frame has been noted (Bakare, Taofiq & Jimoh, 2018; Hashim, 2017; Singh & Sultana, 2011), of which Nigeria financial reporting clime is not an exception. This occurrence has made Nigerian Exchange Group to fine some companies heavily in 2018 which did not go down well with their shareholders.

Extant studies conducted in Nigeria such as; Ilaboya and Iyafekhe (2014), Azubike and Aggreh (2014), Arowoshegbe, Uniamikogbo and Adeusi (2017), Akingunola, Soyemi and Okunuga (2018), and Eze and Nkak (2020) found audit-report lag mean and maximum days ranging between 79 – 155, and 146 – 427 respectively, thus, confirming infraction of the stock-market regulatory demand. Whereas, according to the Nigerian Investment Promotion Commission, Nigeria services sector accounts for 53 percent of the Nigerian Gross Domestic Product (GDP) in 2018. Since a 'bunch' of related extant empirical studies in Nigeria have not focused attention on the service sector which accounts for 53 percent of its GDP, this study was an attempt to fill this gap to strengthen its sustainable input to the nation's GDP.

Furthermore, at least 109 quoted firms, such as Continental Reinsurance plc, Dangote Flour Mills Plc, Anino International Plc, Mobil Oil Nigeria plc etc, in Nigeria have been delisted between 2002 and 2019. Although, myriad of factors could be responsible, delay in issuing listed firms audited annual financial reports is a great concern in the Nigeria stock market, which also attracts delisting consequence. On the backside, it is apparent that some peculiar firm's features reinforce effectiveness of the management, thereby playing a pivotal role in ensuring the distinctive worth of financial reports. Hashim (2017) is of the position that parties that have strong control over the company would have power to influence time lag to publish annual report. Meaning that since board of directors is among the recognized parties responsible for coordinating daily activities of the companies and most importantly, representing the shareholders interest by rendering stewardship account to them, they will always work assiduously to avoid delay and uncertainty in investment decisions (Dibia & Onwuchekwa, 2013). Also, Habib, *et al.* (2018) explained that audit-report lag differs among corporate entities.

Despite plethora of the extant empirical investigation conducted on audit-report lag, just few have directed attention at the service sector in Nigeria. Whereas the sector is believed would continue to contribute immensely to Gross Domestic Product (GDP) of the country if managed well (Olusoji & Odeleye, 2018; Ishola & Olusoji, 2020) as it recorded a noticeable decline contribution of 43.79 percent to GDP in 2021. Also, International Financial Reporting Standards, (IFRS) implementation in Nigeria, which emphasize more disclosures requirements, implies that variations could exist in timeliness of corporate financial reports of companies listed in Nigerian Exchange Group owing to the nature of their activities which is dependent on firm characteristics. Thus, there is need to conduct empirical inquiry on timely nature of financial reports upon IFRS implementation in Nigeria. Extant investigation has shown that audit report lag is vital in investigating audit information necessities on the stock-trading floor (Al-Ajmi, 2008). Hence, improved financial-report's timeliness would be of great essence to the professionals, especially market participants and users of accounting data.

Consequent upon the above background, the study focused on how some known firm characteristics could help in achieving the desired result regarding aptness of corporate financial reports. Precisely, the study investigated the relationship which subsist between profitability, auditor type, firm's leverage and size, and audit report lag of the Nigerian service sector listed firms. Subsequent sections present review of related studies, methods employed, analysis of data and discussion, and conclusion based on finding, in that order.

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2. Literature Review

2.1 Conceptual review

2.1.1 Audit report lag

Concisely, audit-report lag is the period that is between the close of a corporate financial year, and date of publishing the entity's audit report (Aifuwa, 2020; Modugu & Eboigbe; 2017). It is also described by Dibia and Onwuchekwa (2013) as the period of days between accounting year-end of an economic entity and the reporting date of the audited financial report. Audit-report lag is synonymous to timeliness of financial-reports which has been established as enhancing qualitative characteristic (Ku Ismail & Chandler, 2004). Audit-report lag is well associated with transparency of the firm which also typifies its efficacy in the financial market (Aktas & Kargin, 2011; Abdullah, 2006). According to Leventis, *et al.* (2005), and Owosu-Ansah (2000), reducing audit report time lag reflects a major means of addressing information asymmetry associated with trading on emerging market like the Nigeria Exchange Group, and a measure to improve audit quality.

Since the relevance of a financial report is tied to its timeliness, then it is necessary for firms to publish audited financial report as at when due. Hence, audit report lag has been a concern and point of discussion to accounting standards' setters all over the world. It has been progressively addressed by regulators, corporate entities, and authorities worldwide and, hence the emphasis placed on it by International Accounting Standard Board (IASB).

2.1.2 Corporate Attribute

Corporate attributes simply depict the features or qualities peculiar to a particular corporate entity. It refers to the behavioural patterns of an entity's operation which enables them to realise their objectives throughout the time of their operations (Mohammed, 2005). It can also be described as the copious varieties of information showcased in the financial statement of business entities that serve as the predictors of the firm's quality of accounting figures and performance (Swanson, 2009). It has been established in previous studies that company attributes do impact its choice of firms' internal governance mechanisms, especially as regard performance measures (Karuna, 2009). According to Eze and Nkak (2020), three categories of corporate characteristics exist which are uncontrollable, partially controllable, and controllable. Controllable or uncontrollable, corporate attributes are vulnerable to manipulation by corporate managers. This assertion suggests that perhaps firms' attributes are essential drivers of the quality of financial report as regard timeliness.

Since delay in disclosure of audit opinion could have antithetic effect on shareholders confidence and investment decisions, board of directors, and audit-committee are in place to address such unnecessary delay. Studies have examined how firm characteristics such as audit committee features, and board parameters influence audit-report lag. For instance, Nahla, Haznah and Mazrah (2019) submitted that the audit-committee (financial) expertise reduces audit-report lag. In this

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present study, corporate attributes that have been identified in prior literature are also considered and they are, profitability, auditor type, firm's leverage and size.

2.1.2.1 Company-size, and audit-report lag

Size of a firm is a salient feature of an economic entity. It has to do with the capacity of the firm in the area of production volume, assets owned and controlled. Size of a firms is often connected to the financial reporting lag because the bigger the firm, the more time that may be taken for audit exercise and this may cause delay in publication of audited financial report even though from another way of thought, a bigger firm could afford to hire a big audit firm which can do a thorough job within a reasonable short period of time. Ku Ismail and Chandler (2004) posit that big entities are frequently argued to be early issuers for numerous reasons. These reasons include that; big corporate establishments are frequently known for having more resources; more (accounting) staff; and more (advanced) accounting information systems compare to smaller counterpart firms. All these attributes should benefit companies towards prompt reporting.

Secondly, public attention is more on larger listed entities compare to small size firms. Precisely, there is likelihood that large firms are, and would be followed by numerous analysts. The analysts expect timely information to ascertain or review their expectations. Thus, the big companies are under higher intense to disclose their reports on a timely basis to circumvent speculative trading of their shares. Size is found in most studies as statistically significant determinant of audit-report lag, although with inverse relationship (Echekoba, Ubesie Cyril, Osakwe & Anachedo 2020; Iyoha, 2012; Karim, Ahmed, & Islam, 2006).

Company size can be measured using several methods which has its strength and drawback. Nevertheless, this study chooses to employ natural logarithms of total assets being the most appropriate proxy for company size because it measures the capability of a corporation in the market (Al-Tahat 2015; Ibadin, Izedonmi & Ibadin, 2012). Thus, the study hypothesised in null form as follow.

H01: *Firm size does not have significant relationship with audit-report lag of Nigerian listed service sector firms.*

2.1.2.2 Auditor-type, and audit report lag

The role of an auditor in timely discharge of their contractual audit engagement function and release of corporate financial report cannot be over-emphasised. The larger an audit firm in terms of audit staff, partners, deployed technology, and international affiliations, the higher the probability that the firm would complete an audit assignment faster and more accurately than a smaller audit firm (Kwame, 2018). It is also expected that large audit firms should be more thorough while discharging their audit assignments. It is believed that audit-firms are bound to incur huge take-off time, and costs, to become satisfactorily acquainted with their clients' business operations of which a small audit firm will take longer time for this (Lai & Cheuk, 2005). However, Al-Ajmi's (2008) findings indicate absence of facts to support the consequence of auditor-type

(Big-4 or non-Big-4) on timeliness of audited financial-reports. In view of this, it is then hypothesized in a null form that.

H02: *Auditor type does not have significant relationship with audit-report lag of Nigerian listed service sector firms*

2.1.2.3 Leverage, and audit-report lag

Leverage represents company's financial debts. Ashbaugh-Skaife, *et al.* (2006) put forward that frail corporate-governance can lead to greater debt-financing by a company. It is expected that firm's leverage would have impound an influence on timeliness of financial report (Ku Ismail, & Chandler, 2004). Ku Ismail and Chandler (2004) stressed two opposing views concerning association between leverage and timely disclosure. A view advanced that highly levered firms issue their annual reports more promptly than the lowly levered firms. According to agency-theory, this view posits that more monitoring costs would be incurred by firms that are highly levered because, highly levered firms have the motivation to invest sub-optimally. Debtholders habitually state some clauses in debt-contracts to restrain possible overbearing undertakings of management (Soyinka, *et al.*, 2020). The other view holds that extremely leveraged companies report more slowly than the lowly leveraged companies. Earlier studies noted adverse and statistically significant nexus between leverage of corporate entities and timeliness of annual financial-reports (Al Jabr, 2006; Al-Ajmi, 2008), and interim financial reports (Ku Ismail, & Chandler, 2004). On the flipside, Abdullah (2006), found positive link between timely financial-report and leverage. In this present study, leverage (LEV) is determined as total long-term debts, divided by total assets. It is therefore hypothesised in null form that.

H03: *No significant association exists between leverage, and audit report lag of Nigerian listed service sector firms*

2.1.2.4 Profitability, and audit-report lag

Profitability is a common surrogate for measuring firm's financial performance. It is natural to anticipate that managers of corporate entities would be apt to report good news (profit) more promptly than bad news (loss) because of its consequence on firm's value and other parameters. Thus, profitability is anticipated to influence the time of release of financial information, while firms would be expected to unveil good news to the market promptly (Mahajan, & Chander, 2008). In a bid to avoid future litigations, auditors do take ample moment to audit its clients' firms with bad news (Owusu-Ansah, 2000). This implies that good news (profit) has potential to reduce reporting lag.

H04: *No significant relationship between profitability and audit-report lag of Nigerian listed service sector firms*

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2.2   Theoretical Review

The study is hinged on agency-theory propounded by Jensen, and Meckling (1976). This theory explains how agency-relationship occurs, when one or more principals engage another person(s) as their agent(s) to do a service at their behest. The main underlining postulation of the agency-theory is the belief that human-beings are driven by self-interest. This denotes that a company's manager (agent) may likely have personal goals that compete with the principal's goal of maximizing their wealth. It suggests that in an imperfect market, agents seek to take full advantage of their own goals at the disadvantage of their principals. Therefore, agents have the capacity to operate in their own self-centred against the best interests of the corporate entity as a result of the agents assess to better information about the firm than the principal. The agency-theory suggests the need for managers to lessen information asymmetry by disclosing accounting-information to owners of firms (Wang, & Song, 2002). In a broad sense, stakeholders' theory looks beyond the interest of principal; others who have stakes in the business are captured. Thus, the interest of all stakeholders become paramount. That is, beyond shareholders, interest of other stakeholders like government, creditors, immediate community etc should be put into consideration as managers prepare the entities' annual reports and accounts and ensure its timely issuance for their economic consumption.

IFRS adoption and implementation can be said to have reduced information asymmetry by ensuring that relevant information is being provided by management of the organization in a bid to show how efficient they have used the resources entrusted in their hands. By so doing, the information could be expected to have been disclosed on time to satisfy the needs of the owners and influence their decision. But delay can make (potential) investors lose confidence in such disclosure, and increase the agency-problem (Ilaboya, & Christian, 2014). That is why corporate governance mechanisms were established to abate the conflict in companies and ensure that company's board of directors acts in the interest of the shareholders by ensuring timeliness of the financial reports in view to mitigate the problem (Yunos, 2011; Habbash, 2010).

2.3   Empirical review

Myriad of empirical investigations have been done on nexus between corporate features and audit-report lag in both advanced and developing economies. However, a view out of them that are of paramount relevance are reviewed. Sultana, *et al.* (2015) noted that financial expertise of audit-committee, former audit committee skill, and audit committee independence are found to be linked with shorter audit-report lag among listed entities in Australia. According to Ocak and Özden (2018), gender characteristics and education background of the auditor and Big-4 audit firms showcase positive association with audit-report lag, but years of the firm's existence and financial performance demonstrate antithetic relationship with audit-report lag. Khoufi and Khoufi (2018) also noted that audit opinion, firm type and size, and profitability are related to audit delay, nevertheless appointment of transnational audit firm reduced audit delay. These findings suggest that different corporate innate attributes have diverse form of link with (or effects on) audit-report lag from different reporting climes and sectors.

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In a study conducted by Aliyuh (2020) where corporate attributes and prompt issuance of financial-report of 120 entities listed on Ghana stock-exchange was investigated, the findings showed that statistically significant nexus exist between some companies' attributes such as market listing status, profitability, age, and timeliness of financial-report in Ghana. The strongest statistically significant effect of corporate attributes on audit-report lag was found between profitability, firm growth, and audit-report lag. Also, Agyei-Mensah (2018) investigated selected corporate traits and financial-reporting lag, and the influence on performance of quoted firms in Ghana. Descriptive statistics show that during the three-year study, the mean value of timeliness of financial-report lag was 86 days, with standard deviation, minimum and maximum days of 21, 55, and 173 respectively. Results of regression analysis showed that financial-reporting lag has adverse and statistically significant relationship with firm performance using profitability. This presupposes that profitable companies have propensity to disclose its corporate situation to the public early.

Several related studies have been conducted in Nigeria such as Echekoba, *et al.* (2020), Aifuwa (2020), and Adedeji, *et al.* (2020). In a study conducted by Echekoba, *et al.* (2020), effect of firm attributes on timeliness of financial reports of quoted firms in Nigeria was investigated. The study documented no statistically significant link between type of industry and audit-report lag of the investigated companies. Also, Aifuwa (2020) investigated timeliness of corporate financial-reports, and audit-committee attributes in Nigeria. The result based on OLS showed that independence of audit committee, and female directorship in the audit-committee reduce audit-report lag. Findings revealed absence of significant connexion amid audit-committee diligence and timeliness of financial-reports among the sampled firms.

Eze and Nkak (2020) examined possible influence of corporate-governance features on timeliness of audited annual-reports of quoted entities in Nigeria. The study focused on all quoted companies listed at the NSE, and the findings indicate that board composition, board independent and audit-committee financial expertise have significant and positive influence on timeliness of the annual audit-reports. Similarly, Adedeji, *et al.* (2020) investigated corporate-governance features and timeliness of financial-report in Nigeria. Board size, board independence and audit committee independence were proxied as corporate-governance attributes. The findings revealed positive association between timeliness of Nigerian listed firms' financial reports and explanatory parameters such as board size, and independence, and audit committee independence.

Siyanbola, *et al.* (2020) studied the effect of firms' attributes on audit report lag among Nigerian deposit-money-banks. 10 listed banks were investigated for a period from 2008 to 2017. Findings unveiled that age impound positive, and statistically significant effect on audit-report lag of the banks investigated, while size does not. However, profitability demonstrates negative and in-significant effect on audit-report lag with a submission that age is the contributing factor to delay in issuance of audited reports.

Further, Mohammad (2020) examined the dynamics affecting auditor's efficiency in completing audit functions, proxied by audit-report lag of service companies in Nigeria for a period covering

2007 and 2016. Using data drawn from 16 services companies, the study found out that, longer auditor tenure impounds adverse effect on audit-report lag.

Succinctly, a deduction from the review exercise is that empirical investigation has not captured relationship between corporate attributes and audit-report lag among listed service sector, specifically at the Nigerian stock market, while conflicting submissions are also noted. This study is distinct from that of Mohammad (2020) that focused on auditors' attributes of listed service industry sector in Nigeria and that of Kiptoo, *et al.* (2021) that focused on corporate-governance, and financial-performance of insurance firms in Kenya.

3. Data and Methods

Ex-post facto formed research design basis embraced in the study. The choice of this research method was grounded on data of the past event of listed entities on the Nigeria Exchange Group (NXG) NSE used. This will help to present the event as it occurred in the various firms. The study used secondary data as contained in the published annual financial-reports of the concerned services sector companies for a six-year period between 2013 and 2018. The choice of 2013 and 2018 as base year and terminal year were informed by IFRS adoption in Nigeria with effect from 2012 together with availability of data as at the time of this investigation respectively. Twenty-five (25) listed service companies on the NXG as at 31st December 2019 constituted the population and 21 firms that have been listed on or before December 31, 2012 with all annual reports available and have its shares actively in trade all through the period under examination were purposively selected.

The data were analysed through descriptive and inferential statistics. Panel Corrected Standard Error (PCSE) was conducted due to observed heteroscedasticity problem in the Ordinary least square and Fixed effect models. A robust test was later conducted to address the only identified heteroscedasticity problem, and 'n' which is found greater than '*t*' since PCSE is more appropriate when autocorrelation problem is involved. The univariate models were employed to unveil relationship between the dependent variable, and each of the independent variables in line with specific objective one to four, while multivariate model 5 was drawn for multiple regression analysis.

$$ARL_{it} = \beta_0 + \beta_1 PROF_{it} + \varepsilon_{it} \quad \dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots \quad \text{Equ. (i)}$$
$$ARL_{it} = \beta_0 + \beta_1 AUDSIZ_{it} + \varepsilon_{it} \dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots \quad \text{Equ. (ii)}$$
$$ARL_{it} = \beta_0 + \beta_1 LEV_{it} + \varepsilon_{it} \quad \dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots \quad \text{Equ (iii)}$$
$$ARL_{it} = \beta_0 + \beta_1 nlFS_{it} + \varepsilon_{it} \dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots \quad \text{Equ. (iv)}$$
$$ARL_{it} = \beta_0 + \beta_1 PROF_{it} + \beta_2 AUDSIZ_{it} + \beta_3 LEV_{it} + \beta_4 nlFS_{it} + \varepsilon_{it} \dots\dots\dots\dots \quad \text{Equ. (v)}$$

Where:

ARL = Audit-Report Lag; nlFS = Natural log of firm size; AUDSIZ = Audit Firm-size; LEV = Leverage; PROF = Profitability; *it* is for firm *i* in year *t* and *ε* is the error-term; β_0, β_1, β_2, β_3, β_4 = the coefficients of the variables.

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Table 1: Description and measurement of parameters

S/N	Variable Name	Description	Measurement	Source
1	Audit Report lag	Dependent variable	Number of days that elapse between the company`s year-end (ARL) and the date of auditors' report	Ku Ismail and Chandler (2004)
2	Profitability	Independent variable	Dummy variable coded 1 if the company declare profit, otherwise 0	Iyoha (2012), Al-Ajmi (2015)
3	Auditor type	Independent variable	Coded 1 if the entity is audited by any of the big-4 audit firm in the country zero, if otherwise	Ibrahim, *et al.* (2004)
4	Leverage	Independent variable	Measured by the ratio of total debts to total assets	Iyoha (2012), Saqer and Yousef (2015)
5	Firm size	Independent variable	The natural-log form of firms total assets measured in millions	Iyoha (2012), Owusu-Ansah (2000)

Source: Authors' Compilation (2021)

4. Results and Discussion

4.1 Descriptive Statistics and Correlation Results

The descriptive statistics as presented in Table 2 revealed information on the mean, standard-deviation, maximum, and minimum values for each of the variables.

Table 2: Descriptive Statistics

	ARL	PROF	AUDTYP	LEV	nlFS
Mean	90.328	0.818	0.746	2.828	7.507
Median	83.000	1.000	1.000	1.561	7.454
Maximum	536.00	1.000	1.000	19.462	9.695
Minimum	31.000	0.000	0.000	-45.666	5.927
Std. Dev.	53.168	0.388	0.437	5.753	1.180
Skewness	5.589	-1.644	-1.130	-4.181	0.402
Kurtosis	43.226	3.702	2.278	42.27839	1.740
Jarque-Bera	9078.356	59.317	29.574	8466.770	11.736
Probability	0.000	0.000	0.000	0.000	0.003
Observations.	126	126	126	126	126

Source: Authors' Computation (2021)

The Table 2 showed that Audit-Report Lag (ARL) has average approximately 90 days with standard-deviation of 53 days which indicates low dispersion of the sampled firms' ARL from mean. That is, reporting lag of the listed firms are widely spread or dispersed. The minimum and

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maximum ARL are 31 days and 536 days. The average ARL of 90 days confirmed in this distinct study is marginally above 86 days noted at Ghana stock market by Kwame (2018). It is also significantly far above improved 62 days obtained by Hussey and Woolfe (1998) from the United Kingdom, and roughly 56 days documented by Ku Ismail and Chandler (2004) in Malaysia. But, the mean ARL reported in this present study is significantly far below 163 days reported by Oladipupo and Izedomi (2013) from the same stock market, although the study captured 75 listed firms and for a period between 2000 and 2010. Furthermore, average profitability level of the firms is 0.824 and standard-deviation of 0.382, indicating not very high erraticism across the sampled firms. Regarding auditor type, the mean value is 0.746 with standard-deviation of 0.437.

The firms leverage level stood at 2.828 on average with very high standard-deviation of 5.754. The firms' minimum and maximum leverage stand at -45.67 and 19.46 respectively. The natural-log form of the firm size using total assets shows and average value of 7.507 with standard deviation of 1.179 which indicates very low dispersion from the mean.

Since correlation among the parameters is very essential, the correlation matrix of the indices considered in this study is as presented in Table 3. The correlation matrix as presented in Table 3 showcases the relationships between the variables. The variables generally demonstrate weak but positively or negatively related to one another. According to Gujarati and Porter (2009), coefficient of association between two independent parameters above ±0.8 could be considered very excessive, indicating existence of multicollinearity. Thus, variables employed do not present excessive association with one another.

Table 3: Correlation Matrix

Variables	(1)	(2)	(3)	(4)	(5)
(1) ARL	1.000				
(2) PROF	-0.285	1.000			
(3) AUDTYP	0.045	0.114	1.000		
(4) LEV	0.057	0.040	-0.017	1.000	
(5) nlFS	0.198	-0.085	0.247	0.020	1.000

Source: Authors' Computation (2021)

The Variance inflation factor (VIF) values and tolerance level presented in Table 4 showed absence of multicollinearity among the regressors. That is, high correlation of two or more independent variables cannot be established since the mean VIF is less than 10. From the Table 4, the VIFs are consistently less than 10, signifying complete absence of multicollinearity. This further provides further evidence of no multicollinearity issue about the variables employed.

Table 4: Variance inflation factor results

	VIF	1/VIF
AUDTYP	1.087	.920
nlFS	1.081	.925

PROF	1.030	.971
LEV	1.003	.997
Mean VIF	1.050	.

Source: Authors' Computation (2021)

To test for possible departure of the data from normality, Sharpiro-Wilk W test was performed to determine the data's distribution pattern. The result is as presented in Table 5, and it reveals that the residual is not normally distributed. However, according to Gauss-Markov theorem, normality of data and residual distribution is not necessary for obtaining Best Linear Unbiased Estimate (BLUE) using Ordinary Least Square (OLS) for as long as the sample size is greater than 30 observations.

Table 5: Shapiro-Wilk W test for normal data

Variable	Obs	W	V	Z	Prob>z
Resid	126	0.630	36.808	8.096	0.000

Source: Authors' Computation (2021)

Table 6 presents the result of heteroscedasticity check test. The result showed presence of heteroscedasticity using OLS regression since the p-value is significant at 1 percent. This denotes that variance of the model's error terms differ across observations. Consequently, Panel-Corrected Standard-Error (PCSE) regression was sought and used to correct for the presence of heteroscedasticity.

Table 6: Breusch-Pagan / Cook-Weisberg test for heteroskedasticity

Breusch-Pagan / Cook-Weisberg test for heteroskedasticity

Ho: Constant variance
Variables: fitted values of arl
$\quad$ chi2(1) $\quad = \quad$ 179.94
$\quad$ Prob > chi2 $\quad = \quad$ 0.000

Source: Authors' Computation (2021)

4.2 Profitability, and Audit-report Lag

Specific objective one was advanced to investigate the effect of profitability on timeliness of financial report of listed service sector firms in Nigeria. Audit-report lag, and dummy variable representing 1 if the listed firm has declared profit, zero otherwise were sought and used. As such, univariate regression was performed using Panel Corrected Standard Errors (PCSE). The result is presented in Table 7.

Table 7: Univariate linear regression of profitability and audit-report lag

Arl	Coef.	St.Err.	t- Value	p- value	[95% Conf	Interval]	Sig
Prof	-39.650	12.018	-3.30	0.001	-63.439	-15.862	***

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Constant	123.000	10.909	11.28	0.000	101.407	144.593	***
Mean dependent var		90.328	SD dependent var			53.168	
R-squared		0.081	Number of obs			125.000	
F-test		10.886	Prob > F			0.001	
Akaike crit. (AIC)		1340.493	Bayesian crit. (BIC)			1346.149	

Source: Authors' Computation (2021)   *** *p<0.01, ** p<0.05, * p<0.1*

Table 7 presents univariate regression of the relationship between audit-report lag and the profitability of sampled firms. The result shows that profitability alone accounts for about 8% variability in the audit-report lag among service sector quoted firms investigated. The model is statistically significant at 0.01 (p-value = 0.001; F-test = 10.886) which provides basis for rejecting the possibility that it is ill-suited to explain variability in audit reporting lag, although the explained variability is very small. Hence, the need arises to explain variation caused by the parameter under consideration. It is evident from the result that nexus between explanatory and the explained variables is inverse (coef. = -39.650; p-value = 0.001). This suggests the fact that listed service firms in Nigerian declare profit does not result to extension or increase in audit-report lag. That is, profitability attribute brings about reduction in corporate audit-report lag among Service sector firms in Nigeria. This might have been informed by the established theory that firms with good-news will always be apt to relay the information to the public in a bid to convey the management efficiency consistent with agency theory and to also bring about appreciation in firm-value (Johnson *et al.,* 1992).

This finding confirms the submission of Kwame (2018) that profitability relate negatively with audit-report lag of firms listed at the Ghana stock exchange, but averse to the finding of Ika and Regina (2011) from the Indonesia that profitability do not affect audit-report lag. Thus, this study concluded that there exists statistically significant antithetic relationship between audit-report lag and profitability among service sector firms in Nigeria. Consequently, the null hypothesis of no significant relationship between profitability, and timely issuance of financial reports of listed firms in Nigerian services sector cannot hold.

4.3   Auditor-type and Audit-report Lag

To investigate nexus between auditor-type and audit-report lag, auditor type is coded 1 if the firm is audited by any of the Big-4 audit-firm, and 0 if otherwise. Therefore, univariate regression was performed using PCSE and the result is as presented in Table 8.

Table 8: Univariate linear regression of auditor-type and audit-report lag

Arl	Coef.	St.Err.	t-value	p-value	[95% Conf	Interval]	Sig
Audtyp	5.481	10.930	0.50	0.617	-16.153	27.115	
Constant	86.250	9.427	9.15	0.000	67.589	104.911	***

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Mean dependent var	90.328	SD dependent var	53.168
R-squared	0.002	Number of obs	125.000
F-test	0.252	Prob > F	0.617
Akaike crit. (AIC)	1350.838	Bayesian crit. (BIC)	1356.495

Source: Authors' Computation (2021)   *** $p<0.01$, ** $p<0.05$, * $p<0.1$

Changes in audit-report lag informed by whether the firms are audited by any of the Big-4 audit-firm is too insignificant, standing at far below 1 per cent. But, the model present a statistically insignificant result (p-value = 0.617; F-test = 0.252), which denotes the model is not fit in explaining variability in audit reporting lag. Coincidentally, positive relationship between auditor-type and audit-report lag observed in the present study is statistically insignificant (coef. = 5.481; p-value = 0.617). That is, as to the examined firms in this study, being audited by any of the Big-4 audit firms would extend or lead to an increase in audit reporting lag. In other words, acclaimed higher quality of staff and audit assignment performed, international exposure and better wealth of audit experience, and assets possess by the Big-4 audit firms do not position it to get audit work completed in lesser days. Nevertheless, this finding cannot be established statistically.

The finding is in consonance with Saqer and Yousef (2015), and that of Ika and Regina (2011) together with Modugu, *et al.* (2012) whose study covered twenty (20) listed firms, but for three-year period of investigation from the same stock market. Therefore, it is concluded that there is no statistically significant association between auditor-type and audit-report lag among service sector listed entities in Nigeria. Consequently, the null hypothesis of no significant relationship between auditor-type and timeliness of financial-reports of listed Nigeria service firms cannot be rejected.

4.4   Firm Leverage and Audit-report Lag

Specific objective three seeks to establish the connection between firms' leverage and timeliness of financial reports of services listed corporate entities in Nigeria. Firms' leverage measured using ratio of total debts to total assets was collected and related with firms audit reporting lag. The univariate regression performed using PCSE is as reported in Table 9.

Table 9: Univariate linear regression of firm leverage and audit-report lag

Arl	Coef.	St.Err.	t-value	p-value	[95% Conf	Interval]	Sig
Lev	0.522	0.830	0.63	0.530	-1.121	2.166	
Constant	88.834	5.326	16.68	0.000	78.291	99.376	***

Mean dep var		90.328	SD dependent var		53.168
R-squared		0.003	Number of obs		125.000
F-test		0.396	Prob > F		0.530
Akaike crit. (AIC)		1350.692	Bayesian crit. (BIC)		1356.348

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Source: Authors' Computation (2021)   *** *p<0.01, ** p<0.05, * p<0.1*

The outcome of regression analysis conducted is as presented in Table 9. The result of univariate regression revealed that possible variability in audit reporting lag among the sample under investigation explained by firms' leverage is 3 percent. This very weak variability is statistically insignificant as the model does not fit the data properly well (p-value = 0.530; F-test = 0.396). Nevertheless, positive association exist between the firms' leverage and audit reporting lag but statistically insignificant (coef. = 0.522; p-value = 0.530). The result implies that, although the sampled firms' indebtedness could elongate audit-report lag, no statistical significance evidence obtained to substantiate this finding.

The finding is in tandem with the submission of Saqer and Yousef (2015) that used 193 listed firms from the Amman stock exchange. It is concluded therefore that there is no statistically significant association between firms' leverage and audit-report lag among services listed firms in Nigeria. Accordingly, the null hypothesis of no significant relationship between firms' leverages and timeliness of financial reports of listed firms in the Nigeria services holds.

4.5   Firm-size and audit-report lag

In pursuance of the fourth specific objective, firm size measured by the firm's total assets (using its natural log form) and audit report lag of the sampled firms were used. As such, the univariate regression was performed using PCSE. Table 10 presents the result.

Table 10: Univariate linear regression of firm-size and audit-report lag

Arl	Coef.	St.Err.	t-value	p-value	[95% Conf	Interval]	Sig
Nlfs	8.946	4.001	2.24	0.027	1.025	16.866	**
Constant	23.297	30.347	0.77	0.444	-36.773	83.366	
Mean dependent var		90.328	SD dependent var			53.168	
R-squared		0.039	Number of obs			125.000	
F-test		4.998	Prob > F			0.027	
Akaike crit. (AIC)		1346.115	Bayesian crit. (BIC)			1351.771	

Source: Authors' Computation (2021)   *** *p<0.01, ** p<0.05, * p<0.1*

The result as presented in Table 10 shows that firm size account for about 4% variability in the audit-report lag, while the remaining 96% is explained by variables not captured. The model presents statistically significant fit at 0.01 level (p-value = 0.027; F-test = 4.998) which provides impetus for rejecting the hypothetical guess that it is ill-suited to explain variability in audit reporting lag, even though the explained variability is very small. Hence, the need arises to explain variation caused by this parameter under consideration.

It is obvious from the result that relationship between the two parameters is positive, while the coefficient (β) is not equal to zero (coef. = 8.946; p-value = 0.027). This suggests that size of listed firms in service sector considered in this study has propensity to extend or increase the firms audit

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reporting lag. That is, how large or small a firm is determines delay in its firms' audit-report lag. This might be connected to volume of transactions and business engagements in each firm, technology deploy in processing business transaction, management experience and expertise, auditors' structure of audit exercise among others. Theoretical implication is that agency problem is likely to ensue as the delay may lead to trading on the entities' information by insiders, thereby affecting the firm's value at the stock exchange market. On the flipside, delay in financial reporting lag may relate to intention to meet all the stakeholders' information needs before making it available as public information.

The finding is in the same direction with the submission of Ku, *et al.* (2004) who examined timeliness of financial reports issued by entities listed on the KLSE, Malaysia and Ika and Regina (2011) from Indonesia but averse to the result obtained by Saqer and Yousef (2015) from Amman stock exchange. This investigation therefore concludes that there is statistically significant association between firm-size and audit-report lag among service listed firms in Nigeria. Thus, the null hypothesis that there is no significant relationship between firm-size and timeliness of financial reports of listed firms in the Nigeria services firms cannot be sustained. Hence, statistically significant relationship exist amid firm size, and timeliness of financial reports in Nigeria.

4.6 Multiple regression model results

In overall, all the four determining variables (that is, profitability, auditor type, leverage and firm size) are related to audit-report lag in a multivariate model. The results are as reported in Table 11

Table 11: Ordinary linear regression result

Arl	Coef.	St.Err.	t-value	p-value	[95% Conf	Interval]	Sig
Prof	-38.671	12.104	-3.19	0.002	-62.635	-14.706	***
Audtyp	4.575	10.852	0.42	0.674	-16.913	26.062	
Lev	0.601	0.792	0.76	0.449	-0.967	2.170	
Nlfs	7.390	4.037	1.83	0.070	-0.604	15.384	*
Constant	61.693	31.983	1.93	0.056	-1.630	125.016	*
Mean dependent var		90.328	SD dependent var			53.168	
R-squared		0.117	Number of obs			126.000	
F-test		3.973	Prob > F			0.005	
Akaike crit. (AIC)		1341.546	Bayesian crit. (BIC)			1355.688	

Source: Authors' Computation (2021)   **** p<0.01, ** p<0.05, * p<0.1*

Table 11 presents multiple regression OLS model results. The model is significant at 0.01 showing that auditor-type, leverage and firm-size are positively related to audit-report lags (ARL) of the sampled firms (p-values > 0.05) while only profitability is negatively connected with ARL (p-values < 0.05).

Since this analysis was based on the use of panel data, it became expedient to conduct effect test. The results are as presented in Table 12 and 13

Table 12: Fixed Effect Model Results

Arl	Coef.	St.Err.	t-value	p-value	[95% Conf	Interval]	Sig
Prof	-4.517	13.841	-0.33	0.745	-31.977	22.944	
Audtyp	25.011	22.575	1.11	0.271	-19.778	69.800	
Lev	3.689	0.960	3.84	0.000	1.785	5.593	***
Nlfs	39.454	17.219	2.29	0.024	5.292	73.616	**
Constant	-230.752	128.197	-1.80	0.075	-485.091	23.587	*

Mean dependent var	90.328	SD dependent var		53.168
R-squared	0.177	Number of obs		126.000
F-test	5.375	Prob > F		0.000
Akaike crit. (AIC)	1275.631	Bayesian crit. (BIC)		1289.772

Source: Authors' Computation (2021) *** *p<0.01, ** p<0.05, * p<0.1*

Table 13: Random Effect Model Results

Arl	Coef.	St.Err.	t-Value	p-value	[95% Conf	Interval]	Sig
Prof	-28.190	12.426	-2.27	0.023	-52.544	-3.835	**
Audtyp	10.726	13.885	0.77	0.440	-16.488	37.940	
Lev	1.621	0.810	2.00	0.045	0.033	3.209	**
Nlfs	8.989	5.721	1.57	0.116	-2.225	20.203	
Constant	34.004	44.452	0.77	0.444	-53.121	121.129	

Mean dependent var	90.328	SD dependent var		53.168
Overall r-squared	0.096	Number of obs		126.000
Chi-square	13.722	Prob > chi2		0.008
R-squared within	0.112	R-squared between		0.093

Source: Authors' Computation (2021) *** *p<0.01, ** p<0.05, * p<0.1*

The Hausman test result unveil that the regression model has 0.01 significance level which connotes that random effect model should not be interpreted. Modified Wald test of heteroscedasticity in a panel OLS was conducted. The result also showed a p-value of 1%. Therefore, no equal variation among the error terms. Consequently, the fixed effect model cannot be interpreted. Rather, PCSE regression was employed to correct for heteroscedasticity and was therefore interpreted.

Table 14: Summary of PCSE result.

Arl	Coef.	Std. Err.	Z	P>|Z|	[95% Conf	Interval]
Prof	-38.664	17.107	-2.26	0.024	-72.192	-5.135
Audtyp	4.572	8.592	0.53	0.595	-12.269	21.414

Lev	0.602	2.224	0.27	0.787	-3.758	4.961
Nlfs	7.400	3.405	2.17	0.030	0.725	14.073
Cons	61.614	17.705	3.48	0.001	26.914	96.314
R-squared		0.117	Number of obs			126.00
Wald Chi^2		15.94	Prob > F			0.003
Autocorrelation			No Estimated			0
		autocorrelation	Autocorrelation			

Source: Authors' Computation (2021)

Table 14 shows the result of multiple regression based on PCSE Model in a bid to address heteroscedasticity and probable autocorrelation (p-value = 0.063) problems. The model is found suitable for interpretation since the F-stat. is significant at 0.01 level (F-stat = 0.003). That is, the four independent variables fit the regression line properly well. Hence, the PCSE model results based on PCSE was. The R^2 is 11.7%, suggesting that combined explanatory power of the predictors considered in this present study is very low, while the remaining 88.3% of change in audit-report lags of the sampled firms is explained by other variables not included in the model.

Profitability is inversely related to the ARL (coeff = -38.67065) and statistically significant at 0.05 level. The result shows that, declaration of profit by the sampled listed firms engenders prompt issuance of the firms' audited annual financial-reports. This indicates that, users of published annual financial-reports receive timely audited reports when the firms have profitable annual financial performance (good news), otherwise there is tendency there will be delay in timely arrival of the financial reports for public consumption. Furthermore, auditor type (coeff = 4.574541), leverage (coeff = 0.6014179) and firm-size (coeff. = 7.390125) present positive connect with ARL, but only statistically significant for firm size (p-value = 0.030). The implication of the result is that as the firms are being audited by any of the big-4 audit firms, experience increase in leverage and total assets, audit report lag increases or extends, but decline for any positive financial performance. This submission is well in consonance with the submission of Siyanbola, *et al.* (2020) and Agyei-Mensah (2018), but at variance with that Ocak and Özden (2018).

The economic implication of the results is that three predictors (i.e. auditor type, leverage and total assets) could cause delay in timeliness of annual audited financial reports of the sampled listed service firms in Nigeria, thereby resulting to decline in investor's trust in the veracity and economic viability of the financial reports. This could also worsen conspicuous decline in foreign-direct investment in the sector and the market at large. Overall, it is expected that management of these firms globally would be more keen or apt to involve in more profitable operations which could inform release of good news about the entities without delay, and also be reluctant in releasing `bad news`. That is, good news (profit) about the organization's financial performance should be released in the spirit of agency theory and support for stakeholders' theory. This act is expected to reduce audit-report lag, makes such developing capital market more information efficient, attracts more local and foreign/potential investors, and consequently increase its current contribution to

the national GDP. However, when further robust test was conducted to address only heteroscedasticity problem identified using fixed effect regression, similar association between audit report lag and corporate characteristics were found, only that the relationship is only significant for firm leverage and size.

Table 15: Robust test

Arl	Coef.	t	p>|t|
Prof	-4.421	-0.53	0.602
Audtyp	24.920	1.57	0.132
Lev	3.697	8.54	0.000
Nlfs	39.734	4.41	0.000
-cons	-232.897	-3.46	0.002
$F(4, 20) = 21.43$			
$Prob > F = 0.000$			

Source: Authors' Computation (2021)

5. Conclusion and Recommendations

This present study drew a conclusion based on evidence gotten that profitable firms have tendency to be apt to share its "good-news" with the stakeholders and users of financial reports, thereby resulting to timely publishing of financial report. It was also concluded that wealth of intellectual, technical capabilities, and international exposure and connection of the Big-4 audit firms in Nigeria, firm leverage and size are antithetic to prompt release of the audited financial reports among the Nigerian Services sector listed firms. Economic implication of the results is that auditor-type, leverage and total assets could cause delay in timely issuance of annual audited financial reports of the sampled listed service firms in Nigeria. This could also result to decline in investor's trust in the authenticity and economic viability of the financial reports and aggravate recorded decline in foreign direct investment inflow to the sector, and the market at large. This study is believed to have contributed to the body of knowledge by showcasing that profitability, auditor-type, leverage and firm size of listed service firms in Nigeria determine extent of audit report lag in the industry.

Based on the conclusion, the following recommendations were made.

i. More efforts should be geared towards attaining profitable annual financial performance since the study established possibility of profitability to drive prompt issuance of financial reports in the sector.
ii. There should be policy engagement by the Stock market regulators in which a set of listed firms that present timely (audited) annual reports are rewarded for timely publishing of their financial reports in order to serve as encouragement for others.

It should be appreciated that the study has its inherent limitation as it sought to focus on listed service industry, thereby making it distinct from prior studies. Thus, future investigation is encouraged to broaden the latitude of audit-report lag's explanatory parameters, especially with

the inclusion of other institutional factors. Further confirmation of findings based on studies from other developing and developed climes is also advocated.

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